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COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc in Operations Excellence
Course code	MSOPXPTC, PDOPXPTC, PCOPXPTC, PDOPXPAC
Academic Year	2023/24
Valid entry routes	MSc (Standard Route), PgDip (Standard and Apprenticeship Route),
Additional exit routes	PgDip, PgCert
Mode of delivery	Part-time
Location(s)[1] of Study	Cranfield University, University of Cambridge, remote online delivery
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Manufacturing
Centre	Sustainable Manufacturing Systems Centre
Course Director	Dr Patrick McLaughlin
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Apprenticeship?	Yes
Apprenticeship Standard the course is mapped to	Senior Leadership
Is the Degree apprenticeship integrated or non-integrated?	Non-integrated
Is the Apprenticeship offered as an open and/or closed course?	Open
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Part-time MSc - up to three years
Course Start Month(s)	October

Institutions delivering the course

This course is delivered by School of Aerospace, Transport and Manufacturing, Manufacturing Theme, Sustainable Manufacturing Systems Centre where the research interests include:
24/04/

- Manufacturing Systems Engineering
- Product-Service Systems and Innovation Management
- Simulation and Modelling
- Supply Chain Management

Cranfield University interacts with the following institutions and in the following ways:

The course is overseen by an Industrial Advisory Panel that formally meets twice a year. The names and affiliations of current members of the Industrial Advisory Panel can be found in the course manual.

Students undertake course related project components off campus. In recent years, projects have been undertaken within sponsoring organisations including Rolls-Royce, BAE Systems and Weetabix.

Cranfield University interacts with the Institute of Manufacturing at Cambridge University, as a strategic partner to deliver one course module.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This MSc course is accredited by the Institution of Engineering and Technology (IET) until August 2025 and the Royal Aeronautical Society (RAeS) and The Institution of Mechanical Engineers (IMechE) until August 2026 on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng). Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

2. What are the aims of the course?

Cranfield University offers this course in order to:

- To prepare individuals for a role in a changing world of manufacturing operations, that will lead to an improvement of manufacturing competitiveness within their company.
- To engage individuals in independent and critical evaluation of the use of operations management knowledge and tools to address manufacturing industry problems.
- To equip individuals in transferable skills such as communication, administration, team-working, and personal and professional effectiveness.
- To enhance an individual's career in the manufacturing and related sectors.
- To assess an individual's ability to demonstrate the application of management and technical knowledge and transferable skills to address operations management problems in industry.

This programme is intended for the following range of students:

- Those wishing to work nationally or internationally with organisations that need to address operations management problems.
- Those wishing to work in manufacturing and operations management consultancy.
- Those wishing to work in the public/government sector on industry competitiveness and productivity issues.
- Those wishing to develop leadership competencies that allow business change to be designed and led

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Demonstrate a thorough knowledge and critical awareness of the key concepts of Operations Excellence within the context of a representative organisation (i.e. manufacturing, service, pharmaceutical organisation).

ILO 2. Critically evaluate appropriate methodologies, based on previous observations, practice and experience, to acquire knowledge of products, processes and systems.

ILO 3. Critically evaluate internationally recognised standard procedures and processes, using tools including systems analysis and mapping that are representative of operational systems.

ILO 4. Develop coherent strategies to manage, apply and transfer principles of Operations Excellence to demonstrate and initiate responsibility at a professional level, and optimise operational performance.

ILO 5. Demonstrate knowledge of and capability in a range of management competencies, styles and techniques to enable critical evaluation of personal strengths and weaknesses.

ILO 6. Demonstrate an ability to make informed judgements at a professional level independently or as part of a team.

B. Postgraduate Diploma

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 7. Demonstrate an ability to design, evaluate and disseminate effectively an operational improvement based solution to a practical business problem within a research work program both individually and as part of a team.

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO. 8 Demonstrate the ability to apply sound experimental design principles and appropriate research methods to obtain, analyse and evaluate data through the individual research project.

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Use of case studies and class exercises to help develop knowledge and skills in analysis and critical evaluation.

- Use of the VLE as a source of information on learning and assessment materials plus routes to additional information and sources of help if required.
- Provision of lectures from external speakers to strengthen teaching in selected areas from academia and industry outside the University's area of expertise.
- Access to library resources, both on-campus and online, which are introduced at the beginning of the course by the Manufacturing Information Specialist.
- Focused tutorial sessions to support the development of information assimilation, written communication and critical evaluation skills.
- Course is taught on a face-to-face basis with online delivery where appropriate
- Study tour takes place at operations business premises across the UK
- Use of an operations investigation requiring technical and management output supported by a self-directed activity of reflection and action planning, designed to encourage independent development of transferable skills such as oral presentation, written communication and project management.
- The opportunity to carry out a research project in the student's place of employment to enable practical application of the theory and techniques learned during the taught course and development of research skills.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction (1) Six modules from Modules 2 to 5 and 7 to 10	0 60
ELECTIVE MODULES:	
None	
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction (1) Modules 2-10 Group Project (11)	0 80 40
ELECTIVE MODULES:	
None	
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Induction (1) Modules 2-10 Group Project (11) Thesis Project (12)	0 80 40 80
ELECTIVE MODULES:	
None	
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

The Level 7 Senior Leader apprenticeship standard does not have a mandatory qualification attached to it. The training programme for this apprenticeship is delivered through registration on the PgDip in Operations Excellence, which is aligned with the relevant Knowledge, Skills and Behaviours (KSBs) as detailed in the apprenticeship standard. The Apprenticeship is successfully completed through passing the End Point Assessment (EPA) only. Apprentices who successfully complete the requirements of the PgDip in Operations Excellence as part of their apprenticeship training programme will receive that award from the University following the completion of their End Point Assessment. Following the culmination of the apprenticeship (through successful EPA completion, failure or withdrawal) apprentices who have not met the requirements for a PgDip may be awarded academic credit for any module successfully completed as part of their training programme, which may entitle them to a PgCert award in Operations Excellence.

Pass Criteria
The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
    - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

MSc students are expected to complete the course within 36 calendar months.

It is envisaged that the (40 credit) Group Project component would commence alongside Module 5 and be conducted over a five month calendar period. Conduct of the Group Project would be in the form of an operations investigation requiring technical and management output and would be presented in a form to provide clear business benefit by students to collaborating organisations. Scheduling of the Group Project allows interim reviews for students with academics and peers during the parallel module delivery and a phased assessment process to encourage student progression and appropriate formative assessment whilst remote from the University.

The (80 credit) Thesis Project, typically conducted with support of the student's sponsoring organisation, would be delivered over nine calendar months using regular meetings with an academic

7. Course Level Assessment Strategy[4]

The assessment tasks are focused on assessing the learning from the module whilst building evidence of the application of skills and behaviours in the students' own workplaces. Both formative and summative assessment is utilised in the taught modules.
The assessments are work based to align with the purpose of the course – to create employees who can implement operational excellence in a work environment. Taught module assessments are between 3000 and 5000 words depending on the nature and content of the assignment. The students have around six weeks to complete the assessment after module completion. Where relevant, formative feedback is provided during class discussion of both module related aspects and work-based instances relevant to the module content. Formative assessment is also provided as part of in-module activity that requires individual and group presentation of findings to the class.
The group project is a work based operations issue that requires the students to work in a team to deliver a group based report and presentation. The group project also has an individual component that self-gauges the skill development during the course of the project.
The thesis project is aligned with the module ILOs to evaluate the implementation of project based findings in the students' own workplaces.
Assessments are focused on application of learning, within and following the module. They relate module ILOs and to students' own workplace issues that are used as a basis of analysis, evaluation and synthesis of potential solutions.

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

The following modules outline all parts of the programme leading to an MSc Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1	I-OPX-INWK	Induction	Dr Patrick McLaughlin	10.5	2	0	N	10/10/23	10/10/23	11/10/23	N/A	AO	N/A				N/A	
2	I-OPX-EF	Effective Factories	Mr John Patsavellas	35	0	10	N	06/11/23	06/11/23	10/11/23	50	ICW	100				05/01/24	At the next available opportunity which may not be until the course runs the following year

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
3	I-OPX-BMS	Business and Manufacturing Strategy	Dr Abdelkader Aoufi	16	0	10	N	08/01/24	08/01/24	12/01/24	50	GCW	100				23/02/24	At the next available opportunity which may not be until the course runs the following year
4	I-OPX-TMT	Team Management	Dr Patrick McLaughlin	35	15	10	N	19/02/24	19/02/24	23/02/24	50	ICW	100				05/04/24	At the next available opportunity which may not be until the course runs the following year
5	I-OPX-IM	Innovation Management	Dr Patrick McLaughlin	35	15	10	Y	08/04/24	08/04/24	12/04/24	50	ICW	100				17/05/24	At the next available opportunity which may not be until the course runs the following year
6	I-OPX-ST	Manufacturing in Practice (study tour)	Dr Patrick McLaughlin	35	31.5	0	N	13/05/24	13/05/24	17/05/24	0	AO	N/A				N/A	N/A

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
7	I-OPX-TM	Technology Management (delivered at Cambridge)	Dr Patrick McLaughlin	35	10	10	N	24/06/24	24/06/24	28/06/24	50	ICW	100				23/08/24	At the next available opportunity which may not be until the course runs the following year
8	I-OPX-SCM	Supply Chain Management	Dr Hendrik Reefke	35	10	10	N	02/09/24	02/09/24	06/09/24	50	ICW	100				18/10/24	At the next available opportunity which may not be until the course runs the following year
9	I-OPX-MAI	Operations Assessment and Improvement	Mr John Patsavellas	35	10	10	N	18/11/24	18/11/24	22/11/24	50	ICW	100				10/01/25	At the next available opportunity which may not be until the course runs the following year
10	I-OPX-LCO	Leading Change in Operations	Dr Colin Pilbeam	35	10	10	N	03/02/25	03/02/25	07/02/25	50	ICW	100				20/03/25	At the next available opportunity which may

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
																		not be until the course runs the following year	
11	I-OPX-GP	Group Project	Dr Patrick McLaughlin	40		40	N	15/04/24	15/04/24	23/08/24	50 50 50	GCW GPRES ICW	64 16 20				23/8/24 02/09/24 23/08/24		
12	I-OPX-THES	Thesis Project	Dr Patrick McLaughlin	40		80	N	25/11/24	25/11/24	22/08/25	50 50	THESIS IPRES	90 10				22/08/25 08/09/25		

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
I-OPX-IM	Innovation Management	Operations Excellence	EngD in Sustainable Manufacturing Systems

8. How are the ILOs assessed?

The following assessment types are utilised:

> The course uses a range of assessment types by submitted work: which include oral and written pieces in individual and group contexts plus a research thesis, and an element of assessment by formal presentation.

The course assessment strategy includes a diverse range of assessments that reflect application of learning in an operations environment. Both individual and group assessments are used. Formative assessment will be used as required in the course modules.

This approach has been adopted because:

This approach has been adopted in order to develop and assess the knowledge and skills required in addition to providing both formative and summative assesments of a student's ability to integrate and apply information in a practical setting.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

For Example:

Award ILOs / ***Module No.***	***ILO 1.***	***ILO 2.***	***ILO 3.***	***ILO 4.***	***ILO 5.***	***ILO 6.***	***ILO 7.***	***ILO 8.***	
98	*ICW*				*EX*	*EX*	*ICW*		
99	*ICW1*		*ICW1*	*ICW2*					

A. Postgraduate Certificate

Award ILOs / **Module No.**	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6			
2	ICW	ICW	ICW	ICW					
3	GCW	GCW		GCW		GCW			
4					ICW	ICW			
5		ICW	ICW	ICW	ICW				
7		ICW	ICW	ICW	ICW				

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6			
8	ICW	ICW	ICW	ICW	ICW				
9			ICW	ICW	ICW				
10				ICW	ICW	ICW			

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7		
11	GPRES					GPRES			
11	GCW	GCW	GCW	GCW	GCW	GCW	GCW		
11	ICW	ICW	ICW	ICW	ICW	ICW	ICW		

C. Master of Science

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8	
12	THESIS	THESIS	THESIS	THESIS	THESIS	THESIS	THESIS	THESIS	
12	IPRES					IPRES		IPRES	

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

It is anticipated that completion of this course will enhance career progression by providing a broader appreciation of complex systems of operation. As the students taking this course are already in employment, completion of the course is expected to provide formal recognition of the skills and knowledge acquired during the course and in their field of work. Integration of the theory and practice is a key objective of the course.

In terms of the likely career paths and employability of graduates completing the course, please refer to section 2. Students are sponsored by an employing organisation and are generally seeking a change in

role that brings higher levels of formal responsibility, a broadening of existing skills and capabilities and a greater level of professionalism.

COURSE SPECIFICATION

Cranfield University: Course Specifications
Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision:	June 2024

1. What is the course?

Course information

Course Title	Pre-Masters Course in Engineering
Course code	QPSOEFQC
Academic Year	2023/24
Valid entry routes	Not Applicable
Additional exit routes	Not Applicable
Mode of delivery	Full-time
Location(s)[1] of Study	Cranfield University
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Aerospace
Centre	Centre for Aeronautics
Course Director	Dr Amir Zare Shahneh
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/A
Is the Degree apprenticeship integrated or non-integrated?	N/A
Is the Mastership offered as an open and/or closed course?	N/A
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Ordinary degree or HND (with 3 years' experience) in engineering and physical science disciplines. Previous experience, aptitude and level of academic achievement will be assessed. EU or international students will

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

	need to provide evidence of a satisfactory test result in an English qualification, the minimum requirements are IELTS 6.5 or equivalent.
UK Qualifications Framework Level	QAA FHEQ Level 6/Level 7
Benchmark Statement(s)	Not Applicable
Registration Period(s) available	10 Months
Course Start Month(s)	September

Institutions delivering the course

This course is delivered by School of Aerospace, Transport and Manufacturing, Aerospace Theme, Centre for Aeronautics where the research interests include:

- Design of Environmentally Friendly Aircraft
- Blended Wing Body (BWB) Aircraft
- Unmanned Air Vehicles (UAV's)

Cranfield University remains fully responsible for the quality of the delivery of the course.

2. What are the aims of the course?

Cranfield University offers this course in order to:

- develop the personal and professional skills needed in the Masters courses and later during the development of the student's career;
- introduce the students to the different aspects of aeronautical and mechanical engineering and lead them into their chosen MSc disciplines;
- refresh and enhance student understanding of engineering sciences and mathematics as applied to the appropriate engineering industries;
- enhance students' knowledge of research methods before entering their chosen MSc courses;
- give students experience of working on open ended project problems in preparation for their MSc Courses and subsequently their careers.

This programme is intended for the following range of students:

- Wish to change career direction.
- Have been out of formal education for some time and wish to enhance their knowledge before entering our engineering MSc courses.
- Has a first degree in engineering, physics or mathematics that does not meet the standard entry requirements for a Cranfield MSc.
- Students wishing to enhance their knowledge of research methods before entering our engineering MSc courses.
- Hold a UK Ordinary/Pass degree in engineering & physical science disciplines (or equivalent).

This access course is unique and distinctive because it will develop the student's personal and professional skills needed for a Master's degree and their future career development. In addition, the course will refresh and enhance the student understanding of engineering sciences and mathematics as applied to the appropriate engineering industries.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Pre-Masters Course in Engineering

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Obtain a working knowledge of engineering fundamentals and demonstrate understanding of concepts, theories and principles of engineering subject relevant to the chosen MSc course. These are achieved by successfully completing the modules offered within the course, such as Mechanical Design, Propulsion & Power, Basic Aerodynamics, Aeronautical Engineering, etc.;

ILO 2. Reinforce the necessary facility in mathematics to be applied when solving engineering problems;

ILO 3. Apply appropriate engineering tools to the analysis of problems by gaining confidence in working with modern computer systems and software packages, such as Visual Basic and CATIA;

ILO 4. Gain some experience in the use of appropriate practical engineering equipment and skills such as test machines and workshops;

ILO 5. Manage their time and individual study necessary to undertake a project or other assignment needing creative initiative from the student;

ILO 6. Develop their skills in presenting work and results successfully to a variety of audiences;

ILO 7. Undertake a structured approach to research for individual projects at masters level.

4. How is the course taught?

The course consists of two major groups of elements:

- Lecture Courses; all the lecture courses are mandatory.
- Individual Project; the Individual Project aims to provide students wishing to progress to MSc. courses, with exposure to, and experience of, research projects similar to the Individual Research Projects to be performed during the MSc year.

Students will be supported in their learning and personal development by:

- Extensive computer network and IT facilities.
- Library facilities including journals, papers, and numerous databases.
- A dedicated course Virtual Learning Environment

5. What do students need to achieve in order to proceed to a Masters Course?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 8. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to proceed to a Masters Course:

A. Pre-Masters Course in Engineering

The accumulation of 200 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Modules 1-12 Module 13 (Individual Project)	140 60
ELECTIVE MODULES:	
N/A	
TOTAL:	200

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

6. How is the course structured?

Full-time students register for the course in September and are expected to complete the course by July of the following year.
The majority of the taught components are structured to be delivered during October to April while formal examinations will take place between December and April. The majority of the individual project activities will take place between March and July. The individual project will end by submitting an individual report and presenting the work to a panel of staff members and supervisors.

7. Course Level Assessment Strategy[4]

Formative assessments and summative assessments are chosen to align with the stated intended learning outcomes based on the nature of modules. Summative assessments including assignments, final year theses and oral presentations are supported by means of formative feedback to enhance learning potential. The assessments enrich the communication skills of students in all aspects of writing and speaking. Examination is used as a type of assessment for modules such as Basic Aerodynamics and Mathematics to align with the learning outcomes of the modules which include formative feedback to help students to identify their strengths and weaknesses while helping teachers to recognize where students are struggling.
Appropriate provision is also made on a case-by-case basis for students with a Learning Support Agreement.

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

The following modules outline all parts of the programme leading to **Pre-Masters Course in Engineering.** Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments[9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment and/or Submission exam date[11]	Assessment / Exam Retake date
1	N-PY-MD	Mechanical Design	Dr Jafar Jamshidi	25		10	N	22/01/24	22/01/24	26/01/24	40	ICW	100				22/02/24@16:00	06/2024
2	N-PY-ESA	Engineering Stress Analysis	Dr Amir Zare Shahneh	20		10	N	30/10/23	30/10/23	10/11/23	40	ICW	100				08/12/2023@16:00	04/2024

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] of Independent assessments (%)	Weighting within module of multi-part assessments[9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment and/or Submission exam date[11]	Assessment / Exam Retake date
3	N-PY-AE	Aeronautical Engineering	Jack Stockford	20		10	N	16/10/23	16/10/23	02/11/23	40	EX	100				Exam Week 1	04/2024
4	N-PY-BAEM	Basic Aerodynamics	Dr Amir Zare Shahneh	28		10	N	02/10/23	02/10/23	13/10/23	40	EX	100				Exam Week 1	04/2024
5	N-PY-PP	Propulsion and Power	Prof Pericles Pilidis	20		10	N	12/01/24	12/01/24	15/03/24	40	EX	100				Exam Week 4	06/2024
6	N-PY-M1	Mathematics I	Dr Peter Sherar	40	40	20	N	30/10/23	30/10/23	06/12/23	40	EX	100				Exam Week 2	04/2024
7	N-PY-M2	Mathematics II	Dr Peter Sherar	40	40	20	N	15/01/24	15/01/24	07/03/24	40	EX	100				Exam Week 4	06/2024
8	N-PY-EMF	An Introduction to Engineering Materials and Failure Analysis	Dr David Ayre	30		10	N	19/02/24	01/03/24	01/03/24	40	EX	100				Exam Week 3	06/2024
9	N-PY-T	Thermofluids	Dr Fernando Tejero Embuena	22		10	N	20/11/23	20/11/23	08/12/23	40	EX	100				Exam Week 2	04/2024
10	N-PY-CAD	Computer Aided Design (CATIA)	Dr Jafar Jamshidi	16		10	N	08/01/24	08/01/24	12/01/24	40	ICW	100				12/03/2024 @16.00	06/2024

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] of Independent assessments (%)	Weighting within module of multi-part assessments[9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment and/or Submission exam date[11]	Assessment / Exam Retake date
11	N-PY-CF90	Computing Course	Dr Jafar Jamshidi	30		10	N	23/10/23	23/10/23	27/10/23	40	ICW	100				24/11/23@16:00	04/20244
12	N-PY-RM	Research Methods	Dr Amir Zare Shahneh	24		10	N	15/01/24	15/01/24	15/02/24	40	IPRES	100				15/02/24	06/20244
13	N-PY-IP2	Individual Project	Dr Amir Zare Shahneh	30		60	N	15/01/24	15/01/24	06/07/24	50	THESIS	100				05/07/24 @16:00	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
N/A			

8. How are the ILOs assessed?

The following assessment types are utilised:

The Students are assessed by a combination of 7 written examinations, 4 pieces of assessment by written assignments and presentation. In addition the Individual Project will be examined by a report and oral presentation.

This approach has been adopted to ensure that students develop their personal and professional skills needed for a Master's degree and the use the methodologies, philosophies and tools used in industry to provide them with the experience of working on engineering related projects.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Pre-Masters Course in Engineering

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7
1	ICW	ICW	ICW		ICW		
2	ICW	ICW	ICW		ICW		
3	EX						
4	EX	EX	EX				
5	EX	EX	EX				
6	EX	EX					
7	EX	EX					
8	EX	EX	EX				
9	EX	EX	EX				
10	ICW	ICW	ICW	ICW	ICW		
11	ICW	ICW	ICW	ICW	ICW		
12			IPRES		IPRES	IPRES	
13	THESIS	THESIS	THESIS		THESIS		THESIS

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)
N/A			

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

The course has one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

The course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

The course has an Industry Advisory Panel which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.

2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

The Pre-Masters Course in Engineering covers many aspects of general engineering fields including aerospace, automotive and offshore. On successful completion of this programme the School of Aerospace, Transport and Manufacturing and the School of Water, Energy and Environment offer students entry to their MSc courses in these sectors.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: August 2020/ June 2024

1. What is the course?

Course information

Course Title	MSc in Procurement and Supply Chain Management
Course code	MSPSCFTC, PDPSCFTC, PCPSCFTC
Academic Year	2023/24
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time
Location(s)[1] of Study	Cranfield Campus
School(s)	School of Management
Theme	Leadership and Management
Centre	Centre for Logistics, Procurement and Supply Chain Management
Course Director	Dr Hendrik Reefke
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	No
Is the Degree apprenticeship integrated or non-integrated?	n/a
Is the Mastership offered as an open and/or closed course?	n/a
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Full-time MSc - one year
Course Start Month(s)	September

Institutions delivering the course

This course is delivered by the School of Management/Centre for Logistics, Procurement and Supply chain Management, where the research interests include procurement, logistics, supply chain management and marketing.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is accredited formally by The Chartered Institute of Logistics & Transport until 2022 and The Chartered Institute of Purchasing and Supply annually until August 2022.

2. What are the aims of the course?

Cranfield University offers this course in order to fulfil a market demand for highly capable graduates in the field of Procurement and Supply Chain Management. This is addressed through the aims of the course, which are to provide students with:

- An overall appreciation of procurement and supply chain management and their importance to modern business.
- Appropriate technical knowledge in the key areas of procurement and supply chain management.
- Analytical, managerial and critical thinking skills that will enable them to apply this knowledge within a business environment.
- A critical understanding of the need to manage and plan supply chains within an overall business environment in an integrated and co-ordinated manner.
- Development in their ability to manage in complex and uncertain situations by focusing on soft skills such as communication, team-working and negotiation.
- Development in their ability to analyse, synthesise and critically evaluate information to take more effective management decisions.
- An understanding of the ethical and environmental implications of procurement and supply chain management decisions.

This programme is intended for graduates from a wide range of backgrounds who are interested in developing a career in procurement and supply chain management. This course may also appeal to candidates who want to move into procurement from a different management field.

Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) exit routes are provided for students who do not progress to the full MSc.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Be able to identify appropriate techniques to address specific challenges in supply chain management.
ILO 2. Analyse and solve supply chain problems systematically.
ILO 3. Make reasoned judgements in the absence of complete data.
ILO 4. Critically evaluate the application of current supply chain management research and evaluate its relevance to organisational practice.
ILO 5. Communicate their conclusions clearly to specialist and non-specialist audiences.

B. Postgraduate Diploma

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 6. Possess a systematic understanding of supply chain knowledge, and a critical awareness of current supply chain problems and new thinking at the forefront of their discipline.
ILO 7. Be able to be original in the application of knowledge, together with a practical understanding of the analytical and managerial skills that will enable them to apply this knowledge within an overall business environment in a logical and coherent manner.
ILO 8. Be able to analyse and solve complex procurement and supply chain problems systematically and creatively.
ILO 9. Demonstrate self-direction and originality in solving supply chain problems and to act professionally in planning and implementing tasks and projects.
ILO 10. Demonstrate additional transferrable skills, including; effective communication, consultancy, project management, negotiation, cultural awareness and leadership.

C MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 11. Independently and confidently be able to apply procurement and supply management theories, tools and techniques to a variety of situations.
ILO 12. Demonstrate the ability to adapt appropriate procurement and supply management frameworks and contextualise for a specific organisational issue accurately.
ILO 13. Display practical ability in self-directed research, data gathering, data analysis and interpretation, report writing and presentation skills.
ILO 14. Judge appropriate research methodologies for conducting research, and draw justifiable inferences from the data and analysis generated.
ILO 15. Critically evaluate and synthesis the published literature.
ILO 16. Undertake independent study on a relevant procurement and supply management subject, demonstrating the ability to plan, manage and execute an industrial (private or public sectors) or research-based project with specified time scales.
ILO 17. Produce a high-quality thesis and critically evaluate the interpretations of the data.

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Lectures
- Student centred learning/reflection
- Case studies
- Workshops
- Video and audio materials
- Simulation
- Tutorials
- Problem based learning projects
- The supply chain game played over an extended period is designed to develop team working skills and also as activity which acts to integrate skills and knowledge learned elsewhere on the course.

- Individual research project with academic supervisors

In addition to these methods the programme offers:

- Orientation week
- An international study tour which takes place in Term 3
- A programme of visits and lectures by external speakers
- Learning teams supported by an academic tutor
- Extensive use is made of Virtual Learning Environment (VLE) as a means of delivering material to support and augment classroom learning
- Library induction, referencing and plagiarism sessions
- Personal development plan specifically supported through SOM careers development sessions

The aim is to provide a varied, stimulating and experiential learning environment. All taught modules consist of formal lecturers, in-class case discussions, group and self-study. Group project work, reflective practice and class exercises are used to develop problem solving skills. The students are exposed to leading procurement and supply chain concepts through the use of expert external speakers and the output of faculty research.

Two of the key elements of the teaching and learning strategy of the course are centred on the individual thesis where the focus is on problem analysis and solution development of a sponsoring organisations supply chain problem. Tutorial support is given to aid the students to develop their own skills and to apply what has been taught on the course.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 7. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
Module 1 plus any 50 credits from modules 2 to 10	60
ELECTIVE MODULES:	
N/A	N/A
TOTAL:	**60**

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
Modules 1 to 10	100
ELECTIVE MODULES:	

4 modules from modules 11 to 25	20
TOTAL:	**120**

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Modules 1 to 10 Module 26 Thesis Module 27	100 0 80
ELECTIVE MODULES:	
4 modules from modules 11 to 25	20
TOTAL:	**200**

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee);[3] [4]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);

[3] For students who were registered before 1 August 2015, the requirement to obtain a minimum mark for a taught assessment will not apply for taught assessment taken before 31 August 2015 (unless the assessment was designated as a "key assessment" under the previous Assessment Rules).

[4] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

- it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in September and are expected to complete the course in September the following year.

The course is structured around four eleven week terms. In the first from September to December the students are given a thorough grounding in procurement and supply chain management through a series of six compulsory core elements, including the participation in a supply chain game, which integrates students' learning from the course and develops their team working skills.

In the second term from January to March, students study the remaining four compulsory 10 credit modules, two procurement 5 credit modules and two 5 credit options. The electives allow the students to start to specialise and to tailor their learning to their own interests within procurement and supply chain management.

The third and fourth terms are effectively merged and during this period the students undertake an individual thesis project. It is expected that the majority of students will undertake this thesis project within an organisation, which can be in the profit or not for profit sector. Alternatively, students can undertake a Cranfield led research-based thesis project

7. Course Level Assessment Strategy[5]

The aim is to provide a varied, stimulating and experiential learning environment. All taught modules consist of formal lecturers, in-class case discussions, group and self-study. Group project work, reflective practice and class exercises are used to develop problem solving skills.

The course further aims to offer personal and specialist skills development for candidates with extensive industrial experience.

The assessment strategy of this course is challenging and diverse and enable students to demonstrate a full range of skills and attributes.

Summative assessment will include a range of assessment types including the preparation of individual and group reports and written exams.

This approach has been adopted in order to ensure that students demonstrate their understanding through a wide range of learning techniques, but are not disadvantaged through any one approach.

Written coursework will be of varying lengths, recognising that writing coursework to a short length can be more challenging for some and can develop different skills relevant to professional practice. The length of each assessment task is usually stated within the module descriptor. Students then have opportunities to develop their communication and group working skills, as they are required to give group presentations. Feedback for all assessments is given in a timely fashion, dependent on the type of assessment, but always within 20 working days.

[5] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Many modules *SCSS, PSP, IOM, ATS, FRT, ACF, PMI, SSE and NCM* are supported by a number of formative tasks including group discussion, case studies, oral presentations. Formative feedback will be provided through in-class discussion on the conceptual material introduced during each session

Formative feedback

The taught components precede the research project, so assessment can be used to develop skills required for the individual research project. Students are generally expected to be more self-directed in their learning during this research project and guidance will be provided through the *Evidence-Based Management* module and meetings with their thesis supervisor.

Course modules

The following modules outline all parts of the programme leading to MSc. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[6]	Total hours delivered by Visiting Lecturers[7]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[8] - 40% or 50%	Type of Assessment	Weighting within module[9] (%) of Independent assessments	Weighting within module of multi-part assessments[10]	Type of Assessment	Weighting of individual elements of multi-part assessment[11]	Assessment Submission and/or exam date[12]	Assessment / Exam Retake date
0	M-T-IND	SOM MSc Induction Week	Hendrik Reefke			0	Y		25/09/2023	29/09/2023		AO						
1	M-L/PSP	Principles of Strategic Procurement	Dr Farooq Habib	20		10	Y	23/10/23	23/10/23	08/12/23	40	ICW	100				19/01/2024	
2	M-L/SCSS	Supply Chain Strategy and Sustainability	Dr Heather Skipworth	20		10	Y	03/10/23	03/10/23	09/11/23	40	ICW	100				20/11/2023	

[6] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[7] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[8] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[9] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[10] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.
[11] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[12] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[6]	Total hours delivered by Visiting Lecturers [7]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[8] - 40% or 50%	Type of Assessment	Weighting within module[9] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[11]	Assessment Submission and/or exam date[12]	Assessment / Exam Retake date
3	M-L/AFSC	Accounting and Finance for Supply Chain Management	Lorenzo Prataviera	20		10	Y	30/10/23	30/10/23	04/12/23	40	ICW	100				TBC	
4	M-L/ATS	Analytical Techniques for Supply Chain Management	Prof Emel Aktas	20		10	Y	02/10/23	02/10/23	20/11/23	40	ICW	100				15/12/2023	
5	M-L/FRT	Freight Transport	Prof Melvyn Peters	20		10	Y	01/11/23	01/11/23	01/12/23	40	ICW	100				08/01/2024	
6	M-L/IOM	Inventory and Operations Management	Banu Ekren	20		10	Y	02/10/23	02/10/23	10/11/23	40	GCW	100				08/12/2023	
7	M-L/ISB	Information Systems and e-Business	Dr Abhijeet Ghadge	20		10	Y	03/10/23	03/10/23	30/10/23	40	GCW	100				27/11/2023	
8	M-L/PMI	Project Management Introduction	Chantal Cantarelli	20		10	Y	Occ-A 08/02/24	08/02/24	21/02/24	40	GCW	100				06/03/2024	
9	M-P/SSE	Supplier Selection and Evaluation	Soroosh Saghiri	20		10	N	15/01/24	15/01/24	26/01/24	40	ICW	100				01/03/2024	
10	M-P/NCM	Negotiation and Contract Management	Dr Farooq Habib	20		10	N	08/01/24	08/01/24	22/01/24	40 40	GPRAC ICW	30 70				19/02/2024 19/02/2024	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[6]	Total hours delivered by Visiting Lecturers [7]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[8] - 40% or 50%	Type of Assessment	Weighting within module[9] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[11]	Assessment Submission and/or exam date[12]	Assessment / Exam Retake date
11	M-P/BPO	Business Process Outsourcing	Soroosh Saghiri	12		5	Y	09/01/24	09/01/24	12/01/24	40	GCW	100				09/02/2024	
12	M-P/RSC	Designing and Managing Resilient Supply Chains	Dr Uta Jüttner	12		5	Y	30/01/24	30/01/24	02/02/24	40	GCW	100				06/03/2024	
13	M-L/OUT	Logistics Outsourcing	Prof Melvyn Peters	12		5	Y	08/01/24	08/01/24	10/01/24	40	ICW	100				07/02/2024	
14	M-L/PRR	Planning and Resourcing Road Freight Transport	Prof Melvyn Peters	12		5	Y	26/02/24	26/02/24	20/03/24	40	GCW	100				20/03/2024	
15	M-L/HLR	Humanitarian Logistics	Ismail Abushaikha	12		5	Y	22/02/24	22/02/24	23/02/24	40	ICW	100				22/03/2024	
16	M-L/SIM	Simulation	Dr Nicky Yates	12		5	Y	18/03/24	18/03/24	20/03/24	40	ICW	100				26/04/2024	
17	M-L/SXS	Six Sigma	Banu Ekren	12		5	Y	11/03/24	11/03/24	12/03/24	40	GCW	100				09/04/2024	
18	M-L/PFM	Performance Measurement in the Supply Chain	Rick Forster	12		5	Y	06/03/24	06/03/24	08/03/24	40	GCW	100				19/04/2024	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[6]	Total hours delivered by Visiting Lecturers [7]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[8] - 40% or 50%	Type of Assessment	Weighting within module[9] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[11]	Assessment Submission and/or exam date[12]	Assessment / Exam Retake date
19	M-L/SOP	Sales and Operations Planning	Dr Heather Skipworth	12		5	Y	21/03/24	21/03/24	22/03/24	40	ICW	100				03/05/2024	
20	M-L/RLO	Retail Logistics	Prof Michael Bourlakis	12		5	Y	29/02/24	29/02/24	01/03/24	40	GCW	100				12/04/2024	
21	M-L/BMG	Business Model Generation	TBC	12		5	Y	Not running AY 23-24	N/A	N/A	40	GCW	100				N/A	
22	M-P/FDP	Future of Digital Procurement	Dr Farooq Habib	12		5	Y	04/03/24	04/03/24	05/03/24	40	GCW	100				02/04/2024	
23	M-L/BDA	Big Data Analytics for Supply Chain Management	Dr Abhijeet Ghadge	12		5	Y	27/02/24	27/02/24	13/03/24	40	ICW	100				10/04/2024	
24	M-L/CSC	Circular Supply Chains	Hendrik Reefke	12		5	Y	05/02/24	05/02/24	12/02/24	40	GCW	100				11/03/2024	
25	M-L/SNCC	Social Network Analysis in a Supply Chain Context	Emel Aktas	12		5	Y	04/03/24	04/03/24	15/03/24	40	ICW	100				26/04/2024	
26	M-L/RSM	Research Methods	Hendrik Reefke	12		0	Y	08/04/24	08/04/24	11/04/24	N/A	AO	N/A				N/A	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[6]	Total hours delivered by Visiting Lecturers [7]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[8] - 40% or 50%	Type of Assessment	Weighting within module[9] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[11]	Assessment Submission and/or exam date[12]	Assessment / Exam Retake date
27	M-L/THS	Thesis	Hendrik Reefke	0		80	Y	08/04/24	08/04/24	06/09/24	50	THESIS	100				06/09/2024	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
M-L/SCSS	Supply Chain Strategy and Sustainability	Logistics and Supply Chain Management	Procurement and Supply Chain Management; Exec LSCM
M-L/PSP	Principles of Strategic Procurement	Logistics and Supply Chain Management	Procurement and Supply Chain Management; Exec LSCM
M-L/AFSC	Accounting and Finance for Supply Chain Management	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/ATS	Analytical Techniques for Supply Chain Management	Logistics and Supply Chain Management	Procurement and Supply Chain Management; Exec LSCM
M-L/FRT	Freight Transport	Logistics and Supply Chain Management	Procurement and Supply Chain Management; Exec LSCM
M-L/IOM	Inventory and Operations Management	Logistics and Supply Chain Management	Procurement and Supply Chain Management; Exec LSCM
M-L/ISB	Information Systems and e-Business	Logistics and Supply Chain Management	Procurement and Supply Chain Management; Exec LSCM
M-L/PMI	Project Management Introduction	Logistics and Supply Chain Management	Procurement and Supply Chain Management; Exec LSCM, Design Strategy and Leadership, Digital Design and Strategic Communication, Innovation and Creativity in Industry
M-P/BPO	Business Process Outsourcing	Procurement and Supply Chain Management	Logistics and Supply Chain Management
M-P/RSC	Designing and Managing Resilient Supply Chains	Procurement and Supply Chain Management	Logistics and Supply Chain Management
M-L/OUT	Logistics Outsourcing	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/PRR	Planning and Resourcing Road Freight Transport	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/HLR	Humanitarian Logistics	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/SIM	Simulation	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/SXS	Six Sigma	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/PFM	Performance Measurement in the Supply Chain	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/SOP	Sales and Operations Planning	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/RLO	Retail Logistics	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/SNCC	Social Network Analysis in a Supply Chain Context	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/BMG	Business Model Generation	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-P/FDP	Future of Digital Procurement	Procurement and Supply Chain Management	Logistics and Supply Chain Management

M-L/BDA	Big Data Analytics for Supply Chain Management	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/CSC	Circular Supply Chains	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/RSM	Research Methods	Logistics and Supply Chain Management	Procurement and Supply Chain Management
M-L/THS	Thesis	Logistics and Supply Chain Management	Procurement and Supply Chain Management

8. How are the ILOs assessed?

The following assessment types are utilised:

- Technical reports, case analysis, simulations, use of computer packages to analyse problems, and examinations.
- The individual thesis is focused on real world problems and is also used in assessing the course.

This approach has been adopted because:

A wide range of assessments are used on the course in order to determine whether or not course, module and lesson learning objectives are achieved. These assessments are used to monitor student progress and to inform the teaching learning strategies of the course and individuals teaching on the course.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9	ILO10	ILO11	ILO12	ILO13	ILO14	ILO15	ILO16	ILO17
	PG Certificate in Supply Chain Management						PG Diploma in Procurement and Supply Chain Management				MSc in Procurement and Supply Chain Management						
1	✓	✓		✓	✓	✓				✓		✓					
2		✓	✓	✓	✓	✓			✓	✓		✓					
3				✓				✓									
4	✓	✓	✓	✓		✓	✓	✓				✓					
5		✓		✓	✓	✓											
6	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓					
7	✓			✓						✓							
8	✓		✓		✓				✓	✓							
9	✓	✓	✓		✓	✓	✓	✓	✓								
10	✓	✓	✓		✓	✓			✓	✓							
11			✓		✓	✓				✓	✓	✓					
12	✓	✓	✓		✓	✓	✓	✓		✓	✓						
13	✓	✓				✓					✓	✓					
14	✓	✓				✓	✓				✓	✓					
15	✓				✓	✓				✓	✓						
16	✓	✓				✓	✓				✓	✓					
17	✓	✓	✓		✓	✓				✓	✓	✓					
18					✓	✓				✓	✓		✓				

19	✓	✓	✓		✓	✓				✓	✓						
20	✓	✓					✓	✓		✓	✓						
21	✓	✓	✓			✓	✓	✓		✓	✓						
22		✓				✓	✓	✓		✓							
23			✓		✓				✓			✓	✓			✓	
24				✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25				✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	**Modules Covered**	**Assessment**	
		Type	Weight (%)
N/A	N/A	N/A	N/A
		N/A	N/A

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

As supply chains become longer and more complex, the job market increasingly demands graduates with procurement skills and expertise. Hays' (2014) survey indicates that the most important recruitment requirement for many organisations is to attract in new procurement talent. In manufacturing sectors, professionals with analytical, planning and leadership skills who can manage complex procurement and supply processes are increasingly sought after. The situation in the public sector is also promising, as the role procurement plays in containing costs has resulted in increased public scrutiny and government interest. Thus, there is a strong demand for a range of procurement professionals across the private and public sectors.

In the UK, the job market is confronting a shortage of procurement professionals. Hays' (2014) survey underlines the existing concerns about finding experienced, qualified, skilful candidates for available vacancies. The survey shows that more than one third of companies cannot find well-qualified procurement professionals, and skills shortage is a problem for nearly half of the companies. This trend is not only limited to the UK; research in Europe, the USA and the Asia Pacific region also indicate a shortage of talent in procurement and supply. This situation presents candidates with a fertile ground to find job opportunities after completing the course.

Reference: Hays (2014), Driving strategic value creating a higher profile. HAYS Recruiting Experts in Procurement, hays.co.uk.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	Renewable Energy
Course code	MSRNEFTC, MSRNEPTC, PDRNEFTC, PDRNEPTC, PCRNEFTC, PCRNEPTC
Academic Year	2023/24
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	MSc, PgDip, PgCert
Mode of delivery	Full-time, Part-time
Location(s)[1] of Study	Cranfield
School(s)	School of Water, Energy and Environment
Theme	Energy & Power
Centre	Centre for Renewable and Low Carbon Energy
Course Director	Dr Peter King and Dr Heather Almond
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	NA
Is the Degree apprenticeship integrated or non-integrated?	NA
Is the Mastership offered as an open and/or closed course?	NA

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Full-time MSc, PgDip and PgCert – one year; Part-time MSc, PgDip and PgCert – up to three years
Course Start Month(s)	October

F

Institutions delivering the course

This course is delivered by the Centre for Renewable and Low Carbon Energy where the research interests include:

Solar Energy systems and applications
Concentrated Solar Power technology
Photovoltaic systems
Design of solar plants
Materials durability of solar field components
Thermal energy storage
Geothermal process
Hydro-electricity generation

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This MSc course is accredited by the the Institute of Mechanical Engineers (IMechE) until August 2026 and the Energy Institute (EI) until August 2025 on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng). Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

2. What are the aims of the course?

Cranfield University offers this course in order to:

- Prepare applied science and engineering graduates to meet the increasing demands of the renewable energy industry, consultancies and public sectors.
- Provide applied science graduates with the knowledge of technical principles, economic consequences and risks of renewable energy production technologies.
- Provide engineering graduates with the advanced interdisciplinary skills required to design, optimise and evaluate the technical and economic viability of renewable energy schemes.
- Provide graduates with the knowledge needed to manage technology in the renewable energy industry and create businesses in renewable energy.

Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) exit routes are provided for students who wish to access only parts of the course provided.

This programme is intended for the following range of students:

Engineering, mathematics and applied science graduates keen to specialise in renewable energy technologies.
- Graduates currently in employment and keen to extend their qualifications or pursue a career change.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Critically evaluate the engineering principles that underpin the production, distribution and use of renewable energy resources; and the specific technologies available to generate energy and power.

ILO 2. Systematically assess the challenges involved in the design and/or operation of whole energy conversion systems, including power generation, storage and demand; and taking economics, regulation and policy into consideration,

ILO 3. **Engineering Route specific**: Apply a range of software to the modelling, design and optimisation of renewable energy conversion systems

ILO 4. **Management Route specific**: Analyse relevant energy engineering problems using risk management techniques and design appropriate solutions taking account of social, environmental, economic, technical, regulatory and commercial constraints

B. Postgraduate Diploma

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 5. Integrate knowledge, understanding and skills from the taught modules in a real-life situation to address problems faced by industrial clients; creating new problem diagnoses, designs, or system insights; and communicating findings in a professional manner in written, oral and visual forms.

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 6. Define a research question, develop aim(s) and objectives, select and execute methodology, analyse data, evaluate findings critically and draw justifiable conclusions, demonstrating self-direction and originality of thought

ILO 7. To communicate their individual research via a thesis and in an oral presentation in a style suitable for academic and professional audiences.

4. How is the course taught?

Students will be supported in their learning and personal development by:

A dedicated VLE site; practical workshops in MATLAB and commercial CFD/FEA packages; and experimental testing using laboratories.

The taught programme is generally delivered from October to February and is divided into 4 core and 4 applied modules. Each module is allocated two weeks on the timetable and will be delivered using face to face interactions. The modules will be assessed by assignments.
The group project is delivered between March and early May. Each group will typically include 4-6 students and at least one academic supervisor will be assigned to each group. A formal project review meeting will be held on a weekly basis. All students taking the group project (i.e. both full-time and part-time) are required to participate in at least 80% of the weekly project review meetings. Additionally, it is expected

that students will be responsible to ensure that these meetings are used to good effect, and that appropriate minutes are taken and findings reported to the supervisory academic team. Students are allowed to use tele-conferencing, video-conferencing and web-conferencing facilities to participate in the group project review meetings when they are not able to attend the physical meetings. However, all students will be required to attend in person the initial and final project review meetings.

Part-time students have the option of completing a dissertation as an alternative to the Group Project. Students opting for the part-time dissertation will be assigned by the Course Director to a supervisor and will agree with the supervisor an appropriate topic of study. This may be related to a workplace/industrial activity that is relevant to the student's work environment. The dissertation will include a comprehensive review of classical and contemporary related material and also a discussion and properly argued conclusions. Where appropriate the dissertation will acknowledge the work and contribution of others. The dissertation module will be assessed in a similar way to the group project by presentation and formal report.

The individual research project is typically delivered between May and early September. Each student is allocated an academic supervisor who will guide and assess the students work. Again, it is expected that a formal weekly review meeting will occur at which the students will provide a brief presentation on the work performed between meetings and record minutes and arising actions to be performed.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 8. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits[3] through the assessment of taught modules as detailed below:

Description	**Credits**
Engineering Route -**COMPULSORY MODULES:**	
Induction Renewable Energy Technologies 1	0 10
Engineering Route – **ELECTIVE MODULES:**	
SELECT 5 MODULES FROM: Renewable Energy Technologies 2 Engineering Stress Analysis: Theory & Simulations Fluid Mechanics and Loading Energy Entrepreneurship Solar Energy Engineering Design of Offshore Energy Structures As part of the 5 modules, students may select only one of the following: Energy Systems Case Studies or Short Research Project	 10 10 10 10 10 10 10 10

[3] Senate Regulations require a minimum of 60 learning credits to be accumulated for the Award of PgCert. The number of learning credits for individual courses is set during course validation.

TOTAL:	60

Description	**Credits**
Management Route – **COMPULSORY MODULES:**	
Induction Renewable Energy Technologies 1	0 10
Management Route - **ELECTIVE MODULES:**	
SELECT 5 MODULES FROM: Renewable Energy Technologies 2 Health, Safety and Environment Risk Energy Economics and Policy Energy Entrepreneurship Sustainability and Environmental Assessment Engineering Project Management As part of the 5 modules, students may select only one of the following: Energy Systems Case Studies or Short Research Project	 10 10 10 10 10 10 10 10
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits[4] through the assessment of taught modules as detailed below:

Description	**Credits**
Engineering route - **COMPULSORY MODULES:**	
Induction Renewable Energy Technologies 1 Renewable Energy Technologies 2 Solar Energy Engineering Engineering Stress Analysis: Theory & Simulations Energy Entrepreneurship Fluid Mechanics and Loading Design of Offshore Energy Structures Group Project (Full time students)	0 10 10 10 10 10 10 10 40
Engineering route - **ELECTIVE MODULES:**	
Choose one of the following: Energy Systems Case Studies	 10

[4] Senate Regulations require a minimum of 120 learning credits to be accumulated for the Award of PgDip. The number of learning credits is set during course validation.

Short Research Project Part time students only select one from the following: Dissertation Group project	10 40 40
TOTAL:	120

Description	**Credits**
Management Route - **COMPULSORY MODULES:**	
Induction Renewable Energy Technologies 1 Renewable Energy Technologies 2 Sustainability and Environmental Assessment Energy Entrepreneurship Health, Safety and Environment Risk Engineering Project management Energy Economics and Policy Group Project (Full time students)	0 10 10 10 10 10 10 10 40
Management Route - **ELECTIVE MODULES:**	
Choose one of the following: Energy Systems Case Studies Short Research Project Part time students only select one from the following: Dissertation Group project	 10 10 40 40
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
Engineering Route - **COMPULSORY MODULES:**	
Induction I-ENE-INWK Renewable Energy Technologies 1 N-BPE-PRET Renewable Energy Technologies 2 N-RNE-PGERE Engineering Stress Analysis: Theory & Simulations N-AME-ESA Solar Energy Engineering N-RNE-SEE Energy Entrepreneurship N-RNE-EE Fluid Mechanics and Loading N-AME-FML Design of Offshore Energy Structures N-RNE-RES Group Project I-ENE-GRPP Thesis I-SWEE-THES	0 10 10 10 10 10 10 10 40 80
Engineering Route - ELECTIVE MODULES:	
Choose one of the following: Energy Systems Case Studies N-OFF-ESCS Short Research Project N-OFF-SRP Part time students only select one from the following: Dissertation I-SWEE-DISS Group project I-ENE-GRPP	 10 10 40 40
TOTAL:	200

Description	Credits
Management route - **COMPULSORY MODULES:**	
Induction I-ENE-INWK Renewable Energy Technologies 1 N-BPE-PRET Renewable Energy Technologies 2 N-RNE-PGERE Engineering Project Management N-AME-EPM Energy Entrepreneurship N-RNE-EE Energy Economics and Policy N-RNE-EEP Health, Safety and Environment Risk N-OFF-HSER Sustainability and Environmental Assessment N-ACE-SEA Group Project I-ENE-GRPP Thesis I-SWEE-THES	0 10 10 10 10 10 10 10 40 80
Management route – **ELECTIVE MODULES:**	
Choose one of the following: Energy Systems Case Studies N-OFF-ESCS Short Research Project N-OFF-SRP Part time students only select one from the following: Dissertation I-SWEE-DISS Group project I-ENE-GRPP	 10 10 40 40
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria
The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [5]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award

[5] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
    - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in October and are expected to complete the course within 12 calendar months.

Part-time students register for the course in October and are expected to complete the course within up to 3 years.

Each core module is taught over one week, with the second week largely free of structured teaching to allow time for more independent learning and reflection, and completion of assignments. Each applied module is delivered over two weeks at Cranfield.

7. Course Level Assessment Strategy[6]

Taught modules:

This course offers 8 taught modules that are delivered using a combination of short face-to-face/online lectures, case studies, workshops, and practical sessions. The assessment for each module depends on the nature of the module. All modules have a summative assignment. This includes high value skills required in future employment and professional practice e.g. working as part of team, presenting verbally, writing a consultancy style report, and so on. By the end of the taught modules, the student is expected to achieve all of the ILOs mentioned in the module descriptors.

Group Project:
The group project provides the students with the opportunity to gain professional skills expected of the workplace. In addition to technical skill practice, students develop a range of soft skills such as team working, problem solving, communication skills and reflective practice. The students work in small consultancy teams typically on a client sponsored project for a period of 8 weeks. Many teams will be made up of students from different background giving the students the opportunity of working in an interdisciplinary team. The students are responsible for interpreting the brief, developing a project plan, selecting and implementing a methodology, deriving results, analysing the results and drawing conclusions in alignment with the aims and objectives. All students participate in a peer review activity providing them with the opportunity to reflect on the practices of their colleagues as well as their own. The group is supervised with at least one academic staff.

A single group report is produced and the project is presented orally at the concluding Exhibition Day, both elements are assessed by independent markers and a group mark is assigned for element. Individual assessment is derived from supervisor observation and meeting minute actions and an individual reflective report where the students reflect on the development of three soft skill competencies based on objectives that they set for themselves. The team working competency is mandatory as one of the three skills that should be acquired by the students.

[6] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Dissertation:
Part time students are not required to complete the Group Project undertaken by the full time registered students on Renewable Energy MSc course. An alternative assignment takes the form of a dissertation or design project, which in most situations will be based around a topic relevant to the work of the part-time student. It is evident that some aspects of the Group Project experience that the work-based dissertation replaces – for example the client interaction and group dynamics components will not directly replicated by undertaking this assignment. It is expected that these experiences would normally be a part of the normal working life of the part-time student.

It is expected that the dissertation will normally consist of the following elements: Abstract, Background context, Introduction to the theme(s) addressed within the dissertation, setting out the issues that will be covered, Methodology, In depth analysis/discussion of the topics discussed, Concluding remarks, References, Appendices (if relevant). At least one supervisor is allocated to the dissertation and supervision follows the model used for the independent research project. The student will submit a 6000 word report and will give an oral presentation of their work. Both elements of assessment will be marked by independent assessors.

Individual Research Project/Thesis:

The individual research project requires students to further develop problem definition, hypothesis setting, select and execute a methodology, analyse data, and evaluate findings and draw appropriate conclusions in the context of research questions relevant to the course followed by a student. The student is required to communicate their findings successfully via a thesis report and an oral presentation based around a poster. The projects are designed to integrate knowledge gained during the taught modules and apply understanding and skills from the group project, to deliver a high-quality written thesis and oral presentation. The individual research project/thesis is typically delivered through collaboration with an industrial sponsor, or it may be an ‘internal’ project reflecting the research interests of the School.

Course modules

The following modules outline all parts of the programme leading to **MSc**. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within module of multi-part assessments[11] (%)	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
1	I-ENE-INWK Occ A	Induction	Patrick Verdin	24		0	Y		02/10/23	06/10/23	N/A	AO	N/A				N/A	N/A
2	N-BPE-PRET	Renewable Energy Technologies 1	Peter King	30		10	Y		09/10/23	20/10/23	50	ICW	100				FT 21/10/23 PT 04/11/23	05/24

[7] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[8] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[9] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[10] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[11] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.
[12] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[13] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within module of multi-part assessments[11] (%)	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
3	N-RNE-PGERE	Renewable Energy Technologies 2	Jerry Luo	40		10	Y		23/10/23	03/11/23	50	ICW	100				FT 04/11/23 PT 18/11/23	05/24
4	N-RNE-SEE	Solar Energy Engineering	Peter King	30		10	N		06/11/23	17/11/23	50	ICW	100				FT 18/11/23 PT 02/12/23	05/24
5	N-OFF-HSER Occ A.	Health, Safety and Environment Risk	Gill Drew	25		10	N		06/11/23	17/11/23	50	ICW	100				FT 18/11/23 PT 02/12/23	05/24
6	N-AME-ESA Occ A	Engineering Stress Analysis: Theory & Simulations	Luofeng Huang	32		10	Y		20/11/23	01/12/23	50	ICW	100				FT 02/12/23 PT 06/01/24	05/24
7	N-RNE-EEP	Energy Economics & Policy	Ali Alderete Peralta	27		10	N		20/11/23	01/12/23	50	ICW	100				FT 02/12/23 PT 06/01/24	05/24
8	N-AME-FML Occ A	Fluid Mechanics and Loading	Liang Yang	30		10	Y		04/12/23	15/12/23	50	ICW	100				FT 06/01/24 PT 20/01/24	05/24
9	N-ACE-SEA	Sustainability and	Gill Drew	27		10	Y		08/01/24	19/01/24	50	ICW	100				FT 20/01/24 PT 03/02/24	05/24

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within module of multi-part assessments [11](%)	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
	Occ A	Environmental Assessment																
10	N-RNE-RES	Design of Offshore Energy Structures	Liang Yang	25		10	Y		08/01/24	19/01/24	50	ICW	100				FT 20/01/24 PT 03/02/24	05/24
11	N-OFF-ESCS Occ A	Energy Systems Case Studies	Renaldi Renaldi	32		10	Y		22/01/24	02/02/24	50	ICW	100				FT 03/02/24 PT 17/02/24	05/24
12	N-OFF-SRP	Short Research Project	Ying Jiang	10		10	N		22/01/24	02/02/24	50	ICW	100				FT 03/02/24 PT 17/02/24	05/24
13	N-RNE-EE	Energy Entrepreneurship	Orsolya Ihasz	28		10	Y		05/02/24	16/02/24	50	GCW	100				FT 17/02/24 PT 17/02/24	05/24
14	N-AME-EPM	Engineering Project Management	Gill Drew	20		10	Y		19/02/24	01/03/24	50	ICW	100				FT 02/03/24 PT 16/03/24	05/24

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within module of multi-part assessments[11] (%)	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
15	I-ENE-GRPP Occ A	Group Project	Patrick Verdin	16		40	Y		04/03/24	10/05/24	50 50 50 50	GCW GPRES ICW RP	64 16 10 10				03/05/24 @ 16.00 30/04/24 @ 16.00 10/05/24 @ 16.00 11/05/24 @ 23.59	TBC
16	I-SWEE-DISS Occ A	Dissertation (part-time option)	Jitka MacAdam	10		40	Y		26/02/24	20/09/24	50	IPROJ IPRES	80 20				20/09/24 @ 16.00 wc 23/09/24	09/24
17	I-SWEE-THES Occ A	Thesis	Jitka MacAdam	20		80	Y		13/05/24	06/09/24	50 50	OR THESIS	10 90				w/c 27/08/24 – 04/09/24 02/09/24 @ 16.00	09/24

Module type for Renewable Energy

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

	Renewable Energy - Engineering Route			Renewable Energy - Management Route		
	PgCert	PgDip	MSc	PgCert	PgDip	MSc
Induction	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
Renewable Energy Technologies 1	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
Renewable Energy Technologies 2	Elective	Compulsory	Compulsory	Elective	Compulsory	Compulsory
Solar Energy Engineering	Elective	Compulsory	Compulsory	N/A	N/A	N/A
Sustainability and Environmental Assessment	N/A	N/A	N/A	Elective	Compulsory	Compulsory
Engineering Project Management	N/A	N/A	N/A	Elective	Compulsory	Compulsory
Engineering Stress Analysis: Theory & Simulations	Elective	Compulsory	Compulsory	N/A	N/A	N/A
Energy Entrepreneurship	Elective	Compulsory	Compulsory	Elective	Compulsory	Compulsory
Energy Systems Case Studies	Elective	Elective	Elective	Elective	Elective	Elective
Short Research Project	Elective	Elective	Elective	Elective	Elective	Elective
Fluid Mechanics and Loading	Elective	Compulsory	Compulsory	N/A	N/A	N/A
Design of Offshore Energy Structures	Elective	Compulsory	Compulsory	N/A	N/A	N/A
Energy Economics and Policy	N/A	N/A	N/A	Elective	Compulsory	Compulsory
Health, Safety, ~~Sustainability~~ and Environment Risk	N/A	N/A	N/A	Elective	Compulsory	Compulsory
Group Project	N/A	Compulsory FT Elective PT	Compulsory FT Elective PT	N/A	Compulsory FT Elective PT	Compulsory FT Elective PT
Dissertation (part-time option)	N/A	Elective PT	Elective PT	N/A	Elective PT	Elective PT
Thesis	N/A	N/A	Compulsory	N/A	N/A	Compulsory

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
I-ENE-INWK	Induction week	Advanced Mechanical Engineering	• Advanced Chemical Engineering • Advanced Digital Energy Systems • Renewable Energy
I-ENE-GRPP	Group project	Advanced Mechanical Engineering	• Advanced Chemical Engineering • Advanced Digital Energy Systems • Renewable Energy
I-SWEE-DISS	Dissertation	Advanced Water Management	• Water and Sanitation for Development • Water and Wastewater Engineering • Water and Waste Infrastructure for Resilience • Advanced Mechanical Engineering • Advanced Chemical Engineering • Advanced Digital Energy Systems • Renewable Energy • Environmental Engineering • Environmental Management for Business • Geographical Information Management • Global Environmental Change • Applied Bioinformatics • Future Food Sustainability • Food Systems Management • Design Thinking
I-SWEE-THES	Thesis	Advanced Water Management	• Water and Sanitation for Development • Water and Wastewater Engineering • Water and Waste Infrastructure for Resilience • Advanced Mechanical Engineering • Advanced Chemical Engineering • Advanced Digital Energy Systems • Renewable Energy • Environmental Engineering • Environmental Management for Business • Geographical Information Management • Global Environmental Change • Applied Bioinformatics • Future Food Sustainability • Food Systems Management • Design Thinking
N-AME-FML	Fluid Mechanics and Loading	Advanced Mechanical Engineering	• Advanced Mechanical Engineering • Renewable Energy (Engineering route) • Mechanical Engineering (Jiangsu)
N-AME-ESA	Engineering Stress Analysis: Theory and Simulations	Advanced Mechanical Engineering	• Advanced Mechanical Engineering • Renewable Energy (Engineering route) • Mechanical Engineering (Jiangsu)

N-OFF-ESCS	Energy Systems Case Studies	Renewable Energy	• Renewable Energy (Engineering route) • Renewable Energy (Management route) • Advanced Digital Energy Systems
N-AME-EPM	Engineering Project Management	Advanced Mechanical Engineering	• Advanced Chemical Engineering • Advanced Mechanical Engineering • Renewable Energy (Management route)
N-RNE-EE	Energy Entrepreneurship	Renewable Energy	• Advanced Digital Energy Systems • Renewable Energy (Management route) • Renewable Energy (Engineering route)
N-ACE-SEA	Sustainability and Environmental Assessment	Renewable Energy	• Renewable Energy (Management route) • Global Environmental Change
N-RNE-RES	Design of Offshore Energy Structures	Renewable Energy	• Renewable Energy (Engineering route) • Advanced Mechanical Engineering
N-BPE-PRET	Renewable Energy Technologies 1	Renewable Energy	• Advanced Digital Energy Systems
N-RNE-PGERE	Renewable Energy Technologies 2	Renewable Energy	• Advanced Digital Energy Systems

8. How are the ILOs assessed?

The following assessment types are utilised:

- the taught modules (40%) are assessed by in-module assessment (including coursework or exams, which focuses on application of principles studied and class tests, which support underpinning knowledge).
- group projects (20%) are assessed by means of a written group report, presentations and an individual contribution component. For part time students a dissertation based around a topic relevant to the student work will be evaluated through a report and oral presentation.

This approach has been adopted because:

This is the standard criteria within the School of Water, Energy and Environment.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO 1.	ILO 2.	ILO 3. Engineering Route	ILO 4. Management Route
2 N-BPE-PRET	ICW	ICW		
3 N-RNE-PGERE	ICW	ICW		
4 N-RNE-SEE	ICW	ICW	ICW	
5 N-OFF-HSSE.				ICW
6 N-AME-ESA			ICW	
7 N-RNE-EEP				ICW
8 N-AME-FML			ICW	
9 N-ACE-SEA				ICW
10 N-RNE-RES	ICW	ICW	ICW	
11 N-OFF-ESCS			ICW	ICW
12 N-OFF-SRP	ICW	ICW	ICW	ICW
13 N-RNE-EE				GCW
14 N-AME-EPM			ICW	ICW

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 5.
15	GCW GPRES ICW RP
16	IPROJ IPRES

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 6.	ILO 7.
17	THESIS OR	THESIS OR

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment

		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning

and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

On completion, graduates will have a broad knowledge, skills and increased career opportunities in the fields of renewable energy engineering and management.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc in Robotics
Course code	MSRBTFTC MSRBTPTC PCRBTFTC PCRBTPTC PDRBTFTC PDRBTPTC
Academic Year	2023/24
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time, Part-time
Location(s)[1] of Study	Cranfield University and ABB Ltd
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Aerospace
Centre	Centre for Robotics and Assembly
Course Director	Dr Gilbert Tang
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/A
Is the Degree apprenticeship integrated or non-integrated?	N/A
Is the Mastership offered as an open and/or closed course?	N/A
Teaching Institution	Cranfield University

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Admissions body	Cranfield University
Entry requirements	Standard University Entry Requirements
UK Qualifications Framework Level	QAA FHEQ level 7
Benchmark Statement(s)	N/A
Registration Period(s) available	Full-time MSc - one year, Part-time MSc – three years
Course Start Month(s)	September

Institutions delivering the course

This course is delivered by the School of Aerospace, Transport and Manufacturing, Aerospace Theme, Centre for Structures, Assembly and Intelligent Automation and Centre for Computational Engineering Sciences where the research interests include:

Development and deployment of Industrial Robot Systems
Human-Robot Collaboration
Automation in Aerospace Manufacturing
Metrology Assisted Assembly and Systems Installations
Industrial Psychology and Human Factors
Human Factors in Automation
Computer and Machine Vision
Artificial Intelligence and Machine Learning in Computer Vision
Computation Techniques in Engineering

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This MSc course is accredited by the Institution of Mechanical Engineers (IMechE) until August 2026 on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng). Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

2. What are the aims of the course?

-Provide students with relevant theoretical knowledge and practical skills for developing robotic solutions in solving real world problems.
- To offer students the opportunity to gain practical robot programming experience and to work on industrial, mobile and other real life robotics applications.
- Improve the employment prospects and broaden career options of students by providing them the skills required to become robotics engineers, automation engineers, research scientists/engineers and project engineers.
- To meet rising global demands across many industries for graduates who can apply practical knowledge in the development of industrial, social, medical and domestic robotic systems.

This programme is intended for the following range of students:

Any 1st or 2nd class UK honours degree (or equivalent) in an engineering related discipline.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Design and develop a working programme for the control of a robotic system.

ILO 2. Appraise the functionalities of different robot configurations and mode of operations, and examine their applications in solving real world problems.

ILO 3. Examine fundamental robot control theories, describe and appraise the characteristics of different control mechanisms and identify for developing practical robotic solutions suitable applications.

B. Postgraduate Diploma

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 4. Design autonomous robot systems using artificial intelligence and machine learning approaches.

ILO 5. Examine the societal impact of robotics and the implications of psychology, ethics and standards in human-robot interaction.

ILO 6. Create automated and semi-automated robot systems via the use of offline programming and implementation of sensing technologies.

ILO 7. Examine current and existing robotic developments and critically appraise the outcome of each research.

ILO 8. Design original robotic solution to solve practical problems and execute research work program individually and as part of a team.

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 9. Execute the development of novel robotic solutions systemically and implement experimental techniques to evaluate the performance of developed systems, and critique their research findings

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Lectures
- Computer labs
- Robotics Labs
- Online contents on Virtual Learning Environment
- IT and Library Training Course
- Robot simulation and virtual reality workshop
- Group project
- Individual project

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 8. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction (module 1) Module 2	0 10
ELECTIVE MODULES:	
5 modules from module 3-9	50
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction (module 1) Modules 2-9 Group Project (f/t 10a) or Dissertation (p/t 10b)	0 80 40
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Induction (module 1) Modules 2-9 Group Project (f/t 10a) or Dissertation (p/t 10b) Individual Research Project	0 80 40 80
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of

your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]

- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in September and are expected to complete the course within 12 calendar months.

Part-time students register for the course in September and are expected to complete the course within 3 years.

A 10-credit module is taught over a week followed by a week free for completing assignments and facilitate private study and reflection. The group project will take place between February and May. For part-time students who are unable to attend during that period, a dissertation could be completed instead. Individual research project runs from April until August. A typical path for part-time students is to complete module 2,3, 5 and another taught module during the first year, and complete the rest of the taught modules in the second year. Students can choose to complete the group project/ dissertation and the individual research project in the second year after completing all the taught modules, or in the third year.

7. Course Level Assessment Strategy[4]

Majority of the taught modules will be assessing skills and knowledge using assignments. The intention is to examine students' comprehension of theoretical knowledge and their ability in applying practical skills in problem solving.
The group project will provide students the opportunity to work within a team of engineers to design and develop robotic solutions. It will assess the ability to create and execute a research programme in a team working environment as well as the ability to evaluate results and present the research outcome. Part- time students unable to complete the group project will undertake a dissertation.
Further knowledge and application will be assessed by the individual thesis. It will also assess

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

as well as develop research skills in terms of the ability to assemble a technical literature review and the ability to plan and implement an independent research project.

Course modules

The following modules outline all parts of the programme leading to **MSc.** Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1	N-RBT-IND	Induction week for Robotics MSc	Dr Gilbert Tang	12		0	N	02/10/23	02/10/23	06/10/23		AO						
2	N-RBT-FR	Fundamentals of Robotics	Dr Gilbert Tang	30		10	N	09/10/23	09/10/23	13/10/23	50	GCW	100				FT 20/11/23 PT 04/12/23	At the next available opportunity within the same academic year

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
3	N-RBT-RC	Robotics Control	Dr Seemal Asif	35		10	N	23/10/23	23/10/23	27/10/23	50	ICW	100				FT 15/12/23 PT 02/01/24	At the next available opportunity within the same academic year
4	N-RBT-AIML	Artificial Intelligence and Machine Learning for Robotics	Dr Jun Li	30		10	N	06/11/23	06/11/23	10/11/23	50	ICW	100				FT 02/01/24 PT 15/01/24	At the next available opportunity within the same academic year
5	N-RBT-PMR	Programming Methods for Robotics	Dr Irene Moulitsas	20		10	N	20/11/23	20/11/23	24/11/23	50	ICW	100				FT 15/01/24 PT 29/01/24	At the next available opportunity within the same academic year
6	N-RBT-HRI	Human-Robot Interaction	Dr Gilbert Tang	24		10	N	04/12/23	04/12/23	08/12/23	50	ICW	100				FT 29/01/24 PT 12/02/24	At the next available opportunity within the same

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
																		academic year
7	N-RBT-MVR	Machine Vision for Robotics	Dr Stuart Barnes	35		10	N	22/01/24	22/01/24	26/01/24	50	ICW	100				FT 11/03/24 PT 25/03/24	At the next available opportunity within the same academic year
8	N-RBT-ARS	Autonomy in Robotic Systems	Dr Leonard Felicetti	28		10	N	05/02/24	05/02/24	09/02/24	50	ICW	100				FT 02/04/24 PT 16/04/24	At the next available opportunity within the same academic year
9	N-RBT-PES	Psychology, Ethics and Standards	Dr Iveta Eimontaite	30		10	N	08/01/24	08/01/24	12/01/24	50	ICW	100				FT 19/02/24 PT 04/03/24	At the next available opportunity within the same academic year
10a	N-RBT-GP	Group Project in Digital Robotics	Dr Gilbert Tang	30		40	N	26/02/2024	26/02/2024	26/04/2024	50 50	GCW/ GPRES	80/ 20				26/04/24/ 22/04/2024	At the next available opportunity which may

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
																		not be until the course runs the following year
10b	N-RBT-DISS	Dissertation in Digital Robotics	Dr Gilbert Tang	20		40	N	26/02/2024	26/02/2024	03/05/2024	50	ICW	100				03/05/2024	At the next available opportunity which may not be until the course runs the following year
11	N-RBT-THESIS	Individual Research Project	Dr Gilbert Tang	20		80	N	29/04/2024	29/04/2024	29/08/2024	50 50	THESIS/ IPRES	80/ 20				30/08/24 23/08/24	As specified by the Board of Examiners

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
N/A	N/A	N/A	N/A

8. How are the ILOs assessed?

The following assessment types are utilised:

Exam, assignment, group project or dissertation and individual projects.

This approach has been adopted because:

Majority of the taught modules will be assessing skills and knowledge using assignments. The intention is to examine students' comprehension of theoretical knowledge and their ability in applying practical skills in problem solving. Exam is applied in modules where students should be able to explain fundamental concepts of the subject as well as to recall facts in supporting their judgements. The group project will provide students the opportunity to work within a team of engineers to design and develop robotic solutions. It will assess the ability to create and execute a research programme in a team working environment as well as the ability to evaluate results and present the research outcome. Part- time students unable to complete the group project will undertake a dissertation. Further knowledge and application will be assessed by the individual thesis. It will also assess as well as develop research skills in terms of the ability to assemble a technical literature review and the ability to plan and implement an independent research project.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9
1									
2	GCW	GCW	GCW						GCW
3	ICW	ICW	ICW				ICW		
4	ICW			ICW			ICW		
5	ICW								
6	ICW	ICW			ICW		ICW		ICW
7	ICW			ICW			ICW		
8	ICW	ICW					ICW		
9					ICW				

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9
10a	GCW/ GPRES	GCW/ GPRES	GCW/ GPRES	GCW/ GPRES	GCW/ GPRES	GCW/ GPRES	GCW/ GPRES	GCW/ GPRES	
10b	ICW	ICW	ICW	ICW	ICW	ICW	ICW		

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9
11	THESIS / IPRES	THESIS / IPRES	THESIS / IPRES	THESIS / IPRES	THESIS / IPRES	THESIS / IPRES	THESIS / IPRES	THESIS / IPRES	THESIS / IPRES

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)
		N/A	N/A

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

The Robotics MSc course is designed with the aim to improve graduates' employability and to broaden their career options. The course will equip students with the skills and knowledge required to design and construct robotic systems for tackling real world problems as well as the fundamentals required for robotic systems integration, implementation and management. Upon completing the course, graduates will be exposed to the following opportunities:

- Complete double degree (EU students)

- Research degree - PhD

- Direct employment and graduate schemes in a number of industries - Automotive, aerospace, defence, automation, social robotics, distribution, nuclear, marine, food, etc.

- Among the industries there are various role available - Automation Engineer, Manufacturing Engineer, Research Scientist, Robotics Engineer, Technology Manager in Automation, Mechatronics Engineer, Technical Officer, etc.

- Consultancy - Robotics, AI in Robotics, Machine Vision in Robotics, etc.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

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Course information

Course Title	MSc in Safety and Accident Investigation
Course code	MSSACPTC PDSACPTC PCSACPTC
Academic Year	2023-24
Valid entry routes	MSc in Safety and Accident Investigation PgDip in Safety and Accident Investigation PgCert in Safety and Accident Investigation
Additional exit routes	Not Applicable
Mode of delivery	Part-time
Location(s)[1] of Study	Cranfield University
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Transport Systems
Centre	Centre for Safety and Accident Investigation
Course Director	Craig Cattell
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/A
Is the Degree apprenticeship integrated or non-integrated?	N/A
Is the Mastership offered as an open and/or closed course?	N/A

[1] If any part of this course is delivered at another site, please note which one(s) here

[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	Not Applicable
Registration Period(s) available	Part-time MSc - up to three years, Part-time PgDip - two years, Part-time PgCert - one year
Course Start Month(s)	January or May

Institutions delivering the course

This course is delivered by School of Aerospace, Transport and Manufacturing, Transport Systems Theme, Centre for Safety and Accident Investigation where the research interests include:

- Safety management
- Accident investigation
- Risk management
- Human factors

Cranfield University interacts with the following institutions and in the following ways:

Teaching and assessment is also provided by other centres in the School of Aerospace, Transport and Manufacturing.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is not accredited by any external bodies.

2. What are the aims of the course?

The aim of the course is to provide students with the knowledge and skills to conduct a safety-oriented accident investigation in accordance with the standards and recommended practices as inferred by the appropriate guidelines and legislations, including:

- Collection and preservation of evidence
- Health and safety of themselves and others on the accident site
- Scientific analysis of causes of accidents
- Preparation of defensible and practicable recommendations
- Dissemination of findings and safety promotion

Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) entry routes are provided, it is suggested that these qualifications may be more appropriate for students who have no need for a separate Individual Research Project.

This programme is intended for the following range of students:

- Those with a technical or operational background in transport or other safety critical industries
- Those employed as accident investigators
- Those employed in risk assessment and safety management
- Those employed in relevant roles in military, regulators and manufacturers

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Demonstrate a detailed understanding of the theoretical, methodological and practical approaches in conducting safety-orientated investigations in transportation and other sectors.

ILO 2. Plan, organise and conduct a safety-orientated investigation, evaluating and using appropriate methodologies

ILO 3. Flexibly and creatively apply knowledge and practiced skills to unfamiliar accident events, which will include systematically analysing information and evidence with rigour and generating transformative safety-orientated recommendations.

ILO 4. Work effectively as part of an accident investigation team and work collaboratively with other stakeholders to ensure safety-orientated outcomes are achieved. This includes understanding the roles and responsibilities of an accident investigator and the competing interests of various stakeholders, whilst incorporating this into investigation processes

ILO 5. Communicate safety and investigation-oriented information effectively through written statements or reports, and verbal presentations and statements.

B. Postgraduate Diploma

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

- ILO 6. Apply the techniques developed above into areas of specialism including; Advanced core skills in accident investigation, Accident investigation techniques specific to a mode of transport/safety industry, Safety management and risk assessment, Investigations in engineering and operations

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO7 Undertake an independent research project based on literature review; evaluation and selection of a suitable research methodology; collection and analysis of data, evaluating, appraising and defending findings.

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Lectures from academic staff and external speakers with expertise in particular aspects of the course;
- Access to library resources;
- Use of class and field exercises to help develop knowledge and techniques;
- Conducting an Individual Research Project (MSc only) with individual supervision.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Modules: 1	30
ELECTIVE MODULES:	
One module selected from 2, 14,15 or 16, or all of modules 7, 12, and 13	30
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Modules: 1 PgDip Project: 17	30 20
ELECTIVE MODULES:	
Three or more modules selected from 2, 4-16	70
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Modules: 1 and 3 Individual Research Project: 18	40 90
ELECTIVE MODULES:	
Three or more modules selected from 2, 4-16	70
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists, and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Part-time students register for the course in January or May and MSc students are expected to complete the course within three years. LQ applicants are encouraged to register as a Short Course for Credit Student and can apply for an award after successfully completing at least 30 credits through Short Course Accumulation (SCA). Prior "learning credits" obtained outside of the University (External Credit Accumulation - ECA), which a student wishes to submit as part of their application for an academic award, are subject to Cranfield University guidelines and approval. Furthermore, where a student has graduated from this programme with either a Postgraduate Certificate or Postgraduate Diploma and they want to extend their study to the award of an MSc, they are able to do this under the Transfer to Higher Award (THA) process. For ECA and THA there are limitations on the total number of credits that can be transferred.

The basic structure of the programme is summarised below:

A. Postgraduate Certificate (PgCert)

Students start with compulsory module (Fundamentals of Accident Investigation), and then choose one of the following:

- Applied Aircraft Accident Investigation (30 credits)
- Applied Marine Accident Investigation (30 credits)

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

- Applied Rail Accident Investigation (30 credits)
- Applied Road Accident Investigation (30 credits) or

- All three 10-credit modules as follows:
    - Investigating Human Performance
    - Interviewing Techniques for Accident Investigators
    - Analysis Techniques for Accident Investigators

B. Postgraduate Diploma (PgDip)

In addition to the modules attended in the PgCert route, students select additional modules up to 40 credits from differing specialist areas including:

- Advanced core skills in accident investigation
- Accident investigation techniques specific to a mode of transport/safety industry
- Safety management and risk assessment
- Investigations in engineering and operations

PgDip students are also required to complete a supervised research report on a subject of their choice within the field of safety management, accident investigation or an allied subject area.

C. MSc

MSc students must take Fundamentals of Accident Investigation and Research Methods modules. In addition, they must complete a further 70 credits of modules from a choice of elective modules. They are also required to complete a supervised Individual Research Project on a subject of their choice within the field of accident investigation or safety management. The research is expected to go into much greater depth than that required for the PgDip.

7. Course Level Assessment Strategy[4]

The assessment tasks are challenging and enable students to demonstrate a full range of skills and attributes. The compulsory module Fundamentals of Accident Investigation will introduce students to the assessment approach adopted by this course: a combination of group and individual practical exercises, complemented by individual coursework that elevates the CPD module into an M-Level module. All individual coursework is done post-module, but most of this coursework will be related to practical exercises carried out during the module, thereby ensuring a constructive alignment of teaching and assessments. Formative feedback during a module is an inherent part of the practical exercises, often involving reflective as well as peer feedback in addition to instructor feedback.

The course encourages the use of reflective writing as part of the coursework, to complete their Kolb cycle of experiential learning. Self-directed learning and self-evaluation is characteristic of andragogical approach, which is highly relevant to this course due to the type of students it attracts: relatively mature students with a high level of professional experience.

Students also have opportunities to develop their communication skills, as they are required to give a group presentation and individual presentation in various modules. The taught components precede the research project, so assessment can be used to develop skills required for the individual research project. Students are generally expected to be more self-directed in their learning during this research project and guidance will be provided through Research Methods module, extensive guidance material in the VLE, and periodic supervision meetings.

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

The following modules outline all parts of the programme leading to MSc. Other awards associated with the course include some or all of these modules.

Mo	Mod	Title	Module Leader	Contact	Total hours	Credits	ls	Calendar				Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates			
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date	
1	N-SAI-FOI	Fundamentals of Accident Investigation	Alan Parmenter	100		30	N	10/09/23 (Occ A23)	11/09/23 (Occ A23)	29/09/23 Occ A2)		50 ICW (1) 50 ICW (2)	60 40				27/11/23 27/11/23 (Occ A23)	At the next available opportunity which may not be until the course runs the following year		
								14/01/24 (Occ B23)	15/01/24 (Occ B23)	02/02/24 (Occ B23)		50 ICW (1) 50 ICW (2)	60 40				02/04/24 02/04/24 (Occ B23)			
								12/05/24 (Occ C23)	13/05/24 (Occ C23)	31/05/24 (Occ C23)		50 ICW (1) 50 ICW (2)	60 40				29/07/24 29/07/24 (Occ C23)			

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate). If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Mo	Mod	Title	Module Leader	Contact	Total hour	Cred	ls	Calendar				Assessment								
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Independent Assessment		Multi-part Assessment			Submission dates			
												Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date		
2	N-SAI-AAAIT	Applied Aircraft Accident Investigation	Craig Cattell	100		30	N	02/10/23 (Occ A23)	02/10/23 (Occ A23)	20/10/23 (Occ A23)		50 50	ICW GPROJ	70 30				02/01/24 16/10/23 (Occ A23)	At the next available opportunity which may not be until the course runs the following year	
								03/06/24 (Occ B23)	03/06/24 (Occ B23)	21/06/24 (Occ B23)		50 50	ICW GPROJ	70 30				19/08/24 17/06/24 (Occ B23)		
3	N-HFS-RMS	Research Methods	Dr James Blundell	30		10	Y	22/01/24	22/01/24	26/01/24		40	ICW	100				25/03/24	At the next available opportunity which may not be until the course runs the following year	
4	N-AEN-ASC	Introduction to Aircraft Structural Crashworth-iness	Dr Hessam Ghasemnejad	20		10	Y	18/02/24	19/02/24	23/02/24		40	ICW	100				22/04/24	At the next available opportunity which may not be until	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Mo	Mod	Title	Module Leader	Cont act	Total hour	Cred	ls	Calendar				Assessment								
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Indep ende t Asse smer		Multi-part Assessment			Submission dates		
												Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date	
																			the course runs the following year
5	N-HFS-FDM	Flight Data Monitoring	Dr David Barry	25		10	Y	03/03/24 (Occ A23) 24/09/23 (Occ B23)	04/03/24 (Occ A23) 25/09/23 (Occ B23)	08/03/24 (Occ A23) 29/09/23 (Occ B23)		40 40	ICW ICW	100 100				07/05/24 (Occ A23) 27/11/23 (Occ B23)	At the next available opportunity which may not be until the course runs the following year
6	N-SAI-ISMS	Aviation Safety Management	Dr David Barry	30		10	Y	11/09/23 (Occ A23) 18/03/24 (Occ B23)	11/09/23 (Occ A23) 18/03/24 (Occ B23)	15/09/23 (Occ A23) 22/03/24 (Occ B23)		40	ICW	100				13/11/23 (Occ A23) 20/05/24 (Occ B23)	At the next available opportunity which may not be until the course runs the following year

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Mo	Mod	Title	Module Leader	Contact	Total hour	Cred	ls	Calendar				Assessment								
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												Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date		
7	N-SAI-IHP	Investigating Human Performance	Janos Rozsa	30		10	N	22/04/24	29/04/24	03/05/24	40	ICW	100					01/07/24	At the next available opportunity which may not be until the course runs the following year	
8	N-AW-SAAS	Safety Assessment of Aircraft Systems	Jeremy Turner	35		10	Y	0/11/23 (Occ A23) 1/06/24 (Occ B23)	06/11/23 (Occ A23) 17/06/24 (Occ B23)	10/11/23 (Occ A23) 21/06/24 (Occ B23)	40 40	ICW ICW	100 100					08/01/24 19/08/24	At the next available opportunity which may not be until the course runs the following year	
9	R-FP-CS	Courtroom Skills	Roland Wessling	25		10	Y	02/10/23	29/04/24	03/05/24	50 50	OR ICW	60 40					02-03/05/24 15/03/24	At the next available opportunity which may not be until	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Mo	Mod	Title	Module Leader	Cont act	Total hour	Cred	ls	Calendar				Assessment								
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Indep ende t Asse smer		Multi-part Assessment			Submission dates		
												Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]		Assessment / Exam Retake date
																			the course runs the following year
10	N-HFS-HFAM	Human Factors in Aviation Maintenance	Cengiz Turkoglu	30		10	Y	08/04/24	08/04/24	12/04/24	40	ICW	100					10/06/24	At the next available opportunity which may not be until the course runs the following year
11	N-SAI-CMBC	Crisis Management and Business Continuity	Dr David Barry	24		10	Y	19/11/23	20/11/23	24/11/23	40	ICW	100					22/01/24	At the next available opportunity which may not be until the course runs the following year

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

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								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Independent Assessment		Multi-part Assessment			Submission dates			
												Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date		
	12	N-SAI-ITAI	Interviewing Techniques for Accident Investigators	Mark Robinson	35		10	N	24/06/24	24/06/24	28/06/24	40	ICW	100				27/08/24	At the next available opportunity which may not be until the course runs the following year		
	13	N-SAI-ATAI	Analysis Techniques for Accident Investigators	Janos Rozsa	30		10	N	06/11/23	13/11/23	17/11/23	40	ICW	100				15/01/24	At the next available opportunity which may not be until the course runs the following year		
	14	N-SAI-AMAI	Applied Marine Accident Investigation	Alan Parmenter	100		30	N	05/02/24	05/02/24	23/02/24	50 50	ICW GPROJ	70 30				22/04/24 21/02/24	At the next available opportunity which may not be until		

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Mo	Mod	Title	Module Leader	Cont act	Total hour	Cred	ls	Calendar				Assessment								
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Indep ende t Asse smer		Multi-part Assessment			Submission dates		
												Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date	
																			the course runs the following year
15	N-SAI-ARAI	Applied Rail Accident Investigation	Janos Rozsa	100		30	N	08/07/24	08/07/24	26/07/24		50 50	ICW GPROJ	70 30				23/09/24 15/07/24	At the next available opportunity which may not be until the course runs the following year
16	N-SAI-AROAI	Applied Road Accident Investigation	Mark Robinson	100		30	N	NOT CURRENTLY OFFERED				50 50	ICW GPROJ	70 30				NOT CURRENTLY OFFERED	At the next available opportunity which may not be until the course runs the following year

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

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								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Independent Assessment		Multi-part Assessment			Submission dates			
												Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date		
17	N-SAI-DITHES	PgDip Project	Janos Rozsa	20		20	N	15/01/24	15/01/24	15/01/25	50	ICW	100				15/01/25			
18	N-SAI-THESIS	Individual Research Project	Janos Rozsa	20		90	N	06/08/22 (Occ A22)	06/08/22 (Occ A22)	06/08/23 (Occ A22)	50	THESIS	100				07/08/23 (Occ A22)			
								04/09/22 (Occ B22)	04/09/22 (Occ B22)	04/09/23 (Occ B22)	50	THESIS	100				04/09/23 (Occ B22)			
								01/11/22 (Occ C22)	01/11/22 (Occ C22)	01/11/23 (Occ C22)	50	THESIS	100				01/11/23 (Occ C22)			
								01/12/22 (Occ D22)	01/12/22 (Occ D22)	01/12/23 (Occ D22)	50	THESIS	100				01/12/23 (Occ D22)			
								14/03/23 (Occ E22)	14/03/23 (Occ E22)	14/03/24 (Occ E22)	50	THESIS	100				14/03/24 (Occ E22)			
								16/05/23 (Occ F22)	16/05/23 (Occ F22)	16/05/24 (Occ F22)	50	THESIS	100				14/05/24 (Occ F22)			
								14/11/23 (Occ A23)	14/11/23 (Occ A23)	14/11/24 (Occ A23)	50	THESIS	100				14/11/24 (Occ A23)			
								14/01/24 (Occ B23)	14/01/24 (Occ B23)	14/01/25 (Occ B23)	50	THESIS	100				14/01/25 (Occ B23)			
								14/03/24	14/03/24	14/03/25	50	THESIS	100				14/03/25			

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Mo	Mod	Title	Module Leader	Contact	Total hour	Cred	ls	Calendar				Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates			
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or [illegible]	Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]		Assessment / Exam Retake date	
								(Occ C23) 14/05/24 (Occ D23)	(Occ C23) 14/05/24 (Occ D23)	(Occ C23) 14/05/25 (Occ D23)		50	THESIS	100				(Occ C23) 14/05/25 (Occ D23)		

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
N-HFS-RMS	Research Methods	Safety and Human Factors in Aviation	
N-AEN-ASC	Introduction to Aircraft Structural Crashworthiness	Aircraft Engineering	Airworthiness Military Aerospace and Airworthiness
N-HFS-FDM	Flight Data Monitoring	Safety and Human Factors in Aviation	Safety and Accident Investigation
N-SAI-ISMS	Aviation Safety Management	Safety and Accident Investigation	Airworthiness Military Aerospace and Airworthiness Air Transport Management (Executive) Air Transport Management (Full Time) Airport Planning and Management Safety and Human Factors in Aviation Defence and Security (Engineering)
N-AW-SAAS	Safety Assessment of Aircraft Systems	Airworthiness	Military Aerospace and Airworthiness Safety and Accident Investigation
N-HFS-HFAM	Human Factors in Aviation Maintenance	Safety and Human Factors in Aviation	Airworthiness Military Aerospace and Airworthiness

N-SAI-CMBC	Crisis Management and Business Continuity	Safety and Accident Investigation	Executive Air Transport Management
R-FP-CS	Courtroom Skills	Forensic Programme	Counterterrorism Programme Safety and Accident Investigation

8. How are the ILOs assessed?

The following assessment types are utilised:

Safety and Accident Investigation
The course uses a range of assessment types. Overall, the MSc in Safety and Accident Investigation has **two** distinct but interrelated elements: the taught modules, and the Individual Research Project. All modules are assessed by written assignments, some of which are based on practical exercises that are carried out individually as well as in a group. In the case of the Individual Research Project, students are assessed by their written work and an oral presentation on their research findings.

Where applicable, module assignments are set to be challenging and to encourage the student to study the module topic areas in more depth. The objectives of the assignments are for the students to:

- Acquire the skill to efficiently search literature
- Acquire an in-depth knowledge of safety and accident investigation issues
- Apply skills and knowledge to assess specific techniques
- Develop the power to critically analyse data
- Compile succinct and informative reports to a high standard
- Formulate responses to specific questions against a time limit

This approach has been adopted because:

This approach has been adopted in order to facilitate the completion of the course by part-time students, often from abroad, without the need to return for examinations.

Assessment and ILO Mapping

A. Postgraduate Certificate in Safety and Accident Investigation

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4		ILO 5
1	ICW (1) ICW (2)	ICW (1) ICW (2)	ICW (1)	ICW (1)		ICW (2)

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4		ILO 5
2	ICW GPROJ	GPROJ	GPROJ ICW	GPROJ		GPROJ ICW
7	ICW		ICW			ICW
12	ICW	ICW	ICW			ICW
13	ICW		ICW			ICW
14	ICW GPROJ	GPROJ	GPROJ ICW	GPROJ		GPROJ ICW
15	ICW GPROJ	GPROJ	GPROJ ICW	GPROJ		GPROJ ICW
16	ICW GPROJ	GPROJ	GPROJ ICW	GPROJ		GPROJ ICW

B. **Postgraduate Diploma in Safety and Accident Investigation**

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 6
2	ICW GPROJ
4	ICW
5	ICW
6	ICW
7	ICW
8	ICW
9	ICW OR
10	ICW
11	ICW
12	ICW
13	ICW
14	ICW GPROJ
15	ICW GPROJ
16	ICW GPROJ

Award ILOs / Module No.	ILO 6
17	ICW

C. **MSc in Safety and Accident Investigation**

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 7	
3	ICW	
18	THESIS	

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the

University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

All students are part-time, and are usually in full-time employment. However the MSc prepares them for a higher level of responsibility in safety and accident investigation field, and allied careers. Feedback from past students (the course was launched in 2005) shows that employers regard Cranfield's provision in this area as being world-leading.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc in Safety and Human Factors in Aviation
Course code	MSSHAFTC, MSSHAPTC, PDSHAFTC, PCSHAPTC
Academic Year	2023/2024
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time
Location(s)[1] of Study	Cranfield University
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Transport Systems
Centre	Centre for Safety and Accident Investigation
Course Director	Dr Wen-Chin Li (Acting)
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/A
Is the Degree apprenticeship integrated or non-integrated?	N/A
Is the Mastership offered as an open and/or closed course?	N/A

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	Not Applicable
Registration Period(s) available	Full-time all routes - one year,
Course Start Month(s)	September

Institutions delivering the course

This course is delivered by the School of Aerospace, Transport and Manufacturing, Transport Systems Theme, Centre for Safety and Accident Investigation where the research interests include:

- Safety Sciences
- Human Factors
- Safety Management and Leadership
- Accident Investigation

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is accredited formally by the Chartered Institute of Ergonomics and Human Factors (CIEHF).

2. What are the aims of the course?

Cranfield University offers this course in order to:

- Provide an understanding of the importance of human factors in safety and performance improvement in aviation.
- Provide students, engineers, scientists and professionals from industry, with an understanding of the factors contributing to human error and accidents and the skills to propose and evaluate safety improvements.

This programme is intended for the following range of students:

- Engineering
- Aeronautical/ aviation management
- Psychology and Social Sciences

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Demonstrate a systematic understanding of the technological and human elements and

interactions that contribute to aviation safety.

ILO 2. Identify, evaluate and apply appropriate techniques for the evaluation of human performance, safety performance, safety management and risk in aviation systems;

ILO 3. Design interventions to achieve high human performance in aviation systems with regard to international aviation standards and recommended practices.

ILO 4. Work both independently and as a member of a team towards the solution of safety and human factors related problems in aviation;

ILO 5. Use transferable skills developed through teamwork, communication and problem-solving to enhance their careers in safety and human factors.

B. Postgraduate Diploma

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 6. Apply the techniques developed above into areas of specialism including; aviation maintenance, flight deck design, training and simulation, accident investigation, safety management.

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 7. Undertake an independent research project based on literature review; evaluation and selection of a suitable research methodology; collection and analysis of data, evaluating, appraising and defending findings.

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Lectures
- Practical exercises
- Private study
- Group work

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 8. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

For students registering in October 2020 onwards:

Description	Credits
COMPULSORY MODULES:	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module 1: Course Introduction Modules: 3, 4, 7 and 9	0 40
ELECTIVE MODULES:	
Any two other credit bearing modules chosen from course modules: 2, 5, 6, 8, 11, 12, 13	20
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
Module 1: Course Introduction Modules: 2-9 10: Capstone Project	0 80 20
ELECTIVE MODULES:	
Modules selected from: 11-13 to the value of 20 credits	20
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the Individual Research Project. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Module 1: Course Introduction Modules: 2- 9 10: Capstone Project Individual Research Project: 14	0 80 20 80
ELECTIVE MODULES:	
Modules selected from: 11-13 to the value of 20 credits	20
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in September and are expected to complete the course within 12 calendar months.

The MSc course consists of studying eight compulsory modules, two optional modules, one group project module and submission of an individual research project. In addition, all students will complete the zero-credit induction module which will include the fundamentals of aeronautics, IT and library skills training to achieve MSc.

The PG Diploma consists of studying eight compulsory modules, two optional modules and the Capstone Group project. In addition, all students will complete the zero-credit induction module.

The PG Certificate consists of studying three compulsory modules and then three other modules selected by the student from the remaining modules excluding the Capstone project. In addition, all students will complete the zero-credit induction module.

7. Course Level Assessment Strategy[4]

The ILOs of the course have been developed in consultation with the teaching team and industry recipients of the course. Each module will consist of an initial part of declarative knowledge but will also facilitate the

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

development of functioning knowledge for each student. Each and every module will feature formative feedback as well as summative assessment, which will be diverse in nature and appropriate to the learning outcomes.

The structure promotes group work, with assessed projects in two modules, Applied Safety Assessment and Capstone (a two-week module) worth 20 credits. The course is intended to explain the background theory to safety and human factors in aviation, with a particular focus on regulation. The University's aviation operations are used as a *Living Laboratory* providing case studies and real-life examples to supplement teaching. This involves the Remote Tower facility, Accident Investigation Laboratory and Boeing 737. Using these facilities in teaching is something that the Safety and Accident Investigation Centre has a great deal of experience with and enhances the learning experience.

The ILOs of each module are linked to the teaching activities in order to meet the assessment. And these are diverse in order to give variety. The individual coursework are used in order to test the ability to construct a written argument and meet the requirements of the course. Presentation skills are also assessed as these are vital in the communication of safety and human factors. Both the Safety Assessment modules and Capstone Group project, assess the ability to work within a team environment.

The research aspect of the course is described by ILO7 and assessed by the IRP. A large part of this comprises a written thesis which will address some aspect of safety and/or human factors.

Figure 1 shows the interconnection between related courses in the Safety & Accident Investigation Centre. MSc in Safety & Human Factors in Aviation has some common themes with other safety-related and industry courses, and some of these are shown. However the course is unique in its combination of applied human factors, and is approved by the Chartered Institute of Ergonomics and Human Factors.

Course modules

The following modules outline all parts of the programme leading to **MSc.** Other awards associated with the course include some or all of these modules.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1		N-HFS-IND	Safety and Human Factors in Aviation Course Induction	Dr Wen-Chin Li	15	0	0	N	02/10/23	02/10/23	06/10/23	N/A	AO	N/A				N/A	N/A
2		N-HFS-IHF	Cognitive Ergonomics	Dr James Blundell	30	0	10	N	06/11/23	06/11/23	10/11/23	40	ICW	100				11/12/23	At the next available opportunity which may not be until the course runs the following year
3		N-HFS-SAAS	Safety Assessment of Aircraft Systems	Dr Wai-Nang Chung	35	15	10	N	26/11/23	27/11/23	01/12/23	50 50	Integrated Assessment with N-HFS-ASA GCW ICW	30 70				11/12/23 08/01/24	At the next available opportunity which may not be until the course runs the following year

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice

[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)

[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.

[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.

[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
4		N-HFS-HPE	Human Error and System Safety	Dr Gulsum Kubra Kaya	30	10	10	N	09/10/23	09/10/23	13/10/23	50	ICW	100				13/11/23	At the next available opportunity which may not be until the course runs the following year
5		N-HFS-FDD	Human-Computer Interaction in Aviation	Dr Wen-Chin Li	30	10	10	N	23/10/23	23/10/23	27/10/23	40	EX	100				EXAM WEEK 2	At the next available opportunity which may not be until the course runs the following year
6		N-HFS-RMS	Research Methods	Dr James Blundell	30	0	10	Y	22/01/24	22/01/24	26/01/24	50	ICW	100				26/02/24	At the next available opportunity which may not be until the course runs the following year
7		N-SAI-ISMSOccC	Aviation Safety Management	Dr David Barry	30	10	10	Y	05/02/24	05/02/24	09/02/24	50	ICW	100				11/03/24	At the next available opportunity which may not be until the course runs the following year

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
8		N-HFS-AAIOccA	Aircraft Accident Investigation and Response	Dr Abdul Abushalla	30	10	10	Y	15/04/24	15/04/24	19/04/24	40	ICW	100				20/05/24	At the next available opportunity which may not be until the course runs the following year
9		N-HFS-ASA	Applied Safety Assessment	Dr Wai-Nang Chung	35	15	10	N	04/12/23	04/12/23	08/12/23	50 50	Integrated Assessment with N-HFS-SAAS GCW ICW	30 70				11/12/23 08/01/24	At the next available opportunity which may not be until the course runs the following year
10		N-HFS-SHCP20	Safety and Human Factors 'Capstone' Project	Dr Gulsum Kubra Kaya	10	0	20	N	07/05/24	07/05/24	17/05/24	40 40	GCW GPRES	70 30				20/05/24 20/05//24	At the next available opportunity which may not be until the course runs the following year
11		N-HFS-TS	Training and Simulation	Dr Wen-Chin Li	30	2	10	N	19/02/24	19/02/24	23/02/24	40	ICW	100				25/03/24	At the next available opportunity which may not be until the course runs the following year

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
12		N-HFS-HFAM	Human Factors in Aviation Maintenance	Cengiz Turkoglu	30	10	10	Y	08/04/24	08/04/24	12/04/24	40	ICW	100				13/05/24	At the next available opportunity which may not be until the course runs the following year
13		N-HFS-FDMOccA	Flight Data Monitoring	Dr David Barry	25	22	10	Y	03/03/24	04/03/24	08/03/24	40	ICW	100				08/04/24	At the next available opportunity which may not be until the course runs the following year
14		N-HFS-THESIS	Individual Research Project	Dr James Blundell	20	0	80	N	02/10/23	02/10/23	02/09/24	50	THESIS	100				02/09/24	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
N-SAI-ISMS	Aviation Safety Management	Safety and Accident Investigation	Airworthiness Air Transport Management (Executive) FT Air Transport Management Military Aerospace and Airworthiness Safety and Accident Investigation
N-HFS-AAI	Aircraft Accident Investigation and Response	Safety and Human Factors in Aviation	Airworthiness Military Aerospace and Airworthiness Forensic Engineering and Science Aviation Safety Management, Risk and Regulation
N-HFS-HFAM	Human Factors in Aviation Maintenance	Safety and Human Factors in Aviation	Airworthiness Military Aerospace and Airworthiness Safety and Accident Investigation Aviation Safety Management, Risk and Regulation
N-HFS-FDM	Flight Data Monitoring	Safety and Human Factors in Aviation	Safety and Accident Investigation
N-HFS-RMS	Research Methods	Safety and Human Factors in Aviation	Safety and Accident Investigation

8. How are the ILOs assessed?

The following assessment types are used Group work, Group Presentations, Individual coursework and Examinations.

Students are subject to two forms of assessment for the group project. Firstly, they must submit group coursework and secondly, their group project oral presentation is also assessed. In the latter form of

assessment, each presentation is judged on how well the presentation is organised, the quality of the presentation and visual aids and how well students are able to answer questions from the audience.

The individual research project is assessed through a written report

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7
	PgCert					**PgDip**	**MSc**
1					AO		
2	ICW	ICW					
3	ICW			ICW	GCW		
4	ICW	ICW	ICW	ICW	ICW		
5	EX	EX	ICW				
6		ICW					ICW
7	ICW	ICW	ICW	ICW	ICW		
8	ICW	ICW					
9	ICW			ICW	GCW		
10				GCW	GPRES		
11	ICW	ICW	ICW			ICW	
12	ICW	ICW	ICW			ICW	
13	ICW	ICW				ICW	
14							THESIS

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	**Modules Covered**	**Assessment**	
		Type	Weight (%)
Integrated Assessment	N-HFS-SAAS and N-HFS-ASA	ICW	70%
		GCW	30%

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate. Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress. Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. <u>What opportunities are graduates likely to have on completing the course?</u>

Course graduates generally find suitable employment very quickly. Many continue employment with the organisations they were with when they began the course (changing direction towards safety/ Human Factors). Other former graduates are currently employed by various major airlines, within the rail industry, car manufacturers, defence, consultancy etc. These have included easyJet, Airbus graduate training, NATS graduate training, Baines Simmons, Metronet rail, Network Rail, EDF Energy, DHL and many others.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	Sensors and Communication
Course code	MSCMNPTC
Academic Year	2023/2024
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Part Time
Location(s)[1] of Study	Cranfield and BAE Systems (one module)
School(s)	School for Aerospace, Transport and Manufacturing (SATM)
Theme	Aerospace
Centre	Centre for Autonomous and Cyber-Physical Systems
Course Director	Dr Ivan Petrunin
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	n/a
Is the Degree apprenticeship integrated or non-integrated?	n/a
Is the Mastership offered as an open and/or closed course?	n/a
Teaching Institution	Cranfield University
Admissions body	Cranfield University

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Master's)
Benchmark Statement(s)	Engineering Master level statement
Registration Period(s) available	Part-time MSc up to 3 years
Course Start Month(s)	January (normal annual intake) February (2024 only)

Institutions delivering the course

This course is delivered by the Centre for Autonomous and Cyber-Physical Systems where the research interests include:

Autonomous and Intelligent Systems
Applied Artificial Intelligence
Sensor Fusion
Communication, Navigation and Surveillance
Guidance and Control
Systems Engineering and Integration
Connected Systems
Unmanned Aerial Systems (UAS) Traffic Management

Cranfield University interacts with the following institutions and in the following ways:

This is a closed course developed on request of BAE Systems and aiming to upskill their present staff with a Sensors & Communication MSc. Due to this reason, no other interactions are anticipated in the course.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is not currently accredited by any external bodies.

There are plans to seek for accreditation from IET (The Institution of Engineering and Technology) after completion of the first cohort, in 2026. The course will be designed to comply with the existing accreditation documentation, e.g. AHEP, 4th edition.

2. What are the aims of the course?

The course is targeting BAE engineers and specialists in the area of aerial manned and autonomous systems who are looking for advancing in their knowledge and skills to improve career perspectives.

More specifically the aims of the course are to:

- To provide students with knowledge on modern sensors, perception, surveillance, communication and other (e.g. weapon) systems and related technologies in the area of manned and autonomous aerial systems
- To develop skills in selecting, adapting, integrating and applying systems and technologies in the present-day applications
- To promote further development of transferrable skills in data analysis, communication, time management and problem-solving.

This MSc is a part-time only, closed course delivered at Cranfield Campus.

This programme is intended for the following range of students:

- Engineers (with MSc in another discipline) wishing to train/upskill in the area of up-to-date communication systems, sensors and sensor data processing, including AI/ML-based approaches and
- Specialists (without MSc) who desire to progress in their careers in the area of sensor and communication systems

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate (PGCert)

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Assess different practices and essential theory of sensors and sensing systems
ILO 2. Analyse the fundamental meaning and debate the applicability of machine learning algorithms in a diverse range of applications
ILO 3. Formulate, set up and execute algorithms for sensor data filtering, fusion, target tracking and resource management in practical scenarios
ILO 4. Set up and execute performance assessment methods for sensors and systems
ILO 5. Critically evaluate and analyse the performance of enabling technologies in a defence context.

B. Postgraduate Diploma (PGDip)

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 6. Evaluate the challenges and plan activities for complex heterogeneous system integration, testing and validation
ILO 7. Critically evaluate the project management requirements and compose an effective project plan.
ILO 8. Critically judge the capabilities of AI-based sensing and communication systems for achieving information advantage.

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 9. Execute and communicate work effectively via written work and in an oral presentation in a style suitable for academic and professional audiences.
ILO 10. Manage independent learning by planning and conducting an individual programme of extended research based on a critical evaluation of existing work in the chosen topic area.

4. How is the course taught?

Students will be supported in their learning and personal development by:

An MSc in Sensors and Communication is a unique offering as there is no other MSc in the UK that combines specific knowledge on sensors, sensor data analysis and communication and addresses specific skills and knowledge shortages in the industry. The topics within the present course they form a comprehensive body of materials structured and focused in a way that allows obtaining specific knowledge and skills in the area of Sensors and Communications.

The majority of the lectures and practical sessions in the MSc will be delivered at Cranfield University, with the exception of one module on Systems Integration, which will be delivered by lecturers from BAE

Systems and on its premises, due to the nature of the contents in this module. Assignment marking in the module will be performed by the lecturer from BAE (with RTS) and moderated by the Cranfield module lead.

The course will offer delivery of teaching with support from the technology-enhanced learning (TEL). The module content across the whole course is aiming to emphasise real-world industrial applications using ad-hoc practical sessions and case studies.

Taught modules consist of lectures (more often in the morning) and practical sessions or case studies (predominantly in the afternoon). This helps to put into practice what was learnt during the morning sessions and thus to consolidate the information conveyed. Group exercises will be encouraged to facilitate interaction and improve experience. Face-to-face delivery is aimed for all modules. Lectures and practical sessions will be supported by interactive tools (e.g. polls, Q&As, quizzes, online platforms etc). The course is going to be using the Canvas platform, with the standard support needs that are no different from arrangements in other courses run in the Centre.

Furthermore, the course is utilising Group Design Projects and Individual Research Projects inspired by the practical needs of BAES or directly proposed by them. The emphasis on machine learning aspects of the course will be underpinned by open-source professional platforms like GitHub or Jupyter for some of the learning activities (e.g. practical sessions for majority of the modules). In other cases (e.g. for some GDP and IRP projects), MATLAB or other platforms and security protocols approved by BAE can be utilised. A group design project will enable students to work as part of a team, develop project design planning and management skills, and communications abilities. An academic supervisor will be overseeing each group and progress meetings will be planned to support the project development and provide feedback before the final submission of the group report and associated presentation.

Students will complete group and individual research projects (IRP) remotely, under the supervisory and reviewing activity of Cranfield's academic staff and BAE mentors or co-supervisors. The academic supervisor will be providing guidance and oversight to ensure necessary academic standards of works performed by students while BAE mentors/co-supervisors will ensure alignment with the BAE practical context where appropriate. The current standards of practice will be maintained to have at least fortnightly meetings with the students. The IRP will result in the submission of the thesis of a guide size of 15000 words and following oral presentation.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Six compulsory modules (modules 0, 1, 2, 6, 8, 9)	50
ELECTIVE MODULES:	

One elective module from modules 3, 4, 7	10
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
All compulsory modules (modules 0, 1, 2, 6, 8, 9, 10) Group Design Project	60 40
ELECTIVE MODULES:	
Two elective modules from modules 3, 4, 5, 7 [3]	20
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
All compulsory modules (modules 0, 1, 2, 6, 8, 9, 10) Group Design Project Individual Research Project	60 40 80
ELECTIVE MODULES:	
Two elective modules from modules 3, 4, 5, 7 [4]	20
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of

[3] ***As module 4 is a pre-requisite for module 5, students who wish to undertake module 5 must also select module 4***

[4] ***As module 4 is a pre-requisite for module 5, students who wish to undertake module 5 must also select module 4***

your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [5]

- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Part-time students register for the course in January and are expected to complete the course within 3 years.

The MSc course consists of three major components – the taught part (eight modules of 10 credits each), the group design project (40 credits) and the individual research project (80 credits).

The taught component includes six taught compulsory modules and two elective modules, which are selected by students out of four offered. The modules are distributed over the year to maintain time for part-time students for completing course works and keeping up with their work responsibilities without major out of work times. The course begins with the fundamentals on communication, infrared and optical systems (Apertures and Propagation), and progresses to the other subjects of signatures and imaging using AI, detection and tracking, sensor fusion and sensor resource management, and systems integration. The block of two elective modules (each student will select two out of four modules - 3, 4, 5, 7) appears after the compulsory modules 1 and 2. Four offered elective modules provide deeper knowledge and further training on electro-optics/infrared (EO/IR) systems, Radar Systems, electronic warfare (Radar and Communications Electronic Warfare) or communication (LOS/BLOS communication). The selection of two elective modules should account for dependencies between them. Due to module 4 (Radar Systems) being the pre-requisite for module 5 (Radar and Communications Electronic Warfare) selection of module 5 will result in the automatic selection of module 4 for PGDip and MSc qualifications. For the same reason selection of module 5 for the PGCert qualification will not be possible.

The taught modules are allocated two-week slots. The material delivery is usually planned in week 1, with lectures in the morning and laboratory, practical sessions or case studies in the afternoon. The following week is largely free of structured teaching, so that the students are given enough reflection time for assignments or other course work.

The students (all part-time) are recommended to complete 6 modules in the first year (Apertures and Propagation, Signatures and Imaging Using AI, two elective modules - selected from four offered, Detection and Tracking and Sensor Fusion) and the remaining two taught modules (Sensor Resource

[5] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

Management and Systems Integration) and the Group Design Project in the second year. The final year is expected to be focused on the Individual Research Project.

7. Course Level Assessment Strategy[6]

The taught modules are assessed by submitted coursework, to encourage students to develop an appropriate written style. This also ensures that students are given enough time to research the subject, critically think about the topic at hand and provide a critical assessment of it. It enables students to absorb more information that will be stored in their long-term memory. Students can thus expect to have 8 pieces of assessment by submitted coursework. Course work may consist of problem-solving exercises, an assessment of a case study or a critical thinking piece. These different types of individual coursework will allow the student to develop different but complementary analytical and written skills.

The assessment tasks are challenging and enable students to demonstrate a full range of skills and attributes. Taught modules are introducing various practical aspects of communication, sensor, optical and other systems and will be assessed through essays and reports. These will be of varying lengths, recognising that writing articles to a short length can be more challenging for some and can develop different skills relevant to professional practice. Therefore, the length of each assessment task may be constrained within the module descriptors.

While preparing the assignment reports students will gain the skills they require to succeed in the area of manned and autonomous aerial systems and to address the specific award ILOs 1-8.

A number of formative tasks including group discussion, case studies and oral presentations support the taught modules and the group design project. Formative feedback is provided verbally within the classroom following discussions, via a written summary for case studies from the module leader and oral feedback provided by the tutor and peers for presentations. Students will also engage with an interactive learning activity, which incorporates formative feedback.

In addition, all students undertake a group design project (GDP), that is assessed by an individual presentation and group report. This provides the opportunity for the students to develop their communication skills and their ability to work effectively in groups. Students are expected to design, implement, test and validate an advanced aerial platform system or system component, applying the knowledge acquired in the taught modules and integrating the various concepts learnt. The GDP aims at providing the students with the experience of working on a collaborative engineering project, satisfying the requirements of a potential customer and respecting deadlines. These activities will address ILOs 6-10.

Finally, following completion of the taught modules, all students will complete an individual research project (IRP) that addresses a significant challenge in technologies related to manned or autonomous aerial systems, providing an opportunity to implement the knowledge learnt to solve a real-life problem. The IRP will assess both their written and oral presentation skills, through a submitted thesis and oral examination. The thesis will be based on a structured programme of research and should satisfactorily demonstrate the student's ability to conduct original investigations, test ideas (whether their own or those of others) and obtain appropriate conclusions from the work. The course industrial advisory board consisting of BAE staff and selected by BAE customers proposes the topics of the IRPs. Students are generally expected to be more self-directed in their learning during this research project and guidance will be provided by academic supervisors. The IRP addresses ILOs 9 and 10 and takes the form of a thesis and a final presentation of the student to the teaching team.

The 3-part assessment approach (coursework, GDP and IRP) has been adopted in order to ensure that students demonstrate their understanding of the taught modules and their capability to apply the knowledge learnt in real-life applications both through working as a group and through individual research.

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[6] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

The following modules outline all parts of the programme leading to MSc. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within [illegible]	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
0	N-SC-CID	Course Induction	Dr Ivan Petrunin	12	0	0	N	28/02/2024	28/02/2024	28/02/2024	N/A	N/A	N/A				N/A	N/A
1	N-SC-AP	Apertures and Propagation	Dr Ivan Petrunin	28	0	10	N	11/03/2024	11/03/2024	22/03/202	50	ICW	100				19/04/2024	June 2024
2	N-SC-SIAI	Signatures and Imaging Using AI	Dr Yang Xing	28	0	10	N	29/04/2024	29/04/2024	10/05/2024	50	ICW	100				10/06/2024	Sept 2024
3	N-SC-EOIR	Electro-optics and Infrared Systems	Dr Ivan Petrunin	32	0	10	N	01/07/2024	01/07/2024	12/07/2024	50	ICW	100				12/08/2024	Oct 2024

[7] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[8] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[9] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[10] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education.
[11] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[12] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*)*. If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[13] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within [illegible]	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
4	N-SC-RS	Radar Systems	Dr Alessio Balleri	30	0	10	N	02/09/2024	02/09/2024	13/09/2024	50	ICW	100				14/10/2024	Jan 2024
5	N-SC-RCEW	Radar and Communications Electronic Warfare	Dr Ioannis Vagias	32	0	10	N	14/10/2024	14/10/2024	25/10/2024	50	ICW	100				25/11/2024	Feb 2025
6	N-SC-DT	Detection and Tracking	Prof. Hyo-Sang Shin	28	0	10	N	02/12/2024	02/12/2024	13/12/2024	50	ICW	100				27/01/2025	Apr 2025
7	N-SC-LBC	LOS/BLOS Communications	Dr Saba Al-Rubaye	28	0	10	N	17/02/2025	17/02/2025	28/02/2025	50	ICW	100				31/03/2025	June 2025
8	N-SC-SF	Sensor Fusion	Prof. Hyo-Sang Shin	28	0	10	N	31/03/2025	31/03/2025	11/04/2025	50	ICW	100				12/05/2025	Sept 2024
9	N-SC-SRM	Sensor Resource Management	Prof. Hyo-Sang Shin	28	0	10	N	12/05/2025	12/05/2025	23/05/2025	50	ICW	100				23/06/2025	Oct 2025
10	N-SC-SI	Systems Integration	Prof. Gokhan Inalhan	30	30	10	N	23/06/2025	23/06/2025	04/07/2025	50	ICW	100				04/08/2025	Nov 2025
11	N-SC-GDP	Group Design Project	Prof. Gokhan Inalhan	20	0	40	N	21/07/2025	21/07/2025	16/01/2026	50	IPRES GCW	25 75				30/01/2026 16/01/2026	At the next available opportunity which may not be until the course runs the

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within [illegible]	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
																		following year
12	N-SC-IRP	Individual Research Project	Dr Ivan Petrunin	20	0	80	N	13/02/2026	13/02/2026	11/02/2027	50	THESIS IPRES	85 15				11/02/2027 11/03/2027	At the next available opportunity which may not be until the course runs the following year

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module

8. How are the ILOs assessed?

The following assessment types are utilised:

Individual Coursework assignment, Group Course Work, Thesis and Individual presentations.

This approach has been adopted because:

MSc-level assessment of Intended Learning outcomes (ILOs) in the area of Engineering requires the students to exhibit a deep knowledge and comprehension of the topic, but also the capability of the students to synthesise and evaluate complex strategies for problem-solving. Thus, in many practical engineering subjects, this can be readily done relying on individual coursework assignments that are based upon realistic applications and problems.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5
1 Apertures and Propagation	ICW	ICW		ICW	ICW
2 Signatures and Imaging Using AI		ICW		ICW	ICW
3 Electro-optics and Infrared Systems	ICW		ICW	ICW	ICW
4 Radar Systems	ICW			ICW	ICW
5 Radar and Communications Electronic Warfare			ICW	ICW	ICW
6 Detection and Tracking		ICW	ICW	ICW	
7 LOS/BLOS Communications	ICW	ICW		ICW	ICW
8 Sensor Fusion			ICW	ICW	
9 Sensor Resource Management			ICW	ICW	ICW

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 6	ILO 7	ILO 8
1 Apertures and Propagation			
2 Signatures and Imaging Using AI			
3 Electro-optics and Infrared Systems			
4 Radar Systems			
5 Radar and Communications Electronic Warfare			
6 Detection and Tracking			
7 LOS/BLOS Communications			
8 Sensor Fusion			
9 Sensor Resource Management			
10 Systems Integration	ICW	ICW	ICW
11 GDP	GCW	GCW IPRES	GCW IPRES

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 9	ILO 10
11 GDP	GCW IPRES	GCW
12 IRP	THESIS IPRES	THESIS

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

Upon completing this course, the graduates are expected to improve their career perspectives within BAES being more valuable resources after attending the program, broaden their career options, e.g. through enabling promotion to new positions and generally improve their attractiveness to the market.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: March 2021/June 2024

1. What is the course?

Course information

Course Title	MSc in Strategic Marketing
Course code	MSSTMFTC, PDSTMFTC, PCSTMFTC
Academic Year	2023/24
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time
Location(s)[1] of Study	Cranfield Campus
School(s)	School of Management
Theme	Leadership and Management
Centre	Centre for Strategic Marketing Sales (CSMS)
Course Director	Dr Sharifah Alwi; Deputy Course Director Dr Tamira King
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/A
Is the Degree apprenticeship integrated or non-integrated?	N/A
Is the Mastership offered as an open and/or closed course?	N/A
Teaching Institution	Cranfield University
Admissions body	Cranfield University

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Full-time MSc - one year
Course Start Month(s)	September

Institutions delivering the course

This course is delivered by School of Management primarily the Centre for Strategic Marketing and Sales with a variety of industry and practice-oriented research interests.

The Centre for Strategic Marketing and Sales: For over thirty years, Cranfield School of Management has been renowned throughout the world for its pragmatic, state-of-the-art approach to marketing and sales. Some of the world's foremost organisations from GFMCG through to not-for-profit have sponsored research through our Centre for Strategic Marketing and Sales (CSMS). The Centre focuses on the areas of marketing that are at the forefront of today's commercial environment, developing valuable ideas and new insights into current and future business practice.

The CSMS is also home to the following specialist research groups:

- Customer Management Forum
- Key Account Best Practice Club

Through our applied research, we feed best practice into our curriculum and make certain that it is second to none in dealing with practical and current marketing issues.

The experiences of our highly respected faculty and the crucial links we maintain with a diverse range of industries ensures that you receive a topical and global perspective of marketing, delivered by some of marketing's most highly respect and influential thinkers.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

The School of Management has received accreditation from three high profile international organisations:

- EQUIS, the European Quality Improvement System, established by the European Foundation for Management Development (efmd).
- AACSB – Association to Advance Collegiate Schools of Business.
- AMBA - Association of MBAs

The School of Management is one of just a handful of schools to be accredited by the three accreditation bodies AACSB, AMBA and EQUIS.

The MSc in Strategic Marketing course also benefits from accreditation by the premier UK professional bodies in marketing Chartered Institute of Marketing (CIM) and the Market Research Society (MRS).

Candidates are able to undertake the MRS Advanced Certificate in Market and Social Research besides their MSc taught programme, on an optional basis. Students who have completed both the Advanced Certificate and the Cranfield MSc, and who have work experience in market research, are also encouraged to apply for membership

The course is also accredited with the CIM and students who have completed the Cranfield MSc in Strategic Marketing programme are eligible for maximum exemptions from the Chartered Institute of Marketing's Certificate in Professional Marketing (Level 4) and Diploma in Professional Marketing (Level 6). You are also encouraged to apply for membership.

2. What are the aims of the course?

Cranfield University offers this course in order to:

- Provide an advanced and thoroughly research-grounded marketing course for students preparing for a career in marketing or who are looking to advance their careers in marketing either in the UK or overseas.

The course includes a Postgraduate Certificate (60 credits) and Postgraduate Diploma (120 credits) exit point for students who do not satisfactorily complete all components of the taught course element and the thesis.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Demonstrate a systematic application and a critical awareness of current research in strategic marketing, customer management, and market analysis together with the capacity to evaluate its relevance to industrial and commercial practice.

ILO 2. Acquire and use information effectively in several media, including the increasing range of networked information resources.

ILO 3. Demonstrate originality in the application of knowledge, including data and information collected by the student, in relation to a series of projects focussing on live marketing problems.

ILO 4. Display self-direction and originality in tackling and solving problems.

ILO 5. Work effectively both individually and in teams at a professional level.

ILO 6. Demonstrate the qualities and transferable skills necessary for employment requiring exercise of initiative and personal responsibility in a real world, marketing context.

ILO 7. Display conceptual understanding that enables the student to critically evaluate current research and/or methodologies, develop critiques of them and, where appropriate, adapt them in the contact of both advanced scholarship and their selected elective subject.

ILO 8. Critically understand, have experience with, and confidently be able to apply marketing theories, tools and techniques and will have practised implementing these theories and tools in a variety of situations including case studies, group projects and an individual thesis.

ILO 9. Demonstrate the ability to identify the appropriate marketing framework for the issue or situation under consideration, to apply the tool or technique accurately, and to develop appropriate marketing strategies using such frameworks.

ILO 10. Display practical capabilities in marketing research: data gathering, data analysis and interpretation, report writing and presentation skills.

ILO 11. Demonstrate independent learning abilities in the practical application of marketing tools and techniques to current marketing issues.

ILO 12. Communicate clearly and effectively both orally and in writing and be able to make presentations appropriate for communication to their academic audience and to the practitioners in any organisations involved

4. How is the course taught?

Cranfield places great emphasis on personal development through a teaching style that sets us apart from our rivals. The programme has been developed to produce practical, proactive strategic marketers, so our teaching methods are specifically geared toward encouraging participation, self-development and team working.

Teaching and learning methods focus on the application of learning.

The acquisition of knowledge and understanding is achieved via taught lectures, learning from others in a small team environment (the Learning Team) and students' personal study.

Case studies and examples drawn from practice play a significant role in teaching and learning about translating theory into practice and about applying marketing frameworks to practical situations. Additional practical expertise will be provided through visiting lecturers.

The students are taught research methods as part of the thesis process. This includes critical literature appraisal and search methods. The thesis requires them to apply these skills.

Students are encouraged to reflect on their learning throughout the programme.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 8. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. **Postgraduate Certificate**

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
6 modules from modules 1-12	60
ELECTIVE MODULES:	
N/A	N/A
TOTAL:	60

B. **Postgraduate Diploma**

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
11 modules from modules 1-12 (must include 10 credit MRM and 20 credit BIA module)	120
ELECTIVE MODULES:	
N/A	N/A
TOTAL:	120

C. **MSc**

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Modules 1-12 Thesis (13)	130 70
ELECTIVE MODULES:	
N/A	N/A
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in September and are expected to complete the course within 11 calendar months.

The course is run in either two streams or in only one stream (depending on the size of the cohort).

7. Course Level Assessment Strategy[4]

The used assessment strategy for the programme is to permit students to apply, wherever possible, the knowledge and skills acquired to real life organisational situations. The assessment methods employed on the programme are varied and allow students to demonstrate the acquisition of the full range of programme knowledge and skills outcomes. The assessment strategy is designed ranging in a variety of means in order to ensure students achieve the learning outcomes and are prepared for facing the challenges of strategic marketing in the real world.
Although no one method will focus solely on one particular outcome type (a range of outcomes being assessed by each method) those that place most significant emphasis on knowledge and understanding include essays, exams, reports (based on real life project or case related topics), case study analysis, exam, presentations, group projects and the dissertation.
These different kinds of assessments will help in demonstrating students' acquired/developed leadership skills and their delegation, development and management capabilities. Allow students to create structured and systematic pieces of work where they can show also their creative, originality and self-direction capabilities. Also, will help students to gain core skills of nowadays managers such as the capability to synthesize, share and communicate ideas and solutions to a range of audiences in a global context as well as the ability to cope with time pressure. Furthermore, the use of traditional techniques, such as exams, will also be a part of the portfolio of assessment as this is seen as a complementary assessment strategy to ensure a deep learning and that the acquired knowledge is consolidated and replicated in a critical way so that the work produced is that of the student.
This programme includes some elements of group work and group projects. It is recognised by employers that team working skills are essential and students need to be able to demonstrate that they can work in groups and develop solutions in a collaborative environment. This programme has been developed to bring theory to life and wherever possible assess students in a way that reflects professional practice. In almost all modules, students will be asked to work in teams and their success is often based on the success of work developed with fellow professionals. The programme will help students gain a range of skills that are vital to professional roles they will hold in the future. Students will benefit from peer learning which enhances university experience and can contribute to overall success.
Finally, in this programme, we applied an integrated assessment approach for the following reasons

1- To improve the student learning journey
2- Consolidated assessment approach to test for the breadth of knowledge and synthesized learning and learning outcomes.
3- Provides a more coherent and better narrative or road map for the programme
4- Vastly reduced but more comprehensive and consolidated assessment approach
5- To update the course in line with advice from the Practice Advisory Board
6- Provide better position fit with Cranfield position of linking theory to practice.

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

MSc

The following modules outline all parts of the programme leading to **MSc.** Other awards associated with the course include some or all of these modules.

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
0		M-T-IND	SOM MSc Induction Week	Dr Sharifah Alwi & Dr Tamira King			0			25/09/2023	29/09/2023		AO						
1		M-K/SMP	Strategic Marketing and Planning	Prof Vasilis Theoharakis	20		10	N	02/10/2023	02/10/2023	19/10/2023	40	Integrated assessment ICW 100%	100				09/11/2023	

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice

[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)

[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.

[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.

[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
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2		M-K/COB	Consumer Behaviour	Dr Sharifah Alwi	20		10	N	03/10/2023	03/10/2023	12/10/2023	40							
3		M-K/MCP	Marketing Consulting Project	Prof Stan Maklan	20		10	N	02/05/2024	02/05/2024	10/05/2024	40	GPRES	100				10/05/2024	
4		M-K/AFS	Accounting and Finance for Strategic Marketing	Dr Matt Nnadi	20		10	N	24/10/2023	24/10/2023	02/11/2023	40	EX	100				11/12/2023	
5		M-K/MBS	Managing Brands	Dr Sharifah Alwi	20		10	N	05/02/2024	05/02/2024	14/02/2024	40	GPRES	100				04/03/2024	
												40	Integrated ICW	100				ICW: 21/03/2024	
6		M-K/IMC	Integrated Marketing Communications	Dr Marwa Tourky	20		10	N	06/02/2024	06/02/2024	16/02/2024								
7		M-K/DIR	Digital and Social Media Marketing	Dr Annmarie Hanlon	20		10	N	23/02/2024	23/02/2024	07/03/2024								

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
8		M-K/ROM	Retailing and Omnichannel Management	Dr Tamira King	20		10	N	09/01/2024	09/01/2024	31/01/2024	40	Integrated Assessment ICW 100%	100					
9		M-K/CRM	Customer Relationship Marketing and Customer Experience	Dr Tamira King	20		10	N	21/11/2023	21/11/2023	07/12/2023							26/02/2024	
10		M-K/SKM	Strategic Sales	Javier Marcos-Cuevas	27		10	N	09/01/2024	09/01/2024	02/02/2024	40	ICW	100				20/02/2024	
11		M-K/MRM	Marketing Research Methods	Dr Konstantina Papadopoulou	20		10	N	13/11/2023	13/11/2023	17/11/2023	40	ICW	100				14/03/2024	
12		M-K/BIA	Big Data, Insights and Analytics	Dr Konstantina Papadopoulou	60		20	N	09/04/2024	09/04/2024	23/04/2024	40	EX ICW	50 50				03/06/2024 17/05/2024	
13		M-K/THS	Thesis – review and	Dr Konstantina	10		70	N	20/11/2023	20/11/2023	24/04/2024	50	THESIS	100				06/09/2024	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
			submission process	Papadopoulou															

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**

8. How are the ILOs assessed?

The following assessment types are utilised:

Individual Coursework, Group Coursework, Group Presentation, Examination and Thesis.

This approach has been adopted because:

To encourage different ways of learning and to probe the achieved learning from different perspectives.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

Award ILOs / Module No.	**ILO1**	**ILO2**	**ILO3**	**ILO4**	**ILO5**	**ILO6**	**ILO7**	**ILO8**	**ILO9**	**ILO10**	**ILO11**	**ILO12**
1 SMP	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
2 COB	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
3 MCP	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
4 AFS	✓	✓	✓		✓	✓		✓	✓		✓	✓
5 MBS	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
6 IMC	✓	✓	✓		✓	✓		✓	✓		✓	✓
7 DIR	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
8 ROM	✓	✓	✓	✓	✓	✓		✓			✓	✓
9 CRM	✓	✓	✓	✓	✓	✓		✓			✓	✓
10 SKM	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
11 BIA	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12 MRM												
13 THS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)
Integrated Assessment	Strategic Marketing and Planning; Consumer Behaviour	ICW	100
Integrated Assessment	Integrated Marketing Communications; Digital and Social Media Marketing;	ICW	100
Integrated Assessment	Retailing and Omnichannel Management; Customer Relationship Marketing and Customer Experience;	ICW	100

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

According to the latest study of our graduate careers by the Career Development Service, 93% of the MSc in Strategic Marketing class of 2014/15 were employed within three months of formal graduation.

48% of students changed country after graduation and 36% of non-UK based students were employed in the UK. The average global basic salary post course was £32,000, and the average total salary increase after Cranfield was £16,000.

The average age of the cohort was 24 years and 59% of the course was female.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc Sustainability
Course code	MSc: MSSUSPTC MSc Apprenticeship: MSSUSPAC PgDip: PDSUSPTC PgCert: PCSUSPTC
Academic Year	2023/2024
Valid entry routes	MSc, PgDip, PgCert, Apprenticeship MSc, Short course (for CPD or credit; selected modules only)
Additional exit routes	PgDip, PgCert. For apprentices these exit routes are only available by exception if apprentices have to withdraw from apprenticeship due to a change of circumstance that leads to ineligibility
Mode of delivery	PT, Online (with an annual Spring School in March each year for f2f activities)
Location(s)[1] of Study	Cranfield, Client Site and Online
School(s)	SOM | SWEE
Theme	Management | Environment & Agrifood
Centre	Strategy, Entrepreneurship & Sustainability | Centre for Environmental and Agricultural Informatics
Course Director	Dr Rosina Watson | Dr Kenisha Garnett
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	Yes
Apprenticeship Standard the course is mapped to	Sustainability Business Specialist

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Is the Degree apprenticeship integrated or non-integrated?	Integrated
Is the Mastership offered as an open and/or closed course?	Open
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements. Students enrolled for an integrated Master's apprenticeship degree require Level 2 English and Maths. An IELTS score of 6.5 is required by students for whom English is not a first language. Applicants who do not have a degree can apply, providing they are able to demonstrate high levels of achievement, exceptional career progression or evidence of technical and/or leadership potential in a sustainability role.
UK Qualifications Framework Level	QAA FHEQ level 7 integrated degree (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	2.5 years (apprenticeship route); 3 years (non-apprenticeship route)
Course Start Month(s)	March, September (From 24/25)

Institutions delivering the course

This course is delivered by the School of Management and the School of Water, Energy and Environment where the research interests include:

University-wide research and teaching related to emergent areas of national government policy such as the Government’s Green Jobs ambition and its Clean Growth Strategy (e.g. Net Zero Emissions).

Our Schools' shared research draws on the University's grand challenges (e.g. Green Technologies and Connected Resilience) to demonstrate the value of a more multidisciplinary approach for the green economy.

The course reflects the research/teaching ambition of our Schools, drawing on management and environmental science to enable businesses to be more resource-efficient leading to bottom line benefits and to better prepare for greener regulation (e.g. Net zero emissions).

Cranfield University interacts with the following institutions and in the following ways:

1) As the course is delivered online, students will have access to Cranfield's learning facilities made accessible via our virtual learning environment (Canvas)
2) Students enrolled as apprentices on the integrated degree apprenticeship will be allocated an apprenticeship tutor who will act as a coach and mentor, supporting student progression including guidance on the integrated end-point assessment gateway requirements
3) Apprenticeship students are sponsored by their employers who provide direct support to the course in the form of informal input to support reflective practice within their current role and support coursework and the integrated work-based thesis (i.e. end point assessment) through the provision of information and other practical support.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is accredited formally by IEMA (Institute for Environmental Management and Assessment) until March 2023.

The Institute of Environmental Management and Assessment (IEMA) have pre-accredited the apprenticeship standard so graduating apprentices will also receive professional recognition as Practitioner Member of IEMA. Depending on their experience prior to the course, they could also receive recognition as a Full Member of IEMA, and become a 'Chartered Environmentalist.'

IEMA has carried out an evaluation of the knowledge, skills and behaviours (KSBs) gained through the L7 Integrated Sustainability Business Specialist apprenticeship standard and have confirmed that institutions approved for course delivery will meet IEMA accreditation requirements. The Standard stipulates an Integrated Degree, so graduating apprentices will be awarded an MSc Sustainability as well as becoming Sustainability Business Specialists. IEMA accreditation provides a badge of credibility for UK employees/employers and will similarly boost the career prospects of students abroad who seek internationally recognised sustainability credentials. IEMA have committed to marketing the course (non-exclusively) to their members.

To ensure we meet the requirements of the Standard and IEMA's accreditation, we have

1) mapped the course and module-level ILOs and end-point assessment against the KSBs for the apprenticeship degree standard (see Appendix 1)
2) designed our delivery to provide a blend of academic and professional learning principles, applied through the course modules and the work-based thesis project, covering different KSBs within the apprenticeship standard
3) evaluated requirements for an integrated degree, ensuring the MSc is achieved by students successfully completing the academic components alongside participating in meeting the apprenticeship standard

We have also been in discussions with the Institute of Corporate Sustainability and Responsibility (ICRS) who will also market the course to their members.

2. What are the aims of the course?

This course is designed to provide a distinct and collaborative learning experience to employees working in sustainability-related roles to enable them to become Sustainable Business Specialists

The MSc will be delivered through online learning and networking activities with some face-to-face learning delivered through 'Spring School' events at Cranfield. Whilst students are welcome as company-sponsored apprentices and as independently funded candidates, the learning experience for all students will be in the spirit of an apprenticeship and include a combination of academic and work-based learning, drawing on faculty's direct involvement in global sustainability businesses/research and the professional experience of a diverse student cohort to ensure graduates gain the advanced theoretical knowledge and practical skills to be able to evaluate complex environmental and social challenges, develop effective sustainability strategies which respond to these and lead their implementation.

This learning experience is based on the following inter-related aims:

1) To develop a group of sustainability leaders who will deliver real change in their organisations and play an integral role in their community;
2) To deliver a mix of technical and leadership (management/business) skills that will enhance the knowledge of sustainability practice; i.e. improvements in the environmental, social and governance performance of the business;

3) To create a sustainability mindset capable of understanding the relationship between business and society, including the market drivers of sustainability, in order to build a business case for integrating sustainability into practice, recognising the importance of creating value for all stakeholders;
4) To build sustainability leadership and behaviour in self and others to meet the complex sustainability challenges and the changes required;
5) To build competencies, self-awareness and confidence to operate effectively as 'change leaders' and 'visionaries' in a team and to effectively communicate the sustainability agenda to internal and external stakeholders.

The Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) entry and exit routes are available for non-apprenticeship students who wish to access only parts of the course provided. Six modules (as indicated in Section 5A below) are also offered as short courses which can be attended individually, either as continued professional development, or to gain credits (on successful completion of module assessment).

The Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) entry routes are not available for apprentices and these exit routes are available strictly by exception if apprentices have to withdraw from apprenticeship due to a change of circumstance that leads to ineligibility.

This programme is intended for the following range of students:

Our MSc Sustainability will support professionals who are either new to their sustainability role or aspire to attain a senior sustainability position within their organisation, as it develops a good blend of technical and management/leadership skills and builds an understanding of the materiality impact of sustainability in key industry areas and the means to deliver a sustainability strategy in the current business environment. The course is suitable for:

1) Sustainability professionals at various management levels or working within a matrix management structure who are keen to improve / enhance their sustainability skills, knowledge and abilities, and become more effective leaders.
2) Employees who are new to their sustainability role, whether leading or employed within a team of dedicated experts, who are keen to build their sustainability skills, knowledge and abilities, and apply these in their workplace.
3) Employees in other functional areas (e.g. operations, procurement) for whom sustainability is becoming an increasingly important aspect of their role, and who want to build their knowledge and skills in this area, and be equipped to lead their function to align with their organisation's sustainability strategy.
4) Entrepreneurial individuals who are looking to develop their sustainability skills, knowledge and abilities to start a new business or grow an existing business in a sustainable way and through effective leadership.

Students are welcome either as company-sponsored apprentices and as independently funded candidates.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate in Sustainability (completion of 6 taught modules)

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Evaluate the global sustainability challenges and opportunities by examining how these translate, via the influence of stakeholders, to drivers for sustainability and formulating responses to these through applying key organisational levers for change.

ILO 2. Develop life cycle and systems thinking to understand environmental and social impacts, evaluate an organisation's material sustainability impacts, and build the business case for integrating sustainability into practice to create more competitive, resilient business models

ILO 3. Design and implement an effective performance management system that targets business critical environmental and social impacts by setting, evaluating and incentivising action against key performance indicators

ILO 4. Create effective internal and external stakeholder communication and engagement strategies to enable collaborative value creation across economic, environmental and social dimensions

B. **Postgraduate Diploma in Sustainability (completion of 12 taught modules)**

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 5. Distinguish what skills, competencies and leadership are needed to promote an organisational culture of sustainability, enabling continuous learning for innovation, sustainable growth and resilience.

C. **MSc in Sustainability (completion of 14 modules + work-based project / practice-based thesis)**

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

For students on the Apprenticeship MSc route:

ILO 6. Define a research question based on a sustainability opportunity or challenge faced by an organisation/employer, develop aim(s) and objectives, select and execute a methodology (e.g. case study), analyse data, critically evaluate findings and draw justifiable conclusions and recommendations, demonstrating self-directed application of learning and originality of thought.

ILO 7. Communicate research findings via a work-based thesis report and defend the findings in an oral presentation and technical interview with an independent assessor.

ILO 8. Develop your reflective practice by documenting how you have applied learning from the taught modules in your professional life by means of portfolio of evidence that records and tracks the development and application of the knowledge, skills and behaviours required by the sustainability business specialist apprenticeship standard.

For students on the MSc (non-apprenticeship) route:

ILO 6 (a). Define a research question based on a sustainability opportunity or challenge faced by an organisation/employer, develop aim(s) and objectives, select and execute a methodology (e.g. case study), analyse data, critically evaluate findings and draw justifiable conclusions and recommendations, demonstrating self-directed application of learning and originality of thought.

ILO 7 (a). Communicate research findings via a work-based thesis report and defend the findings in an oral presentation.

ILO 8 (a). Develop your reflective practice by documenting how you have applied learning from the taught modules in your professional life

Annex 1 below maps the course modules to the knowledge, skills and behaviours (competencies) (KSBs) set out in the apprenticeship standard. Module leaders used their knowledge and experience to indicate how the learning outcomes of their respective modules will deliver against these KSBs.

4. How is the course taught?

Students will be supported in their learning and personal development by:

The course is delivered mostly online to minimise carbon emissions and facilitate inclusive participation, with each module taught online on alternate Fridays over a 6-week period (c.20 hours of live online teaching). Each year Cranfield will convene a 3-day 'Spring School' in March to bring cohorts together with their peers, faculty and industry representatives. The face-to-face activities at the Spring Schools (held in March) will complement your online learning and include sessions on research skills, a sustainable futures games, a campus innovation tour, a consultancy project and annual keynote speaker events.

The Spring Schools play a vital role in bringing the cohort together with their peers, faculty and industry representatives, providing opportunities to build relationships with your peers, network with faculty and industry representatives, enhance social learning and to deepen your connections with the course and Cranfield. As cohorts come back each year, the Spring Schools will also enable multiple cohorts, and course alumni to meet and connect.

The course will be supported by an online portal on "Canvas" where all course materials will be available as you work your way through. There will be an area for your personal reflective work and also to interact with your cohort.

A key feature of the curriculum will be 'professional learning', with a focus on providing you with the skills, qualities and attributes required by industry and professional bodies (e.g. IEMA). In practice, this will require deeper learning in relation to your professions, including opportunities for work-integrated learning and industry engagement through interaction with associate faculty and guest lecturers. We anticipate this will be provided through opportunities for (1) industry practitioner delivery, (2) industry coaching and mentoring of students and (3) industry case studies.

You will also be supported in their learning and personal development by:

1) being placed in mixed professional groups to encourage peer learning
2) adopting active learning sets and industry-led coaching and mentoring sessions (delivered through master classes and Spring School events) that will support and deepen 'professional learning'
3) various online learning and self-directed learning resources, accessible via Canvas, to support a range of learning abilities
4) being assigned to an apprenticeship tutor (apprentice students) or a course tutor (independent students). Apprentices should expect to meet with their apprenticeship tutor every 4 -6 weeks, and with their apprenticeship tutor and employer together every 12 – 16 weeks to review progress, guide reflective practice; and support the collation of your required portfolio of evidence. Independent students similarly should expect to meet their course tutor every 4 – 6 weeks to review progress and guide reflective practice.

Further information on how we will support students in their learning and personal development can be found in Appendices 2 and 4. Appendix 2 depicts the students' learning journey throughout the course. This 'journey map' will be developed into an interactive infographic to help students navigate each element of the course and situate themselves within their overall learning development. Appendix 4 details how technology enhanced learning will support the virtual delivery of the course.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
2. Principles of Sustainability* 3. Leading Sustainable Business* 6. Performance Management and Reporting	10 10 10
ELECTIVE MODULES:	
30 credits from the following modules: 1. Personal Leadership for Sustainability 4. Sustainability and Environmental Assessment 5. Economics of Sustainability 7. Environmental Risks: Hazard, Assessment and Management* 8. Risk Communication and Perception* 9. Environmental Innovation 10. Sustainable and Circular Supply Chains 11. Circular Innovation 12. Strategic Foresight* 13. Social Entrepreneurship 14. Sustainability in Practice	10 10 10 10 10 10 10 10 10 10 10
TOTAL:	**60**

* also available as an award bearing short course

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
2. Principles of Sustainability 3. Leading Sustainable Business 6. Performance Management and Reporting	10 10 10
ELECTIVE MODULES:	
90 credits from the following modules: 1. Personal Leadership for Sustainability 4. Sustainability and Environmental Assessment 5. Economics of Sustainability 7. Environmental Risks: Hazard, Assessment and Management 8. Risk Communication and Perception 9. Environmental Innovation 10. Sustainable and Circular Supply Chains 11. Circular Innovation 12. Strategic Foresight 13. Social Entrepreneurship 14. Sustainability in Practice	10 10 10 10 10 10 10 10 10 10 10
TOTAL:	**120**

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete all 14 taught modules as well as a work-based thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
1. Personal Leadership for Sustainability 2. Principles of Sustainability 3. Leading Sustainable Business 4. Sustainability and Environmental Assessment 5. Economics of Sustainability 6. Performance Management and Reporting 7. Environmental Risks: Hazard, Assessment and Management 8. Risk Communication and Perception 9. Environmental Innovation 10. Sustainable and Circular Supply Chains 11. Circular Innovation 12. Strategic Foresight 13. Social Entrepreneurship 14. Sustainability in Practice Work-based Project (apprenticeship route) / Practice-based Thesis (non-apprenticeship route)	10 10 10 10 10 10 10 10 10 10 10 10 10 10 60
ELECTIVE MODULES:	
N/A	
TOTAL:	**200**

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria
The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
    - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Part-time students register for the course in March. Students on the apprenticeship route are expected to complete the course within 2.5 years (aligned with the Apprenticeship Standard), while students on the non-apprenticeship route are expected to complete the course in 3 years (aligned with the University's policy).

The MSc in Sustainability comprises taught modules (140 credits) and a work-based thesis (60 credits).

The taught programme, delivered over 24 months (2 years), comprise a sequence of 14 modules. Each module is taught online on alternate Fridays over a 6-weeks period for a total of 20 hours (see draft course calendar in Appendix 3). Online teaching sessions will be structured with some preparation (5 hours) set for asynchronous learning access prior to the start of the module. Student-led learning and group work online, some of which will be facilitated by faculty, is an integral part of the learning on modules, while other periods free of structured teaching/learning will allow time for independent learning and reflection, as well as working on module assessments. Module assessments will be due for submission 6 weeks from the start of the taught module.

The work-based project (or thesis for independently funded students is delivered over a 6-month period following completion of the taught programme (see draft course calendar in Appendix 3). For apprentices, the academic progression board and apprenticeships office will assess whether the student has met all EPA gateway requirements before progressing to their work-based project. These requirements comprise: successful completion of all taught modules; submission of portfolio of evidence and definition and submission of an outline of their proposed work-based project.

Appendix 5 provides an outline of course management (staff roles, and responsibilities) and details the level of support staff will provide to students to support their engagement.

Learning

The part-time nature of the course requires considerable time for independent research and study. We will work with Cranfield Technology Enhance Learning Team to develop student-centred learning activities, employing a range of techniques to deliver learning content in the modules (e.g. case studies, videos). We will make use of quizzes, opinion polls, participative software such as Padlet to stimulate and review the learning. Many modules include the use of case studies, simulation activities and work-based activities to build skills that directly apply to work.

Teaching

The course applies a range of teaching methods, including individual and interactive group learning sessions, according to particular module specifications. Core sustainability theories and frameworks will be applied to relevant sectors (e.g. food supply chain, agriculture, water, energy, environment), drawing on the expertise of faculty to relate these to organisations. Case studies and simulation exercises will be incorporated to illustrate sustainability in practice. Industry associates will be incorporated at both module and course level (i.e. Spring Schools) to share their sustainability experiences.

7. Course Level Assessment Strategy[4]

The assessment is aligned to the course learning outcomes, which has a core purpose of equipping students to develop a deep understanding of the drivers for sustainability, their material impacts and the relationship between the organisation, society and the environment.

The faculty have thought carefully about the student experience for this course. With students potentially working alongside their studies, and over a prolonged period of time, the variety and spacing of the assessments is critical. The course uses a combination of existing and new modules, and the assessment is varied across these. These range from personal reflective portfolios or case study analysis to podcasts and posters. The assessment has also been considered in relation to the markers and overlaps with other commitments, and any support that will be required to manage this if the intake is above a certain threshold.

The work-based project which students complete in the final 6 months of their course presents a unique opportunity for the student to a tackle a specific sustainability issue or initiative for their organisation with the support of Cranfield University experts. The project will require students to consult their employer (or selected third party organisation for independent students not in employment) in order to address a sustainability opportunity or challenge at work and build a business case to support action, while at the same time developing their research and project management skills, including providing the ability to think and work in an original way, contribute to knowledge, make concrete recommendations, and communicate through a written thesis and oral exam, and for apprentices, a technical interview.

Students will receive guidance on research methods in their first Spring School and guidance on writing their thesis and preparing for oral examinations at their third (final) Spring School.

On completion of the taught programme, apprenticeship will have to fulfil the EPA gateway requirements noted above before progressing to their work-based project.

Apprentices will write a work-based project report (c. 18,000 words) and deliver an oral presentation of their project, which will be graded by an independent end-point assessor appointed by Cranfield as the end point assessment organisation (EPAO) for this integrated degree. They will also conduct a technical interview with the independent assessor which will also be graded by the assessor.

Independently funded students will write up their project in the form of a work-based thesis (c.12,000 words) and deliver an oral presentation of their thesis, which will be marked by their Cranfield supervisor and a second independent Cranfield academic.

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

The following modules outline all parts of the programme leading to MSc. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark7 - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
0	SUST-IND	Induction	Rosina Watson/ Kenisha Garnett	12	0	0	N	N/A	05/03/24	08/03/24	AO	N/A	N/A				N/A	N/A
1	MX-SU-PLS M23	Personal Leadership for Sustainability	Richard Kwiatkowski	20	0	10	N	16/02/2024	05/03/24	06/03/25	40	ICW	100				06/02/26	
2	I-EMB-A1122	Principles of Sustainability	Paul Burgess	20	0	10	Y	15/03/24	22/03/24	03/05/24	40	ICW	100				17/05/24	

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education.
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*)*. If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark7 - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
	M23																	
3	M-M/LSB M23	Leading Sustainable Business	Rosina Watson	20	0	10	Y	10/05/24	17/05/24	14/06/24	40	ICW	100				28/06/24	
4	N-ACE-SEA M23	Sustainability and Environmental Assessment	Gill Drew	25	0	10	Y	21/06/24	28/06/24	26/07/24	40	ICW	100				09/08/24	
5	MX-SU-EOS M24	Economics of Sustainability	Andrew Angus	20	0	10	N	06/09/24	13/09/24	11/10/24	40	GCW	100				25/10/24	
6	MX-SU-PMR- M24	Performance Management and Reporting	Gill Drew / Adam Faiers	20	20	10	N	18/10/24	25/10/24	22/11/24	40	ICW	100				06/12/24	
7	I- ERM-A2005 M24	Environmental Risks: Hazard, Assessment and Management	Monica Rivas Casado	20	0	10	Y	29/11/24	06/12/24	17/01/25	40	ICW	100				31/01/25	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark7 - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
8	I-ERM-A2014 M24	Risk Communication and Perception	Theresa Mercer	20	0	10	Y	24/01/25	31/01/25	28/02/25	40	ICW GPRES	70 30				14/03/25	
9	I-EMB-A1128 M24	Environmental Innovation	Alice Johnston	20	0	10	Y	04/03/25-07/03/25	14/03/25	11/04/25	40	ICW	100				25/04/25	
10	MX-SU-SCSC M24	Sustainable and Circular Supply Chains	Hendrik Reefke	20	0	10	N	02/05/25	09/05/25	06/06/25	40	GCW	100				20/06/25	
11	MX-SU-CIN M24	Circular Innovation	Adriana Encinas-Oropesa	20	0	10	N	13/06/25	20/06/25	18/07/25	40	ICW	100				01/08/25	
12	I-EMB-A1005 M25	Strategic Foresight	Kenisha Garnett	20	0	10	Y	25/07/25	05/09/25	03/10/25	40	ICW	100				17/10/25	
13	M-E/SEM M25	Social Entrepreneurship	Mel McLaren	20	0	10	Y	10/10/25	17/10/25	14/11/25	40	ICW	100				29/11/25	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark7 - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
14	MX-SU-SIP M25	Sustainability in Practice	David Grayson	20	20	10	N	21/11/25	28/11/25	09/01/26	40	ICW	100				23/01/26	
15 a	MX-SU-WBP M25	Work-based project (end-point assessment)	Rosina Watson	20	0	60	N	TBC	TBC	TBC	50	IPROJ OR OR (Interview)	40 10 50				TBC	
15 b	MX-SU-THS M25	Practice-based thesis (individual thesis project	Rosina Watson	20	0	60	N	TBC	TBC	TBC	50	THESIS OR	90 10				TBC	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
I-EMB-A1122	Principles of Sustainability	Environmental Management for Business	Environmental Management for Business Future Food Sustainability EngD Sustainable Materials and Manufacturing Sustainability (SWEE/SOM)
M-M/LSB	Leading Sustainable Business	Full Time MBA	Sustainability (SWEE/SOM)
N-ACE-SEA	Sustainability and Environmental Assessment	Renewable Energy-Management	Environmental Engineering (Jiangsu) Environmental Management for Business Future Food Sustainability Global Environmental Change Sustainability (SWEE/SOM)
I-ERM-A2005	Environmental Risks: Hazard, Assessment and Management	Environmental Engineering	Environmental Engineering Water – WIRE Sustainability (SWEE/SOM)
I-ERM-A2014	Risk Communication and Perception	Environmental Management for Business	Environmental Management for Business Sustainability (SWEE/SOM)
I-EMB-A1128	Environmental Innovation	Environmental Management for Business	Environmental Management for Business Sustainability (SWEE/SOM)
I-EMB-A1005	Strategic Foresight	Environmental Management for Business	Environmental management for business Future food sustainability Engineering Management (Jiangsu) Sustainability (SWEE/SOM)
M-E/SEM	Social Entrepreneurship	Management and Entrepreneurship	Management and Entrepreneurship Management and Corporate Sustainability Sustainability (SWEE/SOM)

8. How are the ILOs assessed?

The following assessment types are utilised:

A range of assessment types are adopted on modules and includes opportunities to provide both summative and formative feedback on assessments. Faculty uses a combination of assessments, including individual and group coursework, personal reflective portfolios, critical reviews, case study analysis and a podcast. A common form of assessment on the more technical (SWEE) modules are written assessments based on a case study or a specific scenario, where students work often in groups to interrogate a problem, design a solution and then produce individual reports that extend their thinking and knowledge, applying the scenario to their own contexts (e.g. organisation, country). The leadership and management (SOM) modules are similar, but include some unique forms of assessments such as reflective reports supported by reflective portfolios and the creation of an A1 poster communicating the outcomes of and reflections on a simulation game. Other assessments require students to engage in a consultancy type project with a specific 'client' organisation, where they must propose viable solutions to sustainability-related challenges or opportunities presented by the case organisation. The format and length of assessments vary to reflect the wide variety of forms of communication students need to deploy effectively in their workplaces, from presentations and short executive summaries to more in-depth reports and proposals as well as reflections on personal development.

Where possible, module assessments will allow students to express their agency by providing them with a choice of topic, domain or organisation in a component of the assessment.

This approach has been adopted because:

A number of key factors influenced the choice of assessment method. First, the focus of the course is the application of learning in an organisational context and developing professional skills. Second, the majority of students will be in role with their employers and therefore combining their studies with their professional duties. Thirdly, students will be engaging remotely with their learning and with each other. We have therefore designed an assessment strategy which focuses on the practical application of learning in the students own workplace, or in the context of a case study or client organisation. We have used a variety of assessment methods to offer variety to students, as well as to help them develop their analysis and communication skills across a variety of mediums. We have included group work to help build cohorts, while recognising that too much conducted online can be onerous for students. Finally, we have included elements of self-reflective activities which will help student to develop their own self-awareness and be better prepared to evidence their learning progression, which will be of particular importance to apprenticeship students.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4
1				ICW
2	ICW			ICW
3	ICW	ICW		ICW
4		ICW	ICW	
5		GCW	GCW	
6	ICW	ICW	ICW	

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4
7	ICW			ICW
8	ICW			ICW
9	ICW	ICW		
10		GCW		GCW
11	ICW	ICW	ICW	
12	ICW			ICW
13		RP		
14				ICW

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO5
1	ICW
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	RP
14	ICW

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO6	ILO7	ILO8	ILO6 (a)	ILO7 (a)	ILO8 (a)
15a PROJECT	IPROJ	OR	OR*			
15b THESIS				THESIS	OR	OR

*for apprentices OR comprises both the oral presentation of the work-based project report and a technical interview

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.

2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

While it is likely that most of the graduates on the course will already be in employment, we anticipate completion of the course will support career progression and have identified a number of roles/functions in the organisation that would be suitable to graduates including those who may opt to set up their own businesses/consultancies. These sustainability roles were identified during a market analysis to develop a business case for the course (further details are in Appendix 7).

On successful completion of the course and the work-based thesis, all graduates will hold an MSc in Sustainability. Graduating apprentices will, in additional become accredited as 'Sustainable Business Specialists', and hold IEMA Practitioner or Full Member status (depending on their experience prior to starting the course).

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc in Sustainable and Digital Banking (Retail)
Course code	MSSBNPAC, MSSBNPTC, PCSBNPTC, PDSBNPAC, PDSBNPTC
Academic Year	2023/24
Valid entry routes	MSc in Sustainable and Digital Banking
Additional exit routes	PgCert, PgDip
Mode of delivery	Part-time; blended
Location(s)[1] of Study	Cranfield University and Metro Bank Premises
School(s)	School of Management
Theme	Leadership and Management
Centre	Finance & Economics
Course Director	Dr Lakshmy Subramanian
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	Yes
Apprenticeship Standard the course is mapped to	Level 7 Senior Investment/Commercial Banking Professional
Is the Degree apprenticeship integrated or non-integrated?	Non-integrated
Is the Mastership offered as an open and/or closed course?	Open
Teaching Institution	Cranfield University
Admissions body	Cranfield University

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	MSc - part-time - maximum of 5 years PG Certificate – 3 years PG Diploma – 4 years
Course Start Month(s)	December

Institutions delivering the course

This course is delivered by Cranfield School of Management where the research interests include:

A wide range of management functions, as well as specialist knowledge and interest in aspects of Economics and Finance relevant to the Financial Services Industry.

Cranfield University interacts with the following institutions and in the following ways:

All students will undertake both a group consulting project and an in-company project and will be expected to present their findings to senior managers from the organisation involved;
Each module will incorporate input from senior managers/practitioners where appropriate;
Some of the modules require learning teams to engage with an organisation to audit their approach;

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is accredited by the Chartered Banker Institute. As a result, the students will obtain a Chartered Banker Diploma (professional qualification), following successful completion of the taught modules (PGDip) as well as an MSc, following successful completion of the thesis.

2. What are the aims of the course?

The PGDip/MSc in Sustainable and Digital Banking (RDB) will provide students with an advanced-level conceptual foundation of the various dimensions of retail banking (and product management) and several aspects of general management (e.g., analysis of the economic environment, financial management, organisational management, marketing and business strategy). The MRB is developed on the basis of the Senior Investment/Commercial Banking Professional (Level 7) Apprenticeship Standard, which requires the completion of a professional qualification, hence the PGDip as an additional entry route. This course incorporates SOM's experiences and learning from both the Master in Finance & Management as well as the MSc in Management and the Executive MBA. The proposed course will be particularly attractive to financial institutions who want to use their apprenticeship levy to develop their early career employees in retail banking.

The aim of the programme is to add value to applicants' first degrees by developing individuals' knowledge and skills, necessary for them to perform effectively and efficiently in the highly competitive and fast changing retail and digital banking sector.

The programme also aims at improving learners' critical awareness of management and organisations and enhancing their skills to successfully address financial and, more generally, management challenges in their banks. In addition, the workplace-based project allows learners to tackle a substantial product management task within their organisations, under the guidance of academic supervisors. Upon completion of the programme, the learners should be able to advance their careers within the retail and digital banking sector and contribute to the enhancement of banks' performance.

The objectives are fivefold:

1. To prepare students to tackle the world of retail and digital banking, partly through a strong balanced focus between theoretical perspectives and application. The learning objectives are based on those set out in the Senior Investment/Commercial Banking Professional apprenticeship standard and will be applied in practice during simulations, case study discussions, role plays within the taught part and in the workplace-based project.
2. The advanced study of retail and digital banking, the analysis of changing external context (particularly the digital environment) in which retail banks operate as well as the general management of banks
3. Development of a range of business knowledge and skills, including ethical behaviour and an ethical approach to business, together with self-awareness and personal development appropriate for career progression
4. Development of the ability to apply concepts and theories to complex management issues, both systematically and creatively, to advance the effectiveness and competitiveness of the employing organisation
5. Enhancement of lifelong learning through the development of transferable intellectual and study skills, personal development to enable self-direction and creativity, in order to contribute to business, the economy and society at large.

This programme is intended for the following range of students:

Primarily employees of banking institutions:

- with a technical background (e.g. IT, mathematics, etc) who wish to gain a good knowledge of finance, management and retail banking
- with a background in finance, who wish to have a fine-grained understanding of the link between finance, management and technology in financial services.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Diploma (PG Dip) in Sustainable and Digital Banking

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Examine the role of the Financial Services Industry and, in particular, of retail and digital banking in the wider economy.
ILO 2. Identify effectively key business objectives and measurements of success.
ILO 3. Relate the Financial Services legal and regulatory framework and ethics to their purpose.
ILO 4. Explain the purpose, technical content, features and benefits of financial service (including digital) products and services that they support and deliver to clients/ customers
ILO 5. Assess the client/customer segments that the organisation delivers to, the various channels, including the digital channel, that they use and the approach to delivering fair client/customer outcomes across the business in a financial services setting, including best practice
ILO 6. Identify the organisation's technical policies and procedures, as well as the systems, tools and processes used in the role, together with the standards to be met.
ILO 7. Lead others in the development of strategic and operational plans; effectively planning service delivery for their teams, as appropriate.
ILO 8. Take ownership of the business changes from development through to implementation.
ILO 9. Evaluate complex information quickly and draw accurate conclusions.

B. MSc in Sustainable and Digital Banking

In completing this course, and achieving the associated award, a diligent student should be able to achieve the ILOs stated above in *A* (i.e. ILOs 1 to 9). In addition, the student should also be able to:

ILO 10. Engage and carry out an evidence-led project within a financial organisation which engages in retail and digital banking and critically discuss it in a substantial project report, developing justified recommendations and/or action plans. The student should demonstrate self-guided project and analytical skills, initiative and critical thinking when producing the report.

4. How is the course taught?

Students will be supported in their learning and personal development by:

Part-time students register for the course in September and are expected to complete the course within 2 years. They are expected to attend sessions one day a month at Cranfield University.
Tutorial support throughout the course, including meetings with a personal tutor regularly.
Extensive use is made of Canvas as a means of delivering material to support and augment classroom learning.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 8. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate (PG Cert) in Sustainable and Digital Banking

A PG Cert will be awarded on successful completion of 60 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Module 0 Modules 7; Any Modules 1-6, 8-12	0 60
ELECTIVE MODULES:	
N/A	0
TOTAL:	60

To be eligible for the PG Certificate students must successfully complete Module 7 Retail Banking and Product Management.

B. Postgraduate Diploma (PG Dip) in Sustainable and Digital Banking

A PG Dip will be awarded on successful completion of 120 credits as outlined below.

Description	Credits
COMPULSORY MODULES:	
Module 0 Module 7 Modules 1-6, 8-11	0 20 100
ELECTIVE MODULES:	
N/A	0
TOTAL:	120
Chartered Banker Diploma: Modules 1-12	130

Students are required to achieve 130 credits (all modules from 1-12) to be eligible for the professional qualification ***Chartered Banker Diploma*** provided that a minimum average mark of 50% is achieved following successful completion of all taught modules.

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists, and the student meets the requirements of that lower award.

C. MSc in Sustainable and Digital Banking

An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Module 0 Modules 1-12 Thesis	0 130 70
ELECTIVE MODULES:	
N/A	0
TOTAL:	200

If the MSc is completed successfully, the student will also obtain the professional qualification ***Chartered Banker Diploma*** provided that a minimum average mark of 50% is achieved following successful completion all taught modules.

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
    - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Part-time students register for the course in September and are expected to complete the course within two to three years.

7. Course Level Assessment Strategy[4]

The assessment tasks are challenging and enable students to demonstrate a full range of skills and attributes. The initial modules introduce students to the rigour of academic writing, and assessments are in the form of essays and reports. These will be of varying lengths, recognising that writing articles of a short length can actually be more challenging and can develop different skills relevant to professional practice. The length of each assessment task is clearly stated within the module descriptor and the requirements for each will be discussed by the module leader. Some modules will include a number of formative tasks including group discussions, case studies, and oral presentations. Formative feedback is given verbally within the classroom following discussions and presentations, and written feedback given for submitted assignments.

Students have opportunities to develop their communication skills, as they are required to give both group and individual presentations. The ability to work effectively in groups is a highly desirable skill and this is developed throughout the course, specifically through the two group projects. The taught components precede the research project, so assessment can be used to develop skills required for the thesis phase. The two group projects help develop skills in reviewing literature, developing appropriate research methods, collecting and analysing data, and drawing appropriate conclusions. This builds the skills necessary for the individual thesis, where students are generally expected to be more self-directed in their learning, whilst being guided by an academic supervisor. The 10,000-word thesis is expected to be both academically rigorous and beneficial to their organisation in terms of addressing a specific business issue

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules – September 2022

The following modules outline all parts of the programme leading to **MSc.** Other awards associated with the course include some or all of these modules.

[efsModule Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments[9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
0		MXR-IND F23	SOM Induction Module	Prof Catarina Figueira	6		0	N		04/12/23	04/12/23	N/A	AO					AO	
1		MXR/ESFS Occ F23	Economics of Sustainable Financial Services	Dr Lakshmy Subramanian	16		10	N		15/01/2024	26/02/24	40	GCW	100				02/04/24	
2		MXR/OBM Occ F23	Organisational Behaviour for Managers	Dr Lyn Lanka	16		10	N		11/03/24	08/04/24	40	ICW	100				29/05/24	

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andrological reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

efsModule Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
3		MXR/FMRE Occ F23	Financial Markets, Regulation and Ethics	Dr Nemanja Radic	16	20	10	N		15/04/24	20/05/24	40	ICW	100				26/06/24	
4		MXR/ACB Occ F23	Accounting for Business	Dr Irfan Ansari	16		10	N		10/06/24	08/07/24	40	ICW	100				05/08/24	
5		MXR/DIB Occ F23	Digital Banking	Dr Lakshmy Subramanian	16	20	10	N		22/07/24	16/09/24	40	ICW	100				21/10/24	
6		MXR/FIN Occ F24	Financial Management	Dr Wasim Ahmed	16		10	N		16/09/24	28/10/24	40	ICW	100				09/12/24	
7		MXR/SRB Occ F24	Sustainable Retail Banking	Dr Lakshmy Subramanian	32	40	20	N		11/11/24	24/03/25	40	ICW	100				22/04/25	
8		MXM/P2M Occ F24	Programme and Project Management	Dr Stephen Carver	16		10	Y		13/01/25	27/01/25	40	GCW GPRAC	50 50				17/02/25 17/02/25	
9		MXR/MAM Occ F24	Modelling & Analysis for Management	Dr Andy Angus	16		10	N		07/04/25	19/05/25	40	GCW	100				16/06/25	
10		MXR/NPSD Occ F24	New Product and Service Development	Dr Abdelkader Aoufi	16		10	N		09/06/25	23/06/25	40	GCW	100				14/07/25	
11		MXR/MKT Occ F24	Strategic Marketing	Dr Marwa Tourky	16		10	N		07/07/25	15/09/25	40	ICW	100				20/10/25	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

efsModule Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
12		MXR/SBKA Occ F25	Sustainable Banking Research in Action	Dr Lakshmy Subramanian	16		10	N		13/10/25	08/12/25	40	ICW	100				10/11/25	
13		MXR/THS Occ F24	Thesis	Prof Catarina Figueira			70	N		31/03/25	29/09/25	50	THS	100				09/02/26	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
MXM/P2M	Programme & Project Management	Exec MBA	MSc Sustainable & Digital Banking

8. How are the ILOs assessed?

The following assessment types are utilised:

The programme uses a range of assessment types. In addition to written examinations, students undertake a wide range of group and individual projects. These assessments provide excellent training for writing business reports. Students will also be exposed to simulations. Towards the end of the programme there will be the opportunity for students to work on company based projects, assessed through a presentation and a written report.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

Award ILOs / **Module No.**	***ILO 1***	***ILO2***	***ILO3***	***ILO4***	***ILO5***	***ILO6***	***ILO7***	***ILO8***	***ILO9.***	***ILO10.***
Economics of Sustainable Financial Services	GCW	GCW			GCW					
Accounting for Business						ICW				
Financial Markets, Regulation and Ethics			IPRAC							
Digital Banking				ICW						
Financial Management						ICW				
Organisational Behaviour for Managers						ICW		ICW		
Sustainable Retail Banking	ICW	ICW		ICW	ICW			ICW	ICW	
Sustainable Banking Research in Action							ICW	ICW		
Project and Programme Management							GCW GPRAC	GCW GPRAC		
New Product & Service Development				GCW			GCW			

Award ILOs / Module No.	*ILO 1*	*ILO2*	*ILO3*	*ILO4*	*ILO5*	*ILO6*	*ILO7*	*ILO8*	*ILO9.*	*ILO10.*
Strategic Marketing				ICW	ICW					
Modelling & Analysis for Management									GCW	
Thesis										THS

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	**Modules Covered**	**Assessment**	
		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6-year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey.

The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

We expect that, following completion, the students will be able to progress faster in their career, particularly within the financial sector industry.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	Systems Engineering[1]
Course code	MSSEEPTC - PDSEEPTC - PCSEEPTC – MSSEEPAC - SPSEEPTC
Academic Year	2023-2024
Valid entry routes	MSc and PgDip
Additional exit routes	PgCert, PgDip
Mode of delivery	Part-time Blended Learning
Location(s)[2] of Study	Cranfield and Distance
School(s)	Cranfield Defence and Security
Theme	Defence and Security
Centre	Centre for Systems and Technology Management
Course Director	Sean Price
Awarding Body	Cranfield University
Is this an AP Contract course?[3]	No
Is this course offered as a Cranfield Mastership?	Yes
Apprenticeship Standard the course is mapped to	Systems Engineer (Degree) Apprentice
Is the Degree apprenticeship integrated or non-integrated?	Non-integrated
Is the Mastership offered as an open and/or closed course?	Open

[1] This course includes a closed pathway specialising in defence
[2] If any part of this course is delivered at another site, please note which one(s) here
[3] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	The Standard University Entry Requirements. IELTS of 7 is normally required
UK Qualifications Framework Level	QAA FHEQ level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	3 years MSc, and 2 years PgDip
Course Start Month(s)	September

Institutions delivering the course

This course is delivered by the Centre for Systems, Technology and Management (CSTM) within Cranfield Defence and Security where the research interests include:

Foundations of Systems Engineering (SE), Systems Engineering Education, Model Based Systems Engineering (MBSE), Simulation and Modelling, Software Intensive Systems, Dependability and Resilience, Autonomy, Test and Evaluation, Operational Analysis and Decision Support, Human Factors, Project and Programme Management and Enterprise Management.

Cranfield University interacts with the following institutions and in the following ways:

All of our industrial students are sponsored by their employers, who provide direct support to the course in the form of informal input to theses and provision of information to support coursework and projects.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is not accredited by any external bodies.*

We will be seeking accreditation which will allow the successful student to be able to apply for a Chartered Engineer (CEng) status through IET.

2. What are the aims of the course?

- Cranfield University offers this MSc in application domain independent systems engineering (SE) to prepare students for professional practice in SE roles in multi-disciplinary teams across a range of industries.

- The course content and delivery focus on SE professionals working in distributed, agile teams using shared models and flexible working approaches. With an emphasis on professional skills such as leadership, team working, communication, data management, ethics, etc.

- While the course is of value for anyone in a current SE role or preparing for such a role, it is of specific value to those organisations developing SE professionals through the Systems Engineer Degree Apprenticeship (SEDA) scheme, formerly known as the Systems Engineering Master's Apprenticeship Programme (SEMAP).

This programme is intended for the following range of students:

- Experienced and or qualified engineers, scientists, managers or leaders wishing to broaden and deepen their skills or apply them in systems engineering or systems engineering related roles.

- Recent graduates wishing to extend their knowledge and skill within systems engineering professional roles.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate in Systems Engineering (Exit Route Only)

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Appraise the value of systems science foundational knowledge to enhance decision making and solution development in complex industrial or government environments comprising people, technology, time and budget

ILO 2. Assess the application of a Model-Based Systems Engineering (MBSE) approach to life cycle processes to the development of cost-effective, timely and effective complex systems

ILO 3. Manage the relationships between system engineering and Project, Programme and Portfolio Management (P3M) in the context of the wider business environment

ILO 4. Evaluate the contribution of the systems engineering processes and methods to the design of effective systems across application domains

B. Postgraduate Diploma in Systems Engineering

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 5. Evaluate the application of systems engineering to a range of industrial or government enterprise challenges

ILO 6. Formulate the correct systems engineering patterns, models, methods and tools needed for a successful integrated systems engineering approach

ILO 7. Manage the integration of different specialist design disciplines, to enable the development of successful systems using modern technologies

ILO 8. Analyse complex systems properties such as security, safety, usability, reliability, and apply appropriate systems engineering methods and specialist knowledge to ensure they are correctly dealt with across the system life cycle

ILO 9. Assess and defend SE professional practices required to undertake systems engineering or management roles as part of an integrated multi-disciplinary team

C. Master of Science in Systems Engineering

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 10. Acquire, organise, discuss and assess knowledge associated with complex engineering problems

ILO 11. Plan, organise and undertake a piece of research with appropriate supervision

ILO 12. Assemble the appropriate methods, tools techniques and knowledge to apply to a complex problem

ILO 13. Gather and critically appraise data, and to utilise it within the appropriate academic and practical context

ILO 14. Prepare a written submission to effectively communicate findings

4. How is the course taught?

Students will be supported in their learning and personal development by:

Our education philosophy which is led by the basic principles of:

- Research led teaching through a course team that are active practitioners and researchers
- Technology enhanced learning to maximise the student learning experience
- Learning through a mixture of formative and summative feedback and assessment using a variety of methods

Full use will be made of blended learning, combining independent distance learning material via the VLE with online and onsite contact. A wide variety of remote learning methods and materials will be used across the course. This is structured around a core of recorded lecture material and supporting text, with additional multimedia methods employed to maximise student learning time and approaches. This may include audio podcasts and audio-visual multimedia-based resources such as vodcasts and both internal and externally produces documentaries. Traditional books and academic papers also form a component of the learning approach mix.

Online Quizzes, hosted on the VLE, enable students to test their understanding of the concepts and methods used covered in the modules. Where there are deficiencies, the quiz provides instant feedback and directs the student to the module resources that require further development or improvement to ensure they are best placed for their summative assessment.

Individual and group exercises, face-to-face or online, will allow students to apply specific methods or skills, formative feedback will always be given using a combination of pre-prepared answers, peer review and direct staff feedback. This specific feedback may then be further discussed during asynchronous discussions or synchronous tutorial sessions.

Case studies are used to bring together content from across the modules and illustrate practical and domain specific issues as the course progresses. This will allow all students to study the same content and then to apply what they have learned to examples from different application domains (e.g. Defence, Rail, Automotive, Distribution, Medical, Transportation, etc.) or technology areas.

To maximise student support and feedback a number of approaches to student contact and formative feedback will feature heavily across the course:

- Asynchronous online discussion: To ensure full formative feedback and support, students will have access to VLE hosted discussion forums that will enable peer-to-peer and academic-student discussion, questions and answers about the concepts and approaches to their work. This may include discussion of specific exercises or general student questions

- Synchronous tutorials: real-time discussions with peers and academics delivered online or face-to-face will allow exchange of ideas, answering of questions and general discussion, providing academics with an ability to provide constructive dialogue with - and to challenge - students.

- Short Residential workshops will bring together group exercises, review of online discussions and face to face tutorials. Longer residential workshops will also form a significant part of the workshop modules.

Dedicated support by Learning Services ensures adoption of consistent online learning design using a robust suite of developed tools and interactions. This is supplemented with an induction and learner support online package focussing on study skills and independent learning.

Direct access to the library to supplement the online catalogue and face-to face discussions with staff are all benefits of this blended approach to learning.

In addition, students will be supported in their learning and personal development:

- The provision of an academic mentor who is available to support and advise the student on academic issues
- Access to a Flexible Education Coordinator for pastoral care and to help in navigating and choosing modules to ensure appropriate progression. This will include checks for suitability where learners are taking modules from different streams.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits[4] through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction	0
Introduction to Systems and Systems Engineering	10
Systems Thinking in Practice	10
Systems Definition	10
System Design and Realisation	10
ELECTIVE MODULES:	
20 credits from the advanced modules 3, 6 - 13	20
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits[5] through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction	0
Introduction to Systems and Systems Engineering	10
Systems Definition	10
Systems Thinking in Practice	10
Enterprise Systems Engineering	10
System Design and Realisation	10
Systems Engineering Application Workshop	20
Research Methods	10
ELECTIVE MODULES:	
40 credits from the advanced modules 6 – 13	40
TOTAL:	120

[4] Senate Regulations require a minimum of 60 learning credits to be accumulated for the Award of PgCert. The number of learning credits for individual courses is set during course validation.

[5] Senate Regulations require a minimum of 120 learning credits to be accumulated for the Award of PgDip. The number of learning credits is set during course validation.

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Induction Introduction to Systems and Systems Engineering Systems Definition Systems Thinking in Practice Enterprise Systems Engineering System Design and Realisation Systems Engineering Application Workshop Research Methods	0 10 10 10 10 10 20 10
ELECTIVE MODULES:	
40 credits from the advanced modules 6-13	40
Thesis	80
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [6]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award

[6] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
    - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Part-time students register for the course in September and are expected to complete the course within 3 years for the MSc, 2 years for the PgDip.

All taught modules are worth 10 credits and have an indicative requirement for 100 hours of study in total.

The Introduction to Systems and Systems Engineering module is a pre-requisite for a number of other modules and is the first module students will take. All other pre-requisites are defined in the module descriptors.

The modules use a blended delivery approach over a period of 15 weeks including assessment. This is typically split into five 3-week units (with unit 5 containing the majority of the module summative assessment). Each unit combines distance learning and online asynchronous discussion with regular online synchronous contact with staff and fellow students. Residential workshops combining group exercises with face to face discussions are included in most modules. The exact date, duration and format of these tutorials/workshops are defined at module level.

To complete a 10 credit module over 15 weeks a student needs to study for an average of 6.67 hours per week. This average total study time includes independent online study, online and residential contact time, and any residential workshops. As the workshop modules have extended residential workshops they are run over 12 weeks. Students should expect to spend the same average time of 6.67 hours in the distance parts of these modules. The bended learning approach makes use of the flexibility of independent distance study, with appropriate peer-peer and staff-student contact to enhance key learning. This means that there will normally be regularly scheduled individual and group online activities each week, designed to maintain the nominal weekly average over the module duration. Students will not be allowed to get ahead of the module timetable, but it will be structured in such a way that students who fall behind due to other commitments can catch up without penalty. Students who fall too far behind or who miss critical module tutorials may need to defer completion of the module to a later date.

To complete the PgDip in 2 years students will need to study at least two modules in parallel. Hence, students should expect to spend an average of 13.33 hours per week over the two years period, and to attend any scheduled tutorials/workshops as defined.

The allowable overlap between modules where a pre-requisite exist, and any other limitations on module scheduling, are defined in the detailed module descriptions.

7. Course Level Assessment Strategy[7]

The practice of modern systems engineering is both group based and distributed. Our course is very much designed to focus on the needs of current SE practitioners or those wishing to become such. As such the

[7] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

assessment strategy for the award will focus not only on individual understanding but also on group contribution, potentially at a distance. Thus our students will participate in assessed individual and group exercises, the latter typically allowing them to be assessed not only on the group output but in their reflections of the exercise. Additionally, and to allow students to apply the ideas covered in each module within a realistic context, many of the modules will use case study based assignments. These may combine discussion of real world issues and how they drive SE application, examples of SE application applied to the case study context, exploration of how SE is applied in different industries or domains. As the course develops we will look for opportunities to bring in case studies from a range of sectors, allowing students who want to focus on SE applied to a particular sector, or to consider several sectors across the course".

Course modules

The following modules outline all parts of the programme leading to MSc. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[8]	Total hours delivered by Visiting[9]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[10] - 40% or 50%	Type of Assessment	Weighting within module[11] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[13]	Assessment Submission and/or exam date[14]	Assessment / Exam Retake date
0	R-SEE-IND	Induction[15]	Dr Steve Barker	3.5		0	Y	A: 25/09/23	**25/09/23 Face to face**	**28/09/23 Face to face** 28/09/23 (Module End Date)	N/A	AO	N/A				N/A	N/A

[8] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[9] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[10] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[11] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[12] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[13] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[14] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.
[15] Further occurrences may potentially run to accommodate students who register at difference points throughout the year

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[8]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[10] - 40% or 50%	Type of Assessment	Weighting within module[11] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[13]	Assessment Submission and/or exam date[14]	Assessment / Exam Retake date
1	R-SEE-ISSE	Introduction to Systems and Systems Engineering	Dr Steve Barker	30	0	10	Y	A: 02/10/23	02/10/23	03/11/23 (Module end date)	50	ICW	100				26/01/24	TBC
2	R-SEE-STIP	Systems Thinking in Practice	Dr Steve Barker	40		10	Y	A: 06/11/23	**05/12/23 Face to face**	**07/12/23 face to face** 15/12/23 (Module End Date)	50	ICW	100				26/01/24	TBC
3	R-SEE-ESE	Enterprise Systems Engineering	Kieran Holling	30		10	Y	A: 29/01/24	**05/03/24 Face to face**	**07/03/24 Face to face** 08/03/23 (Module End Date)	50	ICW	100				17/05/24	TBC
4	R-SEE-SD	Systems Definition	Rick Adcock	25		10	N	A: 11/03/24	**16/04/24 Face to face**	**18/04/24 Face to face**	50	ICW	100				17/05/24	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[8]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[10] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[11] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[13]	Assessment Submission and/or exam date[14]	Assessment / Exam Retake date
										19/04/24 (Module End Date)								
5	R-SEE-SDR	System Design and Realisation	Dr Tim Ferris	25		10	Y	A: 20/05/24	**25/06/24 Face to face**	**28/06/24 Face to face** 28/06/24 (Module End)	50	ICW	100				27/09/24	TBC
6	R-SEE-SCSE	Software and Cyber Systems Engineering	Dr Raju Pathmeswaran	25		10	N	A: 02/01/24	**06/02/24 Face to face**	**08/02/24 Face to face** 09/02/24 (Module End Date)	50	ICW	100				19/04/24	TBC
7	R-SEE-MS	Megaproject Systems	Dr Sean Price	30		10	N	Will not run in AY 23/24	Will not run in AY 23/24	Will not run in AY 23/24	50	ICW	100				N/A	N/A

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[8]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[10] - 40% or 50%	Type of Assessment	Weighting within module[11] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[13]	Assessment Submission and/or exam date[14]	Assessment / Exam Retake date
8	R-SEE-LCCSV	Life Cycle Cost and System Value	Dr Tim Ferris	25		10	N	A: 16/10/23	**23/11/23 Face to face**	**24/11/23 Face to face** 24/11/23 (Module End Date)	50	ICW	100				22/12/23	TBC
9	R-SEE-DR	Dependability and Resilience	Dr Tim Ferris	25	0	10	N	A: 04/09/23	**12/10/23 Face to face**	**13/10/23 Face to face** 13/10/23 (Module End Date)	50	ICW	100				22/12/23	TBC
10	R-SEE-HSE	Human Systems Engineering	Dr Fanny Camelia	25	0	10	N	A: 02/01/24	**08/02/24 Face to face**	**09/02/24 Face to face** 09/02/24 (Module End Date)	50	ICW	100				19/04/24	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[8]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[10] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[11] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[13]	Assessment Submission and/or exam date[14]	Assessment / Exam Retake date
11	R-SEE-DMS	Dynamic Modelling of Systems	Mr Sean Price	25	0	10	N	A: 12/02/24	**19/03/24 Face to face**	**20/03/24 Face to face** 22/03/24 (Module End Date)	50	ICW	100				19/04/24	TBC
12	R-SEE-SSEL	Simulation in the Systems Engineering Lifecycle	Mr Sean Price	25	0	10	Y	A: 16/10/23	**16/10/23 Face to face**	**24/11/23 Face to face** 24/11/23 (Module End Date)	50	ICW	100				22/12/23	TBC
13	R-SEE-CAS	Complex Adaptive Systems	Dr Steve Barker	40	0	10	N	A: 12.02.24	**12/03/24 Face to face**	**14/03/24 Face to face** 14/03/24 Module End date	50	ICW	100				19/04/24	TBC
14	R-SEE-RM	Research Methods	Dr Tim Ferris	10	0	10	N	A: 01/07/24	01/07/24	09/08/24(Module	50	ICW	100				27/09/24	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[8]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[10] - 40% or 50%	Type of Assessment	Weighting within module[11] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[13]	Assessment Submission and/or exam date[14]	Assessment / Exam Retake date
										End Date)								
15	R-SEE-SEAW	Systems Engineering Application Workshop	Dr Steve Barker	80	0	20	N	A: 22/04/24	**07/05/24 Face to face** **18/06/24 Face to face**	**08/05/24 Face to face** **20/06/24 Face to face** 19/07/24 (module end date)	50	GCW	100				12/08/24	TBC
16	R-SEE-THESIS	Thesis	Dr Steve Barker	50	0	80	N	A: 04/09/23	04/09/23	A: 05/09/24 (Module End Date)	50	THESIS	100				A: 05/09/24	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
R-SEE-IND	Induction	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-ESE	Enterprise Systems Engineering	Systems Engineering MSc	Defence and Security Programme
R-SEE-STIP	Systems Thinking in Practice	Systems Engineering MSc	Defence and Security Programme
R-SEE-SDR	System Design and Realisation	Systems Engineering MSc	Defence and Security Programme Systems Engineering Specialising in Defence
R-SEE-RM	Research Methods	Systems Engineering MSc	Systems Engineering Specialising in Defence
R-SEE-SSEL	Simulation in the Systems Engineering Lifecycle	Systems Engineering MSc	Systems Engineering Specialising in Defence
R-SEE-SCSE	Software and Cyber Systems Engineering	Systems Engineering MSc	Systems Engineering Specialising in Defence
R-SEE-DR	Dependability and Resilience	Systems Engineering MSc	Systems Engineering Specialising in Defence
R-SEE-DMS	Dynamic Modelling of Systems	Systems Engineering MSc	Systems Engineering Specialising in Defence
R-SEE-HSE	Human Systems Engineering	Systems Engineering MSc	Systems Engineering Specialising in Defence
R-SEE-THESIS	Thesis	Systems Engineering MSc	Systems Engineering Specialising in Defence

8. How are the ILOs assessed?

The following assessment types are utilised:

Formative Assessment

Across distance and residential modules students will be provided with feedback on a range of activities in order to grow their confidence ahead of summative assessment tasks. Formative assessment may take the form of peer review by fellow students, lecturers and module leaders with a variety of approaches being utilised. In some cases these formative exercises may include the creation of group portfolios and group presentations. In some cases formatively assessed work may be used as an input to summative assessment.

Summative Assessment.

The course uses a range of assessment methods including essays, literature reviews, individual reflections on formative assessment outputs and application of concepts to real world case studies:

When formatively assessed work is used as part of the summative assessment it must be clear that feedback has already been given and any summative tasks must build on this feedback

This approach has been adopted because:

The breadth of assessment methods are intended to cater for differing learning styles ensuring inclusion across the student cohort and minimising any potential disadvantage from limiting assessment types. For students completing the MSc, the individual thesis also requires students to be assessed on their written presentation skills

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4
1	ICW	ICW	ICW	ICW
2	ICW	ICW		
3	ICW		ICW	
4		ICW		ICW
5		ICW		ICW
6		ICW		ICW
7			GCW GPRES	
8			ICW	ICW
9		ICW		ICW
10		ICW		ICW
11		ICW		ICW
12	ICW			
13			ICW	ICW
14				

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9
1					
2					ICW

Award ILOs / Module No.	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9
3	ICW	ICW			ICW
4	ICW	ICW		ICW	
5		ICW	ICW		
6		ICW	ICW		
7	GCW GPRES	GCW GPRES	GCW GPRES		GCW GPRES
8		ICW		ICW	ICW
9		ICW		ICW	
10		ICW	ICW		
11	ICW	ICW			ICW
12		ICW	ICW	ICW	
13	ICW	ICW		ICW	
14					ICW
15	GCW	GCW	GCW	GCW	GCW

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 10	ILO 11	ILO 12	ILO 13	ILO 14
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14	ICW	ICW			ICW
15					
16	THESIS	THESIS	THESIS	THESIS	THESIS

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic

staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

The course aims to prepare students for professional roles in systems engineering in the modern enterprise.

Future graduates of this course will work in:

- Multi skilled teams collaborating on the development of complex, cross technology and cross domain solution to societal problems.
- Working in distributed teams based on shared models, making use of collaborative technologies for communication and work sharing.
- Following agile life cycle approaches in which customer, developer and other stakeholders work together to create iterative solutions which both add immediate value and build towards resilient solutions to larger problems

To fulfil their roles in this kind of working environment, a systems engineering professional will need:

- Full knowledge and skills in model based systems engineering approaches to core life cycle deliverables covering requirements, architectures, test and evaluation, in service support etc.
- A strong overview, plus relevant knowledge and skills, in related systems disciplines such as human system, AR&M, etc.
- The ability to use a range of systems engineering, management and design tools to support these activities.
- The ability to employ professional skills in leadership, ethics, data management and to understand their role in organisation governance and regulations.
- The ability to employ lifelong learning skills to refresh both their systems engineering skills and keep up to date with emerging technology issues

The above competencies are aligned with the SEDA specification, which is a key target for the course, but also align more generally with the competencies of future engineers as defined by the Engineering Council and relevant international professional societies.

The MSc in Systems Engineering prepares graduates to work in this environment, both in its course content and delivery methods

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision:	June 2024

1. What is the course?

Course information

Course Title	Course – Systems Engineering Pathway - Systems Engineering Specialising in Defence[1]
Course code	MSSERFTC, PDSERFTC, PCSERFTC
Academic Year	2023-24
Valid entry routes	MSc
Additional exit routes	PgCert, PgDip
Mode of delivery	Full-Time
Location(s)[2] of Study	Rabdan Academy and Distance
School(s)	Cranfield Defence and Security
Theme	Defence and Security
Centre	Centre for Systems and Technology Management
Course Director	Richard Adcock
Awarding Body	Cranfield University
Is this an AP Contract course?[3]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/A
Is the Degree apprenticeship integrated or non-integrated?	N/A

[1] This closed pathway is aligned with the MSc in Systems Engineering.
[2] If any part of this course is delivered at another site, please note which one(s) here
[3] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Is the Mastership offered as an open and/or closed course?	N/A
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	The Standard University Entry Requirement IELTS of 6.5 is normally required. A case for Exceptional Admissions with IELTS of 6.0 in all components with additional English Language support has been approved by Education Committee.
UK Qualifications Framework Level	QAA FHEQ level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	1 year MSc
Course Start Month(s)	August

Institutions delivering the course

This course is delivered by the Centre for Systems, Technology and Management (CSTM) within Cranfield Defence and Security where the research interests include:

Foundations of Systems Engineering (SE), Systems Engineering Education, Model Based Systems Engineering (MBSE), Simulation and Modelling, Software Intensive Systems, Dependability and Resilience, Autonomy, Test and Evaluation, Operational Analysis and Decision Support, Human Factors, Project and Programme Management and Enterprise Management.

Course delivery is in partnership with Rabdan Academy in the United Arab Emirates (UAE). The academy is accredited by the UAE's Commission for Academic Accreditation (CAA) of the Ministry of Education. The Academy is a government-owned world class education institution established to coordinate and enhance learning outcomes for organisations and individuals in the safety, security, defence, emergency preparedness and crisis management sectors.

The Academy is the first in UAE to provide learning in a dual approach, combining academic and vocational education in one place whilst recognizing prior learning and experience and providing accredited and transferable credit from course to course and job to job

Cranfield University interacts with the following institutions and in the following ways:

This course is a Full Time closed pathway of the MSc in Systems Engineering (SE). It will be delivered at Rabdan Academy for students sponsored by the United Arab Emirates (UAE) military. The UAE military provide direct support to the course in the form of informal input to theses, in country study support and provision of information to support coursework and projects

This specification covers the award of Cranfield's degrees only, which are subject to Cranfield's regulations only. The content is created and delivered by CU "Flying Faculty" at the Rabdan academy, support by Rabdan academic staff and support facilities.

Cranfield is aware that Rabdan may wish to award its own degree on the basis of successful completion of the Cranfield Programme(s) and any such further requirements which Rabdan may specify from time to time. Such award from Rabdan will be made in accordance with Rabdan's regulations and in accordance with such rules as may be applied by the Commission for Academic Accreditation (CAA), Ministry of Education (MOE) UAE.

This course is a Full Time closed pathway of the MSc in Systems Engineering (SE). It will be delivered at Rabdan Academy for students sponsored by the United Arab Emirates (UAE) military. The UAE military provide direct support to the course in the form of informal input to theses, in country study support and provision of information to support coursework and projects

This specification covers the award of Cranfield's degrees only, which are subject to Cranfield's regulations only. The content is created and delivered by CU "Flying Faculty" at the Rabdan academy, support by Rabdan academic staff and support facilities.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is not accredited by any external bodies.

We will be seeking accreditation which will allow the successful student to be able to apply for a Chartered Engineer (CEng) status through IET.

2. What are the aims of the course?

- Cranfield University offers the MSc in systems engineering (SE) to prepare students for professional practice in SE roles in multi-disciplinary teams across a range of industries.
- The course content and delivery focus on SE professionals working in distributed, agile teams using shared models and flexible working approaches. With an emphasis on professional skills such as leadership, team working, communication, data management, ethics, etc.
- The UAE pathway aims to provide these aims in the context of UAE defence applications and will place particular emphasis on relevant military case studies.
-

This programme is intended for the following range of students:

- Experienced and or qualified military personnel, engineers, scientists, managers or leaders wishing to broaden and deepen their skills or apply them in systems engineering or systems engineering related roles.
- Recent graduates wishing to extend their knowledge and skill within systems engineering professional roles.
- Experienced and or qualified military personnel, engineers, scientists, managers or leaders wishing to broaden and deepen their skills or apply them in systems engineering or systems engineering related roles.
- Recent graduates wishing to extend their knowledge and skill within systems engineering professional roles.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate in Systems Engineering (Exit Route Only)

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Appraise the value of systems science foundational knowledge to enhance decision making and solution development in complex industrial or government environments comprising people, technology, time and budget
ILO 2. Assess the application of a Model-Based Systems Engineering (MBSE) approach to life cycle processes to the development of cost-effective, timely and effective complex systems
ILO 3.
ILO 4. Manage the relationships between system engineering and Project, Programme and Portfolio Management (P3M) in the context of the wider business environment
ILO 5. Evaluate the contribution of the systems engineering processes and methods to the design of effective systems across application domains

ILO 6.

B. Postgraduate Diploma in Systems Engineering (Exit Route Only)

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 7. Evaluate the application of systems engineering to a range of industrial or government enterprise challenges
ILO 8. Formulate the correct systems engineering patterns, models, methods and tools needed for a successful integrated systems engineering approach
ILO 9. Manage the integration of different specialist design disciplines, to enable the development of successful systems using modern technologies
ILO 10. Analyse complex systems properties such as security, safety, usability, reliability, and apply appropriate systems engineering methods and specialist knowledge to ensure they are correctly dealt with across the system life cycle
ILO 11. Assess and defend SE professional practices required to undertake systems engineering or management roles as part of an integrated multi-disciplinary team

C. Master of Science in Systems Engineering

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 12. Acquire, organise, discuss and assess knowledge associated with complex engineering problems
ILO 13. Plan, organise and undertake a piece of research with appropriate supervision
ILO 14. Assemble the appropriate methods, tools techniques and knowledge to apply to a complex problem
ILO 15. Gather and critically appraise data, and to utilise it within the appropriate academic and practical context
ILO 16. Prepare a written submission to effectively communicate findings

4. How is the course taught?

Students will be supported in their learning and personal development by:

Our education philosophy which is led by the basic principles of:

- Research led teaching through a course team that are active practitioners and researchers
- Technology enhanced learning to maximised the student learning experience
- Learning through a mixture of formative and summative feedback and assessment using a variety of methods

Each module is delivered at the Rabdan Academy site by CU flying faculty, using face to face teaching supplemented by appropriate distance learning material via the Cranfield VLE. This is structured around

a core of lecture material and supporting text, with additional books, academic papers and multimedia methods employed to maximise student learning time and approaches.

Face to face lectures delivered in country will make up the majority of the teaching. These will be delivered by CU academics directly, or be delivered online by CU academics or guest lecturers. In all cases CU staff will be available at Rabdan academy to facilitate discussions and feedback. This will help to ensure the most relevant staff can deliver the material, but still ensure there is someone in the room to interact with the students.

Rabdan academic staff will support both the classroom and independent study periods. They will both provide another academic perspective and help ensure CU staff can fully engage with the students. CU academic staff are responsible for all aspects of the module content.

Case studies are used to bring together content from across the taught modules and illustrate practical and domain specific issues as the course progresses. This will allow all students to study the same content and then to apply what they have learned to examples from different application domains or technology areas. Additional case studies with direct relevance to the UAE students are used to focus the teaching material on topics relevant to this pathway.

Individual and group exercise, will allow students to apply specific methods or skills during each module. Formative feedback will always be given using a combination of pre-prepared answers, peer review and direct staff feedback. All formative exercises will start during the face to face teaching, but might then extend into the independent study time. When necessary, final discussion and feedback may be completed online, using a mixture of synchronous or asynchronous feedback.

Dedicated support by Learning Services ensures adoption of consistent learning design using a robust suite of developed tools and interactions. This is supplemented with an induction and learner support online package focussing on study skills and independent learning.

The Standard University Entry Requirements is normally an IELTS of 6.5. A case for Exceptional Admissions with IELTS of 6.0 in all components with additional English Language support has been approved by Education Committee. Cranfield English for Academic Purposes provide a package of in-sessional support. This is supported by the English language programme at Rabdan which provides a full support package across advanced speaking, listening, reading and writing skills. Together this provides a robust approach for a small number of highly skilled technical officers to enter the programme and succeed in their studies.

Direct access to the library online catalogue will support the face-to face discussions with staff and independent study tasks. Students will also have access to Rabdan library support, who will work with Cranfield library to ensure access to relevant texts in country.

In addition, students will be supported in their learning and personal development:

- The provision of an academic mentor who is available to support and advise the student on academic issues
- Access to a Flexible Education Coordinator, working with their Rabdan counterparts, for pastoral care and to ensure progression through the MSc.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6.

Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
Induction Introduction to Systems and Systems Engineering Problem Analysis and System Definition Workshop Problem Analysis and System Definition Enterprise Management System Design and Realisation	0 10 10 10 10 10
Elective MODULES:	
10 credits from the advanced modules 7 -11	10
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction	0
Introduction to Systems and Systems Engineering	10
Problem Analysis and System Definition	10
Enterprise Management	10
Problem Analysis and System Definition Workshop	10
Research Methods	10
System Design and Realisation	10
System Design and Realisation Workshop	10
Simulation in the Systems Engineering Lifecycle	10
Dependability and Resilience	10
Software and Cyber Systems Engineering	10
Dynamic Modelling Systems	10
Human Systems Engineering	10
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Induction	0
Introduction to Systems and Systems Engineering	10
Problem Analysis and System Definition	10
Enterprise Management	10
Problem Analysis and System Definition Workshop	10
Research Methods	10
System Design and Realisation	10
System Design and Realisation Workshop	10
Simulation in the Systems Engineering Lifecycle	10
Dependability and Resilience	10
Software and Cyber Systems Engineering	10
Dynamic Modelling Systems	10
Human Systems Engineering	10
Thesis	10
	80
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [4]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in January and are expected to complete the course within 1 year for the MSc.

All taught modules are worth 10 credits and have an indicative requirement for 100 hours of study in total.

The Introduction to Systems and Systems Engineering module is a pre-requisite for a number of other modules and is the first module students will take. All other pre-requisites are defined in the module descriptors. This is a full time course pathway and the modules should normally be taken in the time tabled order. If a student needs to defer their studies and complete them in subsequent years they must do so within any pre requisite rules as stated in the module descriptors.

Each module runs for a total of three weeks, with credit hours split evenly over them.

- Week one is normally an independent study week. Students will be given focused pre reading and other independent study tasks as appropriate. Some of the distance learning material created for the SE MSc may be used in week two, but will be used as an extension of week two teaching. Some modules have the taught week as week one, and independent study as week two. In these cases week two is focused on completion or formative exercises and other study tasks started in week one.

[4] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

- Week two is (or week one, see above) is a full time taught week delivered by CU staff at the Rabdan academy site. This will follow a normal taught week, and will run from Monday to Friday to fit into the Rabdan working week. Each day will contain a mixture of lectures, exercises and discussions as appropriate.

- Week three is the summative assessment period. Summative assessment tasks are set for each module. Assessment is submitted at the end of this week, with feedback provided within the standard 20 working day period.

There are two Thesis periods in the year. The first runs after the Research Methods module and provides time for students to develop an initial thesis proposal and discuss with sponsors as appropriate. The second runs from the end of the last taught module until the year end.

Any summative assessment resits will be scheduled during the thesis periods.

Note, this first thesis period also aligns with Ramadan, and will make it easier for students to carry on working during this period when they have reduced working hours. Some small changes may be required to module timings to accommodate the start and end of Ramadan, and other UAE public holidays, each year. The module times in this document are valid for the 2022/23 academic year calendar.

7. Course Level Assessment Strategy[5]

8. Course Level Assessment Strategy[6]

The practice of modern systems engineering is both group based and distributed. Our course is very much designed to focus on the needs of current SE practitioners or those wishing to become such. As such the assessment strategy for the award will focus not only on individual understanding but also on group contribution, potentially at a distance. Thus our students will participate in assessed individual and group exercises, the latter typically allowing them to be assessed not only on the group output but in their reflections of the exercise. Additionally, and to allow students to apply the ideas covered in each module within a realistic context, many of the modules will use case study based assignments. These may combine discussion of real world issues and how they drive SE application, examples of SE application applied to the case study context, exploration of how SE is applied in different industries or domains. When appropriate UAE specific military case studies will be used as part of the module assessment.

[5] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

[6] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

The following modules outline all parts of the programme leading to MSc. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
0	R-SEE-IND	Induction[14]	Richard Adcock	3.5	0	0	Y	B: 21/08/23	21/08/23	25/08/23	N/A	AO	n/a	N/A	N/A	N/A	N/A	N/A
1	R-SEE-ISSE	Introduction to Systems and Systems Engineering	Richard Adcock	30	0	10	Y	B: 21/08/23	**28/08/23 Taught week start**	**01/09/23 Taught week end** 01/09/23	50	ICW	100	N/A	N/A	N/A	12/09/23	TBC

[7] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[8] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[9] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[10] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[11] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[12] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*)*. If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[13] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.
[14] Further occurrences may potentially run to accommodate students who register at difference points throughout the year

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
2	R-SEE-EM	Enterprise Management	Kieran Holling	40	0	10	N	11/09/23	**18/09/23 Taught week start**	**22/09/23 Taught week end** 22/09/23	50	ICW	100	N/A	N/A	N/A	02/10/23	TBC	
3	R-SEE-PASD	Problem Analysis and System Definition	Richard Adcock	25	0	10	Y	02/10/23	**09/10/23 Taught week start**	**13/10/23 Taught week end** 13/10/23	50	ICW	100	N/A	N/A	N/A	23/10/23	TBC	
4	R-SEE-SDR	System Design and Realisation	Tim Ferris	25	0	10	Y	B: 23/10/23	**30/10/23 Taught week start**	**03/11/23 Taught week end** 03/11/23	50	ICW	100	N/A	N/A	N/A	13/11/23	TBC	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
5	R-SEE-PASDW	Problem Analysis and System Definition Workshop	Steve Barker	25	0	20	N	20/05/24	**27/05/24 Taught week start**	**31/05/24 Taught week end** 31/05/24	50	ICW	100	N/A	N/A	N/A	10/06/24	TBC
6	R-SEE-RM	Research Methods	Tim Ferris	25	0	10	Y	B: 13/11/23	**13/11/23 Taught week start**	**17/11/23 Taught week end** 24/11/23	50	ICW	N/A	N/A	N/A	N/A	04/12/23	TBC
7	R-SEE-SSEL	Simulation in the Systems Engineering Lifecycle	Sean Price	25	0	10	Y	B: 11/12/23	**08/01/24 Taught week start**	**12/01/24 Taught week end** 12/01/24	50	ICW	N/A	N/A	N/A	N/A	22/01/24	TBC
8	R-SEE-DR	Dependability and Resilience	Tim Ferris	25	0	10	Y	B: 22/01/24	**29/01/24 Taught**	**02/02/24 Taught week end**	50	ICW	100	N/A	N/A	N/A	12/02/24	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
									week start	02/02/24								
9	R-SEE-SCSE	Software and Cyber Systems Engineering	Pathmeswaran Raju	25	0	10	Y	B:12/02/24	**19/02/24 Taught week start**	**23/02/24 Taught week end** 23/02/24	50	ICW	100	N/A	N/A	N/A	04/03/24	TBC
10	R-SEE-DMS	Dynamic Modelling Systems	Sean Price	25	0	10	Y	B: 08/04/24	**15/04/24 Taught week start**	**19/04/24 Taught week end** 19/04/24	50	ICW	100	N/A	N/A	N/A	29/04/24	TBC
11	R-SEE-HSE	Human Systems Engineering	Richard Adcock	25	0	10	Y	B: 29/04/24	**06/05/24 Taught week start**	**10/05/24 Taught week end**	50	ICW	100	N/A	N/A	N/A	20/05/24	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
										10/05/24								
12	R-SEE-SDRW	System Design and Realisation Workshop	Richard Adcock	25	0	10	N	B: 10/06/24	**10/06/24 Taught week start**	**14/06/24 Taught week end** 21/06/24 (Module End Date)	50	ICW	100	N/A	N/A	N/A	01/07/24	TBC
13	R-SEE-THESIS	Thesis	Sean Price	50	0	80	Y	B: 04/12/23 Proposal 04/03/24 Thesis Prep **B:01/07/24**	NA	08/12/23 (Session ends) 05/04/24 (Session ends) **30/08/24 (Module end)**	50	THESIS	100	N/A	N/A	N/A	30/08/24	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
R-SEE-IND	Induction	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-ISSE	Introduction to Systems & Systems Engineering	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-PASD	Problem Analysis and System Definition	Systems Engineering Specialising in Defence	Defence and Security Programme
R-SEE-SDR	System Design and Realisation	Systems Engineering	Defence and Security Programme Systems Engineering Specialising in Defence
R-SEE-RM	Research Methods	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-SSEL	Simulation in the Systems Engineering Lifecycle	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-SCSE	Software and Cyber Systems Engineering	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-DR	Dependability and Resilience	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-DMS	Dynamic Modelling of Systems	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-HSE	Human Systems Engineering	Systems Engineering	Systems Engineering Specialising in Defence
R-SEE-THESIS	Thesis	Systems Engineering	Systems Engineering Specialising in Defence

8. How are the ILOs assessed?

The following assessment types are utilised:

Formative Assessment

The SE MSc programme includes a strong element of formative feedback in all modules in order to grow student skills and confidence ahead of summative assessment tasks.

Formative assessment activities are included for all lecture material, in the form of reflective questions and discussions. This can be supplemented by online quizzes hosted on the VLE. Quiz questions focus on key areas of the taught material with answers, further discussion and links to relevant taught material included in the quiz. In addition modules include student exercises to promote discussion and allow practice and formative feedback on any methods, skills or tools covered in the taught content. These exercises are usually case study based, allowing material to be placed into context and its real world implications discussed. The case studies used across these formative exercises cover a range of application domains, including some international defence examples. Feedback for these exercises may take the form of sample answers, peer review by fellow students, or direct feedback from academic staff.

Extended workshops are included in most modules, in which students work in groups creating group portfolios and presentations. In some cases a reflection on formatively assessed work may be used as an input to summative assessment. There are two workshop only modules during which taught material from a number of modules can be applied to case studies to both synthesis understanding of cross cutting themes and promote additional formative assessment and feedback. A single UAE military focused case study will be used across these two workshops. This will allow students to focus on a topic of direct interest to the military sponsors. Relevant subject matter experts identified by the academics at Rabdan academy are used to support these workshops.

Across all module, the academic staff will always elicit questions and discussion during taught sessions, and provide mechanisms for students to raise additional questions via discussion forums on the VLE.

The specific needs of UAE students have been considered in the design of the Specialising in Defence pathway. An increased use of face to face teaching more fully supports their educational experience and learning styles. All formative assessment and feedback is started during the taught phase of the modules, and may then be extended into the independent study time. Rabdan academic staff will support CU staff on all modules. They will both provide their experience of the UAE military context and help to ensure the best classroom experience for the students. Relevant case studies based on UAE and other defence examples are used across the modules, and in particular to enable formative assessment and discussion.

Summative Assessment.

The course uses a range of assessment methods including essays, literature reviews, individual reflections on formative assessment outputs and application of concepts to relevant military case studies.

When formatively assessed work is used as part of the summative assessment it must be clear that feedback has already been given and any summative tasks must build on this feedback.

The case studies used in the summative assessment will be selected to cover UAE military examples.

This approach has been adopted because:

The breadth of assessment methods are intended to cater for differing learning styles ensuring inclusion and accessibility across the student cohort whilst also meeting the expectations of professional accrediting bodies such as the IET. For students completing the MSc there is a further opportunity to expand their skills through self-directed research and the written presentation of a thesis.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate
B. Postgraduate Certificate

Award ILOs / **Module No.**	ILO 1	ILO 2	ILO 3	ILO 4
1	ICW	ICW	ICW	ICW
2	ICW		ICW	

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4
3		ICW		
4		ICW		ICW
5		ICW		
6				
7	ICW			
8		ICW		ICW
9		ICW		ICW
10	ICW			
11		ICW		ICW
12		ICW		
13				

C.

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4
1	ICW	ICW	ICW	ICW
2	ICW		ICW	
3		ICW		
4		ICW		ICW
5		ICW		
6				
7	ICW			
8		ICW		ICW
9		ICW		ICW
10	ICW			
11		ICW		ICW
12		ICW		
13				

D. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9
1					

Award ILOs / Module No.	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9
2	ICW				ICW
3	ICW	ICW		ICW	
4		ICW	ICW		
5		ICW		ICW	ICW
6					ICW
7		ICW	ICW	ICW	
8		ICW	ICW		
9		ICW		ICW	
10		ICW	ICW	ICW	
11		ICW	ICW		
12		ICW	ICW		ICW
13					

E. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 10	ILO 11	ILO 12	ILO 13	ILO 14
1					
2					
3					
4					
5					
6	ICW	ICW			ICW
7					
8					
9					
10					
11					
12					
13	THESIS	THESIS	THESIS	THESIS	THESIS

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter experts eternal to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one Eternal Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. Eternal examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the Eternal Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

The programme aims to prepare students for professional roles in systems engineering in the modern enterprise.

Future graduates of this course will work in:

- Multi skilled teams collaborating on the development of complex, cross technology and cross domain solution to societal problems.
- Working in distributed teams based on shared models, making use of collaborative technologies for communication and work sharing.
- Following agile life cycle approaches in which customer, developer and other stakeholders work together to create iterative solutions which both add immediate value and build towards resilient solutions to larger problems

To fulfil their roles in this kind of working environment, a systems engineering professional will need:

- Full knowledge and skills in model based systems engineering approaches to core life cycle deliverables covering requirements, architectures, test and evaluation, in service support etc.
- A strong overview, plus relevant knowledge and skills, in related systems disciplines such as human system, AR&M, etc.
- The ability to use a range of systems engineering, management and design tools to support these activities.
- The ability to employ professional skills in leadership, ethics, data management and to understand their role in organisation governance and regulations.
- The ability to employ lifelong learning skills to refresh both their systems engineering skills and keep up to date with emerging technology issues

The MSc in Systems Engineering prepares graduates to work in this environment, both in its course content and delivery methods. When a programme pathway includes specialisation in a particular domain the roles above are also placed into the context of that domain, through the use of guest speakers and relevant case studies

Version Jan 23

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

PROGRAMME TITLE:	Systems Thinking Practice

Date of first publication/latest revision:	June 2024

1. What is the course?

Course information

Course Title	Systems Thinking Practice
Course code	MSSTPPTC, PDSTPPTC, PDSTPPAC, PCSTPPTC, SPSTPPTC
Academic Year	2023-2024
Valid entry routes	MSc, PgDip, PgCert and Short Courses for credit
Additional exit routes	PgCert, PgDip
Mode of delivery	Part-time
Location(s)[1] of Study	Cranfield Campus (Open Intake)/NHS Nottingham and Nottinghamshire Clinical Commissioning Group, Stapleford (Closed Intake)
School(s)	Cranfield Defence and Security
Theme	Defence and Security
Centre	Centre for Electronic Warfare, Information and Cyber
Course Director	Open Cohort: Natalie Clewley Closed Cohort: Tim Forsyth
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	Yes
Apprenticeship Standard the course is mapped to	Systems Thinking Practitioner Apprenticeship Standard
Is the Degree apprenticeship integrated or non-integrated?	Not applicable – non degree qualification

[1] If any part of this course is delivered at another site, please note which one(s) here

[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Is the Mastership offered as an open and/or closed course?	Open(September Intake) and Closed(June Intake)
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	The Standard University Entry Requirements. IELTS of 7 is normally required. Apprenticeship entry by experience if standard University entry requirements are not held.
UK Qualifications Framework Level	QAA FHEQ level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	3 years MSc, 2 years PgDip, 1 year PgCert, 30 Months Apprenticeship
Course Start Month(s)	September (Open Intake) and June (Closed Intake)

Institutions delivering the course

This course is delivered by the Centre for Electronic Warfare, Information and Cyber (CEWIC) within Cranfield Defence and Security where the research interests include:
Systems Thinking; Organisational Development; and Systems Engineering.

All our industrial (apprenticeship) students are sponsored by their employing organisations, who provide direct support to the course in the form of enabling on-site activities and the provision of information to support coursework and projects. Employer organisation staff will have some responsibility for the development of their apprentices. This will be identified in the Mastership Office documentation and contained within Employer Agreements.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is not accredited by any external bodies.

2. What are the aims of the course?

The Systems Thinking Practice course has been specifically designed to address the needs of the L7 Systems Thinking Apprenticeship Standard. The course is offered both as an Apprenticeship, with an exit route of PgDip available for those who purely wish to meet the End Point Assessment requirements, and as an MSc.

The broad purpose of the Systems Thinking Practitioner occupation is to support decision-makers in strategic and leadership roles to understand and address complex and sometimes even ‘wicked’ problems through provision of expert systemic analysis, advice and facilitation. These problems have no single ‘owner’ or cause, and no simple solution; they require multi-disciplinary, multi-organisational responses with sensitive attention to diverse viewpoints, behaviour, culture and politics.

This course is intended for the following range of students:
This programme is intended for mid-career people. In their daily work, these people will interact with: decision-makers, strategists, and policy-makers, often in senior roles in private or public sector organisations; individuals and groups (internal and external) with a stake in the defined

system, currently or in the future; peers, change agents and consultants working on similar challenges or in similar fields. They typically have high levels of autonomy, enabling them to engage widely with individuals and groups around the system they operate in. They will be responsible for delivering expert problem-solving and solutions for multi-layer/multi-organisation/multi-government problems.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate in Systems Thinking Practice

In completing the course and achieving the associated award, a diligent student should be able to:

ILO 1. Examine core systems concepts and systems laws, and the relationship between systems methods and approaches, in order to produce a foundation for systems thinking.
ILO 2. Assess a range of systems approaches with a relevant scope and scale and according to situation to enable their appropriate selection in real-world situations.
ILO 3. Propose and assemble a range of systems models to explore boundaries, cause and effect, mapping interconnections, feedback loops, distinguish between differing worldviews or perspectives, identify patterns, anomalies and emergent properties.

B. Postgraduate Diploma in Systems Thinking Practice

In addition to the intended learning outcomes outlined in the Postgraduate Certificate in Systems Thinking Practice, a diligent student would also be expected to:

ILO 4. Evaluate relevant approaches for intervention management, and a range of quantitative and qualitative assessment and evaluation methods for determining outcomes and impact of interventions, and plan a variety of appropriate, ethical, systems interventions, with differing levels of complexity and ambiguity.
ILO 5. Judge the nature of complexity most relevant in the situation of interest and propose one or more appropriate approaches from the range of systems methods or methodologies, combining approaches if needed.
ILO 6. Design and apply a range of inquiry techniques to gather quantitative and qualitative information and construct conceptual models of a variety of systems, real world situations and scenarios to provide insights into current or future challenges and achieve benefits and learning.
ILO 7. Create systems models and representations in a comprehensible language for stakeholders; can relate communication method to audience and interpret interventions from systems models and language in order to propose practical and understandable changes in the real world.
ILO 8. Appraise techniques applied as part of a multi-disciplinary group to identify and engage with diverse stakeholders (including marginalised viewpoints) and assess the effectiveness of the collaborative relationships built and sustained with them.
ILO 9. Reflect critically on personal behaviours and performance whilst undertaking interventions, identifying and exploiting opportunities for continued personal and professional development.

C. Master of Science in Systems Thinking Practice

In addition to the intended learning outcomes outlined in the Postgraduate Diploma in Systems Thinking Practice, a diligent student would also be expected to:

ILO 10. Critically assess published Systems Thinking literature, where necessary by synthesising information from other disciplines.
ILO 11. Plan and conduct relevant independent research using appropriate systems techniques, appraise the results obtained to draw justifiable inferences from the data and analysis.
ILO 12. Formulate your findings in a high-quality written thesis, and critically evaluate and defend your interpretation of the results.

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Practice- and research-led teaching through a course team that are active practitioners and researchers.
- Technology enhanced learning to maximise student engagement and available time in order to maximise the student experience.
- Learning through a mixture of formative and summative feedback and assessment using a variety of methods.

The course is taught through a blend of on-site and remote methods. Three modules are taught as residential modules, combining face-to-face lecturing, workshops and groupwork. Three modules begin with a short residential period, but are then completed through practice in the workplace, with remote mentoring by Cranfield Academic staff. One module and each of the elective modules are taught online through our virtual learning environment (VLE), providing flexibility to the student. For those on the MSc, or those continuing on from PgDip, the final module will begin with a short residential period, and then continue to completion in the workplace and independent study.

The face-to-face elements of the course for the Open Cohort will be taught at the Cranfield Campus, whilst the face-to-face elements of the NHS Nottinghamshire closed cohort course will be taught by Cranfield staff at an assessed NHS site in Nottinghamshire.

An important aspect of this course is to develop practitioners in Systems Thinking; the students must be able to demonstrate the ability to plan interventions and apply the methods in real-world situations. Therefore, much of our teaching is face-to-face with group-based application of methods and techniques, guided by practitioner-academics.

Full use will be made of blended learning, combining distance learning material via the VLE with online and onsite workshops. A wide variety of remote learning methods and materials will be used across the course. This is structured around a core of online lecture material and supporting text, with additional multimedia methods employed to maximise student learning time and approaches. This may include audio podcasts and audio-visual multimedia-based resources.

To maximise student support and feedback, a number of approaches to student contact and formative feedback will feature heavily across the course:

- Individual and group exercises: face-to-face or online, these will allow students to apply specific methods or skills, both individually and in groups. Formative feedback will always be given using a combination of peer review and direct staff feedback. Feedback will include understanding of the methods used, application of the methods in a complex

problem context, group facilitation and personal development in systems thinking practice. This specific feedback may then be further discussed during asynchronous or synchronous tutorial sessions.

- Asynchronous discussion: To ensure full formative feedback and support, students will have access to VLE hosted discussion forums that will enable peer-to-peer and academic-student discussion, questions and answers about the concepts and approaches to their work. This may include discussion of specific exercises or general student questions
- Synchronous tutorials: real-time discussions with peers and academics delivered via webinars or face-to-face will allow exchange of ideas, answering of questions and general discussion, providing academics with an ability to have constructive dialogue with and to challenge students.

We have a number of years' experience in teaching this subject with students of mixed ability and background. The diversity of students' backgrounds can range from those who are deeply technical to those with a creative and artistic preference. We have had some students who are dyslexic, autistic and with learning difficulties. The breadth of ability and interest has provided a benefit, especially when developing practitioners who will be supporting a range of skills and abilities in the workplace. Our mixed teaching approach that has elements of lecture, practice, discussion and reflection has enabled good learning outcomes and good student scores. Our approach through team-teaching has been invaluable and will be continued. Due to a number of the modules being taught online at distance, students will have a tutor to be their point of contact and to provide advice and support alongside the academics teaching the specific subjects. Their role will be to monitor student progression, engagement and liaison with the students' employees, providing the first point of escalation should any issues arise.

Dedicated support by Learning Services for the above will ensure adoption of consistent online learning design using a robust suite of developed tools and interactions. This is supplemented with an induction and learner support online package focussing on study skills and independent learning.

Direct access to the library to supplement the online catalogue and face-to face discussions with staff are all benefits of this blended approach to learning.

In addition, students will be supported in their learning and personal development through the provision of an academic mentor who is available to support and advise the student on academic issues.

Apprenticeship students will be supported by an Apprenticeship Tutor, who will help to guide the students through their Apprenticeship, development of their Portfolio and End Point Assessment.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the - qualifications:

A. Postgraduate Certificate in Systems Thinking Practice

The accumulation of 60 credits through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Fundamentals of Systems Thinking	10
Introduction to Systems Methods	10
Dialogue and Collaboration	10
Systems Leadership and Organisational Behaviour	10
Systems Practice	10
ELECTIVE MODULES:	
Select one from:	
Modelling Social Systems	10
Complex Systems	10
TOTAL:	**60**

B. Postgraduate Diploma in Systems Thinking Practice

The accumulation of 120 credits through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Fundamentals of Systems Thinking	10
Introduction to Systems Methods	10
Dialogue and Collaboration	10
Systems Leadership and Organisational Behaviour	10
Systems Practice	10
Systems Intervention Planning	10
Systems Development and Exploitation	40
ELECTIVE MODULES:	
Select one from:	
Modelling Social Systems	10
Complex Systems	10
	10
Select one from:	
Architecting Enterprises	
Requisite Variety for Organisations	10
Systems Thinking for Social Change	10
	10
TOTAL:	**120**

C. MSc in Systems Thinking Practice

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Fundamentals of Systems Thinking	10
Introduction to Systems Methods	10
Dialogue and Collaboration	10
Systems Leadership and Organisational Behaviour	10
Systems Practice	10
Systems Intervention Planning	10
Systems Development and Exploitation	40
Thesis	80
ELECTIVE MODULES:	
Select one from:	
Modelling Social Systems	10
Complex Systems	10
Select one from:	
Architecting Enterprises	
Requisite Variety for Organisations	10
Systems Thinking for Social Change	10
	10
TOTAL:	**200**

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

D. Apprenticeship in Systems Thinking Practice

For apprenticeship students who successfully complete the postgraduate diploma, confirmation of the award, graduate certificate and transcript will be released once all elements of the apprenticeship training programme have been successfully completed, including the End Point Assessment.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than or equal to

- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

6.1 Open Cohort

Part-time students register for the course in September and are expected to complete the course within 3 years for the MSc, 2 years for the PgDip (and thereby meeting the requirements of the Systems Thinking Practitioner Standard) and 1 year for the PgCert .

All modules except two are worth 10 credits and have an indicative requirement for 100 hours of study in total. The exceptions are Systems Development and Exploitation which is worth 40 credits and has an indicative requirement for 400 hours of study in total, and the Thesis (for those going forward to MSc) which is worth 80 credits and has an indicative requirement for 800 hours of study in total.

The Fundamentals of Systems Thinking module is a pre-requisite for all subsequent modules on the course. The Introduction to Systems Methods module is a pre-requisite for all modules except Dialogue and Collaboration. Additionally, the following modules require 60 credits from prior modules: Systems Thinking for Social Change, Architecting Enterprises, and Requisite Variety for Organisations. Systems Development and Exploitation has a prerequisite of Systems Intervention Planning. The Thesis module requires 120 credits from prior STP modules.

Three modules (Fundamentals of Systems Thinking, Introduction to Systems Methods and Dialogue and Collaboration) are taught as residential modules, with a 2-week directed study period and a 5 day residential, followed by a 4 week assignment period.

One core module (Systems Leadership and Organisational Behaviour) and all elective modules (Modelling Social Systems, Complex Systems, Systems Thinking for Social Change, Architecting Enterprises and Requisite Variety for Organisation) are taught as distance online modules through the Virtual Learning Environment (VLE). These modules are 9 weeks in duration, followed by a 4-week assignment period.

Three modules (Systems Practice, Systems Intervention Planning and Systems Development and Exploitation) are taught as blended modules. They begin with a 3-day residential period and continue to completion through practice in the workplace with remote mentoring by Cranfield academic staff. Systems Practice has an 8-week assignment period, Systems Intervention Planning

50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

has a 4-week assignment period and Systems Development and Exploitation has a 26-week assignment period.

The Thesis module begins with a 3-day residential that will introduce study skills and requirements for the thesis. The student will then conduct a self-directed piece of research with regular supervision meetings with an allocated supervisor from the Academic Tutors. The Thesis module usually has one entry point in September.

Distance learning activities include asynchronous discussion with regular synchronous contact with staff and fellow students. Contact hours have been calculated when there is direct engagement with students. This is according to the residential timetable and the hours of contact on timetabled distance learning activities.

In Year 1, students have 5 core modules and one elective from a choice of 2: Modelling Social Systems and Complex Systems. In year 2, there are 2 core modules (one is 40-credit) and one elective from a choice of 4: Systems Thinking for Social Change; Architecting Enterprises; Requisite Variety for Organisations; and whichever elective they did not choose in the first year. However, this option might result in the student studying two modules at once due to different schedules. All elective modules are distance learning modules

6.2 NHS Nottingham and Nottinghamshire Clinical Commissioning Group Closed Cohort

Part-time students register for the course in June and are expected to complete the course within 30 months, thereby meeting the requirements of the Systems Thinking Practitioner Standard. On successful completion of their apprenticeship, the students will be awarded a PgDip . Those who wish to advance to an MSc will be considered through the University's Transfer to a Higher Award (THA) process to enable a student to join the next available open cohort Thesis module on successful completion of the End Point Assessment.

All modules except one are worth 10 credits and have an indicative requirement for 100 hours of study in total. The exception is Systems Development and Exploitation which is worth 40 credits and has an indicative requirement for 400 hours of study in total.

The Fundamentals of Systems Thinking module is a pre-requisite for all subsequent modules on the course. The Introduction to Systems Methods module is a pre-requisite for all modules except Dialogue and Collaboration. Additionally, the following modules require 60 credits from prior modules: Systems Thinking for Social Change, Architecting Enterprises and Requisite Variety for Organisation. Systems Development and Exploitation has a prerequisite of Systems Intervention Planning. The Thesis module requires 120 credits from prior STP modules.

Three modules (Fundamentals of Systems Thinking, Introduction to Systems Methods and Dialogue and Collaboration) are taught as residential modules, with a 2-week directed study period and a 5-day residential, followed by a 4-week assignment period.

One core module (Systems Leadership and Organisational Behaviour) and all elective modules (Modelling Social Systems, Complex Systems, Systems Thinking for Social Change, Architecting Enterprises and Requisite Variety for Organisation) are taught as distance online modules through the Virtual Learning Environment (VLE). These modules are 9 weeks in duration, followed by a 4-week assignment period.

Three modules (Systems Practice, Systems Intervention Planning and Systems Development and Exploitation) are taught as blended modules. They begin with a 3-day residential period and continue to completion through practice in the workplace with remote mentoring by Cranfield academic staff. Systems Practice has an 8-week assignment period, Systems Intervention Planning has a 4-week assignment period and Systems Development and Exploitation has a 26-week assignment period.

Distance learning activities include asynchronous discussion with regular synchronous contact with staff and fellow students. Contact hours have been calculated when there is direct engagement with students. This is according to the residential timetable and the hours of contact on timetabled distance learning activities.

In Year 1, students have 5 core modules and one elective from a choice of 2: Modelling Social Systems and Complex Systems. In year 2, there are 2 core modules (one is 40-credit) and one elective from a choice of 4: Systems Thinking for Social Change; Architecting Enterprises; Requisite Variety for Organisations; and whichever elective they did not choose in the first year. However, this option might result in the student studying two modules at once due to different schedules. All elective modules are distance learning modules

7. Course Level Assessment Strategy[4]

The course aim is to develop Systems Thinking Practitioner skills and behaviours in addition to the academic focus of a postgraduate level qualification. These skills require proficiency in written communication and in the practical application of systems methods through facilitated workshops.

The assessment strategy at the course level is to assess these factors as well as supporting the preparation of apprentices for the End Point Assessment gateway. Assessment will include formative assessment on the selection of methods for problem resolution, design of interventions and workshops and on presentation skills. Such feedback will be given immediately after the presentations by the tutors and peers. Summative assessment will include the preparation of reports, reflection on the application of methods and running workshops and essays to demonstrate knowledge of the underlying theory and practice of systems thinking.

The assessment tasks are challenging and enable students to demonstrate a full range of skills and behaviours. The pre-requisite modules (Fundamentals of Systems Thinking and Introduction to Systems Methods) will introduce students to the core principles of Systems Thinking and some of the key methods and will be assessed through essays and posters. These will be of varying lengths, recognising that writing articles to a short length can be more challenging for some and can develop different skills relevant to professional practice. The length of each assessment task is clearly stated within the module descriptor.

Many modules (including Fundamentals of Systems Thinking, Introduction to Systems Methods, Dialogue and Collaboration, Systems Practice, Systems Intervention Planning and Systems Development and Exploitation) are supported by a range of formative tasks including group discussion, case studies, and oral presentations. Formative feedback is given verbally within the classroom following discussions, via a written summary for case studies from the module leader and oral feedback provided by the tutor and peers for presentations. Within on-line modules, students will engage with interactive learning activities which incorporate formative feedback.

MSc Students. The taught components precede the research project for MSc students, so assessment can be used to develop skills required for the individual research project. Students are generally expected to be more self-directed in their learning during this research project and guidance will be provided through the Systems Research Methods module and in supporting information provided in the Thesis module. The research project addresses ILOs 10-12 and takes the form of a Thesis.

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses
https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Open Cohort Course modules – Occurrence 'A'

The following modules outline all parts of the programme leading to MSc. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments[9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
0	R-STP-I	Induction	Jeremy Hilton	4	0	0	N	04/09/23	04/09/23	08/09/23	N/A	AO	N/A				N/A	
1	R-STP-FST	Fundamentals of Systems Thinking	Jeremy Hilton	30	0	10	N	04/09/23 A23	04/09/23	08/09/23	50%	ICW	100%				09/10/23	TBA
2	R-STP-ISM	Introduction to Systems Methods	Pedro Pablo Cardoso Castro	30	0	10	N	16/10/23 A23	30/10/23	03/11/23	50%	ICW	100%				04/12/23	TBA

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*)*. If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours5	Total hours delivered by Visiting Lecturers 6	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
3 *	R-STP-FRS	Modelling Social Systems	Natalie Clewley	30	0	10	N	13/11/23 A23	13/11/23	26/01/24	50%	ICW	100%				26/02/24	TBA
4 *	R-STP-CS	Complex Systems	Tim Forsyth	30	0	10	N	13/11/23 A23	13/11/23	26/01/24	50%	ICW	100%				26/02/24	TBA
5	R-STP-DC	Dialogue and Collaboration	Tim Forsyth	20	0	10	N	04/03/24 A23	18/03/24	22/03/24	50%	ICW	100%				22/04/24	TBA
6 *	R-STP-SLOB	System Leadership and Organisational Behaviour	Pedro Pablo Cardoso Castro	30	0	10	N	22/04/24 A23	22/04/24	21/06/24	50%	ICW	100%				22/07/24	TBA
7	R-STP-SP	Systems Practice	Natalie Clewley	20	0	10	N	24/06/24 A23	08/07/24	10/07/24	50%	ICW	100%				09/09/24	TBA
8 *	R-STP-STSC	Systems Thinking for Social Change	Jeremy Hilton	30	0	10	N	14/10/24 A24	14/10/24	13/12/24	50%	ICW	100%				27/01/25	TBA
9 *	R-STP-AE	Architecting Enterprises	Natalie Clewley	30	0	10	N	14/10/24 A24	14/10/24	13/12/24	50%	ICW	100%				27/01/25	TBA
10 *	R-STP-RVO	Requisite Variety for Organisations	Pedro Pablo Cardoso Castro	30	0	10	N	14/10/24 A24	14/10/24	13/12/24	50%	ICW	100%				27/01/25	TBA

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours5	Total hours delivered by Visiting Lecturers 6	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
11	R-STP-SRM	Systems Intervention Planning	Natalie Clewley	20	0	10	N	06/01/25 A24	20/01/25	22/01/25	50%	ICW	100%				24/02/25	TBA
12	R-STP-STDE	Systems Development and Exploitation	Jeremy Hilton	50	0	40	N	03/02/25 A24	17/02/25	19/02/25	50% 50%	ICW 1 ICW 2	40% 60%				31/03/25 22/08/25	TBA
13	R-STP-THESIS	Thesis	Tim Forsyth	48	0	80	N	01/09/25 A25	22/09/25	24/09/25	50 50	ICW THESIS	30% 70%				27/10/25 28/08/26	TBC TBC

* These modules are online only - mixed cohort

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**

8. How are the ILOs assessed?

Though there is both formative and summative assessment on all modules, the main assessment type utilised on all taught modules is Individual Coursework. This is because we are developing practitioners, so need to assess individual progression. This enables feedback to be more specific to the individual and mentoring of the student in their practice can be more relevant.

Formative Assessment

Across distance and residential modules students will be provided with feedback on a range of activities in order to grow their confidence ahead of summative assessment tasks. Formative assessment may take the form of peer review by fellow students, lecturers and module leaders with a variety of approaches being utilised.

Summative Assessment

The course uses a range of assessment methods including essays, literature reviews, model development and application of concepts to real world problems.

This approach has been adopted because:

The breadth of teaching methods and types of assignment are intended to cater for different learning styles ensuring inclusion across the student cohort and minimising any potential disadvantage from limiting approaches to teaching and learning. Due to the practitioner nature of the course, assessment will also include demonstration of skills and attributes. Assessment of a reflective nature is included to incorporate the views of colleagues and managers from the student's workplace. It is a key skill for students to demonstrate good verbal, facilitation, and written communication skills, so formative feedback is provided on verbal, facilitation, and presentation skills, and summative feedback provided on individual written reports and essays.

For students completing the MSc, the individual thesis also requires students to be assessed on their written presentation skills. The thesis assessment can include a viva voce for borderline cases, requested at the discretion of the Examiners. This is to clarify elements of the thesis and confirm the authorship of the thesis if necessary. Additional marks will not be awarded for the thesis following a viva voce but, depending on the student’s performance, the examiners may award a pass with corrections instead of a fail.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3
1 (FST)	ICW		
2 (ISM)	ICW		ICW
3 (MSS)			ICW
4 (CS)			ICW
5 (DC)		ICW	
6 (SLOB)			ICW
7 (SP)		ICW	ICW
Options	Choice of 3 or 4 in Year 1		

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9
8 (STSC)		ICW			ICW	ICW
9 (AE)		ICW			ICW	ICW
10 (RVO)		ICW			ICW	ICW
11 (SIP)	ICW	ICW				
12 (SDE)	ICW	ICW	ICW	ICW	ICW	ICW
Options	Choice of 8, 9 or 10 (or 3 or 4) in Year 2					

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 10	ILO 11	ILO 12
13	ICW/THESIS	ICW/THESIS	ICW/THESIS

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)
N/A	N/A		

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6-year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guidance provided by the QAA particularly in Chapter B7 (External Examining) which emphasises that external examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback, both qualitative and quantitative, is collected for each module studied. In addition, students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the expectations and indicators of sound practice of the QAA Quality Code Chapter B10: Managing Higher Education Provision with Others, with regards to the management and operation of the partnership and that the academic standards and the quality of the student experience are assured in line with the remaining chapters of the QAA Quality Code. The delivery of new partnership provision is ultimately approved by the University's Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5-year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

The primary opportunity for graduates is to complete their course and continue upwards on their career within their sponsoring organisation. The course also aims to ensure that graduates are better prepared to tackle the current and emerging demands of the increasingly complex demands of the world we live and in.

The Apprenticeship in Systems Thinking Practice is aligned to the Institute of Apprenticeships Systems Thinking Practitioner Standard and prepares graduates to work in this environment, both in its course content and delivery methods.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc in Thermal Power and Propulsion with options in: Aerospace Propulsion Gas Turbine Technology Power, Propulsion and the Environment Rotating Machinery Engineering and Management Marine Propulsion Technology
Course code	**September start:** Aerospace Propulsion: MST1AFTC, PDT1AFTC, PCT1AFTC Gas Turbine Technology: MST1GFTC, PDT1GFTC, PCT1GFTC Marine Propulsion Technology: MST1MFTC, PDT1MFTC, PCT1MFTC Power, Propulsion and the Environment: MST1PFTC, PDT1PFTC, PCT1PFTC Rotating Machinery Engineering and Management: MST1RFTC PDT1RFTC, PCT1RFTC **March start:** Aerospace Propulsion: MST2AFTC, PDT2AFTC, PCT2AFTC Gas Turbine Technology: MST2GFTC, PDT2GFTC, PCT2GFTC Marine Propulsion Technology: MST2MFTC, PDT2MFTC, PCT2MFTC Power, Propulsion and the Environment: MST2PFTC, PDT2PFTC, PCT2PFTC Rotating Machinery Engineering and Management: MST2RFTC, PCT2RFTC PDT2RFTC
Academic Year	2023/2024
Valid entry routes	MSc, PgDip
Additional exit routes	PgCert
Mode of delivery	Full-Time

Location(s)[1] of Study	Cranfield University
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Aerospace
Centre	Centre for Propulsion and Thermal Power Engineering
Course Director	Dr Theoklis Nikolaidis (September) / Professor Pericles Pilidis (March)
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/A
Is the Degree apprenticeship integrated or non-integrated?	N/A
Is the Mastership offered as an open and/or closed course?	N/A
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	Not Applicable
Registration Period(s) available	One Year
Course Start Month(s)	September and March

Institutions delivering the course

This course is delivered by the School of Aerospace, Transport and Manufacturing, Aerospace Theme, Centre for Propulsion and Thermal Power Engineering where the research interests include:

- Gas Turbine Engineering
- Turbomachinery and Icing
- Computational Aerodynamics
- Combustor design, utilisation of novel fuels and Low emission technology
- Technical Economic Environmental Risk Assessment
- Environmental Performance and Sustainability

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

- Electrification

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

MSc Thermal Power and Propulsion (Aerospace Propulsion Option), MSc Thermal Power and Propulsion (Gas Turbine Technology Option), MSc Thermal Power and Propulsion (Power Propulsion and the Environment Option), MSc Thermal Power and Propulsion (Rotating Machinery Engineering and Management Option) are accredited by; the Institution of Mechanical Engineers (IMechE) and the Royal Aeronautical Society (RAeS) until August 2026 on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng). Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

What are the aims of the course?

Cranfield University offers this course to:

- Provide the skills required for a challenging career in the field of propulsion and power.

This programme is intended for students with 1st or 2nd class honours degree in:

- A physics-based science subject and a mathematics-based subject or
- A physics-based science subject and an engineering subject or their international equivalent.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Assess and evaluate the design, performance, operation and/or maintenance requirements of gas turbine engines, using analytical and/or experimental tools as appropriate.

ILO 2. Assess the requirement for ethical and professional conduct when using and presenting data.

ILO 3. Produce and evaluate the design and assess the performance of engine component/s for gas turbines for different applications and, where appropriate, their environmental impact.

B. Postgraduate Diploma

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 4. Relate and utilise advanced knowledge and methods to design and analyse gas turbines within the requirement of their applications on air, land, or sea.

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 5. Analyse technical challenges, propose solutions and prepare detailed scientific reports on relevant engineering problems using appropriate methods, while examining and debating aspects related to the design in terms of socio-economic factors (costs, ethics, management and/or social effects of engineering) and environmental impact.

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Group based exercises, project work, presentations, and interaction with external agencies.
  The engine systems symposium is organised entirely by the students and is a team activity involving the marketing of the symposium to external delegates and the raising of funds to cover its cost.
- Classroom teaching.
- Supervisor support.

The Thermal Power and Propulsion MSc comprises three categories of modules:

1. One Whole Engine Module (Gas Turbine Performance, Simulation and Diagnostics).

2. Component Modules (Turbomachinery and Blade Cooling, Mechanical Design of Turbomachinery, Combustors, Engine Systems, Jet Engine Control).

3. Application models and tools (Computational Fluid Dynamics, Management for Technology, Propulsion Systems Performance and Integration, Gas Turbine Operations and Rotating Machines, Marine Propulsion System Integration, Space Propulsion, Propulsion Electrification)

In addition, candidates must complete a thesis worth 50% of the Thermal Power and Propulsion MSc.

5. What do students need to achieve to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following to be awarded the qualifications:
Note: Please refer to the section on Course Modules (Pages 13-20) for the module title corresponding to the numbers indicated in the following tables (e.g Combustors Module is #1)

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Module 3	20
ELECTIVE MODULES:	
Any modules from 1, 2, 4, 5a, 6, 7a, 8a, 9a, 10a,12a,13a,14a to the total value of 40 credits	40
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Modules 1, 2, 3, 4, 5a, 6	90
ELECTIVE MODULES:	
Modules chosen from modules 7a, 8a, 9a, 10a,12a,13a,14a, to the total value of 30 credits	30
TOTAL:	120

C. MSc Gas Turbine Technology Option

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Modules 1, 2, 3, 4, 5a, 6 Individual Research Project (11)	90 100
ELECTIVE MODULES:	
Modules chosen from modules 7a,10a,12a,13a,14a to the total value of 10 credits	10
TOTAL:	200
ATTENDANCE ONLY ELECTIVE MODULES	
Module 8b ,9b	0

D. MSc Aerospace Propulsion Option

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Modules 1, 2, 3, 4, 5a, 6, 8a Individual Research Project (11)	100 100
ELECTIVE MODULES:	
TOTAL:	200
ATTENDANCE ONLY ELECTIVE MODULES	
Modules 7b,10b,13b,14b	0

E. MSc Power, Propulsion, and the Environment Option

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Modules 1, 2, 3, 4, 6, 9a Individual Research Project (11)	90 100
ELECTIVE MODULES:	
Modules chosen from modules 7a, 8a, 10a,13a,14a to the total value of 10 credits	10
TOTAL:	200
ATTENDANCE ONLY ELECTIVE MODULES	
Module 5b, 12b	

F. MSc Rotating Machinery, Engineering and Management Option

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	

Modules 1, 2, 3, 4, 5a, 6, 9a Individual Research Project (11)	100 100
ELECTIVE MODULES:	
TOTAL:	200
ATTENDANCE ONLY ELECTIVE MODULES	
Modules 7b, 12b,14b	0

G. MSc Marine Propulsion Technology Option

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Modules 1, 2, 3, 4, 6, 9a,12a Individual Research Project (11)	100 100
ELECTIVE MODULES:	
N/A	
TOTAL:	200
ATTENDANCE ONLY ELECTIVE MODULES	
Modules 5b, 7b, 14b	0

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists, and the student meets the requirements of that lower award; - this may require an extension of their registration and additional fees to allow attendance to the module along with the next cohort.

Pass Criteria
The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

To achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for most of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the Masters course in September or March and are expected to complete the course within 12 calendar months. All Thermal Power and Propulsion options are available for both entries.

The PgDip course is full-time and are coincident with the MSc courses.

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

The mandatory modules are typically delivered and spread over the first term. Second term modules are generally delivered over a week each.

Project topics for the MSc course are allocated in the first month of term and work towards the project is undertaken through the academic year

7. Course Level Assessment Strategy[4]

Rationale for chosen types of summative assessment

The assessment strategy followed within the MSc in Thermal Power and Propulsion program includes summative and formative feedback. The aim is to provide the students with an opportunity to apply their acquired knowledge to practical challenges, utilising fundamental and theoretical concepts studied previously through a structured learning environment.

The choice of summative assessments (examination, thesis, research paper etc.) is primarily aimed at ensuring the student can satisfactorily achieve the intended learning outcomes (ILOs) and in turn provides the course direction team and module leads with a quantitative means of assessing the same. Apart from assessing the students' knowledge on the domain specific subject (Thermal Power Engineering), it also provides an opportunity for the students to demonstrate several attributes (such as application of their problem-solving, technical and communication skills). This strategy, additionally, enables the students to demonstrate multidisciplinary skill sets needed for their future career requirements and hence includes their ability to engage with time critical/limited technical tasks and demonstration of sound engineering judgement and skills under pressure. Given the expected cohort size and mix of experience level of the MSc Thermal Power and Propulsion student groups, these methods have been time tried and tested and hence proven to be very effective and fair means of assessments.

Summative assessments are completed, and feedback provided to the student within twenty working days. For examinations, feedback sessions are organised to provide the students with detailed information on the general performance of the cohort and detailed description and requirements of model answers to the questions.

Some of the summative assessments (for certain modules) are based on producing a thesis, reports and/or research papers (e.g., Engine systems symposium) and are marked through the electronic learning environment portals (e.g., Canvas) and written feedback is provided to the work submitted. For the specific module and based on their individual ILO requirements, this method of feedback assists the students in their future development as engineers, as it provides excellent learning experience.

Formative and summative assessment and feedback strategy- integrative and holistic

The ***assessment and feedback strategy*** followed in the program is an essential element and is explained to students at the start of the Course. The course includes a diverse range of (formative and summative) assessments depending on the particular subject being assessed, its particular delivery objectives and ILOs. These may therefore include written examinations, individual coursework, individual presentations, individual projects and thesis. These assessments are planned in advance of the start of the program and students are informed of the requirements and schedules during the academic year.

Modules delivered in the first term relate to the basic/fundamental concepts needed to gain knowledge and appreciation in the field of gas turbine engineering and the students are expected to complete the first round of individual summative assessments (for each module). The knowledge gained significantly aids better understanding of modules in the second term, which also have their individual set of summative assessments.

While modules have their individual assessments, they are considered through an ***integrative and synergistic*** approach to normally aid significantly during the IRP delivery phase. Therefore, the student has the opportunity to utilise the knowledge gained (attained through the modules in the two previous terms) and apply it to the technical task being considered in the IRP.

In some instances, the choice of the IRP may require the student to select a particular module as an elective, or attendance only module, if it is not within the compulsory modules in the option of their choice.

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

This may be discussed in advance with the individual supervisor, as it may eventually influence the student's performance and the IRP assessment. It may also additionally be noted that module level-assessments through the program, whilst normally helping develop the requisite knowledge for the IRP, they also provide the student with an opportunity to develop **engineering application**, **research writing skills and an ethical and scientific approach,** necessary to deliver a good thesis commensurate for a post-graduate (M Level) engineering course.

Formative assessment integrated in the course

The goal of formative assessment is to **assist with student learning and to provide ongoing feedback**. This is used by instructors to improve their teaching and by students to improve their learning. More specifically, formative assessments help students **identify their strengths and weaknesses** and target areas that need work and, further, help faculty recognize where students are struggling and address problems immediately.
Within the program and associated modules, the module leaders include a selection of activities related to formative assessment. For example:

- Running structured problem/ numerical solving sessions wherein students will be asked to solve technical problems individually and/or in groups (undertaken usually during or soon after the delivery of the module)
- Run dedicated multiple tutorial sessions **before** exams to specifically identify problem areas in understanding and provide solutions/direction
- Provide minutes to meetings on IRP progress (Regular basis/ Monthly)
- Present IRP topic to peers and faculty with structured written feedback (twice in the year)
- Submit a thesis definition report (month 5) so the supervisor provides gradual, continuous feedback tailored to the individual work.
- Turn in a research proposal for early feedback on research writing requirements, specific areas of focus (at least twice a year)
- Run dedicated feedback sessions **after** examinations to specifically discuss the typical responses expected, identify problem areas in understanding and provide solutions/direction

Planned sessions for formative feedback will be organised and run by module staff (and/or the project supervisor for IRP).

Assessment strategy – equitable and inclusive

The course team provides assessment methods in the strategy that enable significant opportunities for the students to exploit the full range of skills and attributes, acquired as part of their learning and further allowing them to foster and demonstrate their strengths. In case of any existing and established learning difficulties, physical impairments/ challenges or mental wellbeing issues, the students are encouraged to inform the Learning Support team and seek appropriate advice on the arrangements and support available from specialists within the university. For certain established learnings difficulties and specific requirements, **additional examination time** is provided for summative assessments.

Assessment and Feedback schedules
Each element of assessment strategy aims to form a part of the continuous assessment experience and hence the proposed strategy ensures that, normally, module assessments and feedback sessions are scheduled well in advance of the start of the course. Should any change arise (due to unavoidable circumstances), every effort is made to provide the students with adequate notice and information on the alternative arrangement and the future targeted date.

The pre-defined schedule is provided to allow students time for reflective self-evaluation during the intense periods of the course and hence submission deadlines are normally planned to prevent bunching of deadlines.

Additional considerations

The program utilises much ***technology enhanced learning (TEL) concepts*** to facilitate learning. For the IRP and assignment related assessments, the program utilises a virtual learning environment and learning management system (e.g, Turnitin, Canvas). The work is required to be submitted onto a TEL platform for assessment and will receive specific and comprehensive written feedback. This is based on a predefined assessment criterion (specified rubrics) and contextual feedback on the content. This provides the student an excellent opportunity to clearly understand any limitations in the work, the reasons and justification for the mark received and areas of improvement in the future. To ensure ethical integrity, promote self-awareness and personal proficiency, the assignment/report-based work is passed through a software to ensure no plagiarised information is included as part of the report.

For examination based summative assessments the program follows a ***whole class approach*** (described earlier), which provides the student with an opportunity to better understand how the cohort has fared in general and to reflect on their responses to the technical questions in retrospect. This also enables speeding up of feedback whilst enhancing/ improving the learning experience through providing clear indications of performance (such as sample marking followed by common mistakes / points done well).

The overall strategy is therefore designed and structured to support personal and professional development.

Course modules

The following modules outline all parts of the programme leading to **MSc.** Other awards associated with the course include some or all of these modules.

September Intake

								Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date	
1	N-THP-C Occ A23	Combustors	Professor Bobby Sethi	30	13	10	N	03/10/23	03/10/23	07/12/23	50	EX	100				Exam Week 2	At the next available opportunity which will be approximately six months later	

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education.
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
2	N-THP-ES Occ A23	Engine Systems	Dr Ioannis Roumeliotis	30	0	20	N	04/10/23	04/10/23	14/03/24	50 50	ICW IPRES	70 30				07/03/24 13 & 14/03/24	At the next available opportunity which will be approximately six months later
3	N-THP-GPSD A23	Gas Turbine Performance, Simulation and Diagnostics	Dr Theoklis Nikolaidis	65	0	20	N	02/10/23	02/10/23	07/12/23	50	EX	100				Exam Week 2	At the next available opportunity which will be approximately six months later
4	N-THP-TBC Occ A23	Turbomachinery and Blade Cooling	Dr Pavlos Zachos	50	10	20	N	02/10/23	02/10/23	12/02/24	50	EX	100				Exam Week 2	At the next available opportunity which will be approximately six months later

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
5a	N-THP-MDT Occ A23	Mechanical Design of Turbomachinery	Professor Suresh Sampath	30	0	10	N	02/10/23	02/10/23	09/02/24	50	EX	100				Exam Week 2	At the next available opportunity which will be approximately six months later
5b	NEW CODE N-THP-MDTAO Occ A23	Mechanical Design of Turbomachinery	Professor Suresh Sampath	30	0	0	N	02/10/23	02/10/23	09/02/24	N/A	AO	N/A				N/A	N/A
6	G-MTI Occ A23	Management for Technology	Dr Richard Adams	37	0	10	Y	08/01/24	08/01/24	12/01/24	40	RP	100				06/02/24	At the next available opportunity which will be approximately six months later

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
7a	N-THP-CFDGT Occ A23	Computational Fluid Dynamics for Gas Turbines	Dr Fernando Tejero Embuena	30	14	10	N	22/01/24	22/01/24	26/01/24	50	ICW	100				02/04/24	At the next available opportunity which will be approximately six months later
7b	NEW CODE N-THP-CFDAO Occ A23	Computational Fluid Dynamics for Gas Turbines	Dr Fernando Tejero Embuena	30	14	0	N	22/01/24	22/01/24	26/01/24	N/A	AO	N/A				N/A	N/A
8a	N-THP-PSPI Occ A23	Propulsion Systems Performance and Integration	Dr Theoklis Nikolaidis	30	4	10	N	26/02/24	26/02/24	01/03/24	50	EX	100				Exam Week 5	At the next available opportunity which will be approximately six months later

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment								
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
8b	NEW CODE N-THP-PSPAO Occ A23	Propulsion Systems Performance and Integration	Dr Theoklis Nikolaidis	30	4	0	N	26/02/24	26/02/24	07/03/24	N/A	AO	N/A				N/A	N/A
9a	N-THP-GTORM Occ A23	Gas Turbine Operations and Rotating Machines	Dr Uyioghosa Igie	30	22	10	N	18/03/24	18/03/24	22/03/24	50	ICW	100				10/05/24	At the next available opportunity which will be approximately 3-6 months later
9b	NEW CODE N-THP-GTRAO Occ A23	Gas Turbine Operations and Rotating Machines	Dr Uyioghosa Igie	30	22	0	N	18/03/24	18/03/24	22/03/24	N/A	AO	N/A				N/A	N/A

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
10a	N-THP-JEC Occ A23	Jet Engine Control	Dr Ioannis Goulos	30	13	10	Y	04/03/24	04/03/24	08/03/24	50	ICW	100				07/05/24	At the next available opportunity which will be approximately six months later
10b	NEW CODE N-THP-JECAO Occ A23	Jet Engine Control	Dr Ioannis Goulos	30	13	0	Y	04/03/24	04/03/24	08/03/24	N/A	AO	N/A				N/A	N/A
11	N-THP-THES/F Occ A23	Individual Research Project	Dr Soheil Jafari	10		100	N	06/10/23	06/10/23	15/08/24	50 50	THESIS IPRES	90 10				15/08/24 05/09/24	As per individual requirement.
12a	N-THP-MPSI Occ A23	Marine Propulsion System Integration	Professor Suresh Sampath	30		10	N	08/04/24	08/04/24	12/04/24	50	ICW	100				22/05/24	At the next available opportunity which will be approximately six months later
12b	NEW CODE N-THP-MPSAO	Marine Propulsion System Integration	Professor Suresh Sampath	30		0	N	08/04/24	08/04/24	12/04/24	N/A	AO	N/A				N/A	N/A

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
	Occ A23																		
13a	N-ASE-SP Occ A23	Space Propulsion	Dr Enric Grustan	22		10	Y	09/10/23	09/10/23	08/12/23	50	EX	100				14/12/2023	Exam Week 7	
13b	NEW CODE N-ASE-SPAO Occ A23	Space Propulsion	Dr Enric Grustan	22		0	Y	09/10/23	09/10/23	08/12/23	N/A	AO	N/A				N/A	N/A	
14a	N-THP-PEL Occ A23	Propulsion Electrification	Professor Panos Laskaridis	23		10	N	MODULE NOT AVAILABLE 2023-24			50	ICW	100				N/A	N/A	
14b	NEW CODE N-THP-PELAO Occ A23	Propulsion Electrification	Professor Panos Laskaridis	23		0	N	MODULE NOT AVAILABLE 2023-24			N/A	AO	N/A				N/A	At the next available opportunity which will be approximately 3-6 months later	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

March Intake

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers[13]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
1	N-THP-C Occ B23	Combustors	Professor Bobby Sethi	30	13	10	N	11/03/24	11/03/24	22/05/24	50	EX	100				Exam Week 7	At the next available opportunity which will be approximately 6 months later	
2	N-THP-ES Occ B23	Engine Systems	Dr Ioannis Roumeliotis	30	0	20	N	13/03/24	13/03/24	01/10/24	50 50	ICW IPRES	70 30				01/07/24 01/10/24	At the next available opportunity which will be	

[12] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[13] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[14] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[15] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education.
[16] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[17] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[18] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
																		approximately 3 months later
3	N-THP-GPSD Occ B23	Gas Turbine Performance, Simulation and Diagnostics	Dr Theoklis Nikolaidis	65	0	20	N	11/03/24	11/03/24	17/05/24	50	EX	100				Exam Week 7	At the next available opportunity which will be approximately 6 months later
4	N-THP-TBC Occ B23	Turbomachinery and Blade Cooling	Dr Pavlos Zachos	50	10	20	N	11/03/24	11/03/24	22/05/24	50	EX	100				Exam Week 7	At the next available opportunity which will be approximately 6 months later
5a	N-THP-MDT Occ B23	Mechanical Design of Turbomachinery	Professor Suresh Sampath	30	0	10	N	11/03/24	11/03/24	17/05/24	50	EX	100				Exam Week 7	At the next available opportunity which will be approximately 6 months later

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
5b	NEW CODE N-THP-MDTAO Occ B23	Mechanical Design of Turbomachinery	Professor Suresh Sampath	30	0	0	N	11/03/24	11/03/24	17/05/24	N/A	AO	N/A				N/A	N/A
6	G-MTI Occ A24	Management for Technology	Dr Richard Adams	37		10	Y	13/01/25	13/01/25	17/01/25	40	RP	100				04/02/25	At the next available opportunity which will be approximately 3 months later
7a	N-THP-CFDGT Occ B23	Computational Fluid Dynamics for Gas Turbines	Dr Fernando Tejero Embuena	30	14	10	N	24/06/24	24/06/24	28/06/24	50	ICW	100				16/08/24	At the next available opportunity which will be approximately 6 months later
7b	NEW CODE N-THP-CFDAO Occ B23	Computational Fluid Dynamics for Gas Turbines	Dr Fernando Tejero Embuena	30	14	0	N	24/06/24	24/06/24	28/06/24	N/A	AO	N/A				N/A	N/A

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
8a	N-THP-PSPI Occ B23	Propulsion System Performance and Integration	Dr Theoklis Nikolaidis	30	4	10	N	15/07/24	15/07/24	19/07/24	50	EX	100				Exam Week 8	At the next available opportunity which will be approximately 6 months later
8b	NEW CODE N-THP-PSPAO Occ B23	Propulsion Systems Performance and Integration	Dr Theoklis Nikolaidis	30	4	0	N	15/07/24	15/07/24	19/07/24	N/A	AO	N/A				N/A	N/A
9a	N-THP-GTORM Occ B24	Gas Turbine Operations and Rotating Machines	Dr Uyioghosa Igie	30	22	10	N	09/09/24	09/09/24	20/09/24	50	ICW	100				25/10/24	At the next available opportunity which will be approximately 3-6 months later
9b	NEW CODE N-THP-GTRAO Occ B24	Gas Turbine Operations and Rotating Machines	Dr Uyioghosa Igie	30	22	0	N	09/09/24	09/09/24	20/09/24	N/A	AO	N/A				N/A	N/A

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
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10 a	N-THP-JEC Occ B24	Jet Engine Control	Dr Ioannis Goulos	30	13	10	Y	12/08/24	12/08/24	16/08/24	50	ICW	100					At the next available opportunity which will be approximately 6 months later
10 b	NEW CODE N-THP-JECAO Occ B24	Jet Engine Control	Dr Ioannis Goulos	30	13	0	Y	12/08/24	12/08/24	16/08/24	N/A	AO	N/A				N/A	N/A
11	N-THP-THES/F Occ B23	Individual Research Project	Dr Soheil Jafari	10		100	N	15/03/24	15/03/24	12/02/25	50 50	THESIS IPRES	90 10				20/01/25 12/02/25	N/A
12 a	N-THP-MPSI Occ B24	Marine Propulsion System Integration	Professor Suresh Sampath	30		10	N	23/09/24	23/09/24	03/10/24	50	ICW	100				08/11/24	At the next available opportunity which will be approximately 6 months later

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Calendar			Assessment								
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12 b	NEW CODE N-THP-MPSAO Occ B24	Marine Propulsion System Integration	Professor Suresh Sampath	30		0	N	23/09/24	23/09/24	03/10/24	N/A	AO	N/A				N/A	N/A
13 a	N-ASE-SP Occ A24	Space Propulsion	Dr Enric Grustan	22		10	Y	07/10/24	07/10/24	06/12/24	50	EX	100				Exam Week 2 (Jan 2025)	At the next available opportunity which will be approximately 6 months later
13 b	NEW CODE N-ASE-SPAO Occ A24	Space Propulsion	Dr Enric Grustan	22		0	Y	07/10/24	07/10/24	06/12/24	N/A	AO	N/A				N/A	N/A
14 a	N-THP-PEL Occ B23	Propulsion Electrification	Professor Panos Laskaridis	23		10	N	MODULE NOT AVAILABLE 2023-24			50	ICW	100				N/A	N/A
14 b	NEW CODE	Propulsion Electrification	Professor Panos Laskaridis	23		0	N	MODULE NOT AVAILABLE 2023-24			N/A	AO	N/A				N/A	N/A

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
	N-THP-PELAO Occ B23																		

Module Type for Thermal Power and Propulsion Award Options

Module Number	Module Name	Aerospace Propulsion	Gas Turbine Technology	Power Propulsion and the Environment	Rotating Machine, Engineering and Management	Marine Propulsion Technology	Joint with another MSc
1	Combustors	C	C	C	C	C	No
2	Engine Systems	C	C	C	C	C	No
3	Gas Turbine Performance,	C	C	C	C	C	No

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

	Simulation and Diagnostics						
4	Turbomachinery and Blade Cooling	C	C	C	C	C	No
5	Mechanical Design of Turbomachinery	C	C	AO	C	AO	No
6	Management for Technology	C	C	C	C	C	Yes
7	Computational Fluid Dynamics for Gas Turbines	AO	E	E	AO	AO	No
8	Propulsion Systems Performance and Integration	C	AO	E			No
9	Gas Turbine Operations and Rotating Machines		AO	C	C	C	No
10	Jet Engine Control	AO	E	E			No
11	Individual Research Project	C	C	C	C	C	No
12	Marine Propulsion Systems Integration		E	AO	AO	C	No
13	Space Propulsion	AO	E	E			Yes
14	Propulsion Electrification	AO	E	E	AO	AO	No

C - Compulsory; E – Elective; AO – Attendance Only

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
G-MTI	Management for Technology	MSc in Thermal Power and Propulsion	MSc in Computational and Software Techniques in Engineering
N-THP-JEC Occ A	Jet Engine Control	MSc in Thermal Power and Propulsion	Shared teaching with MSc in Airworthiness (N-AW-FAEC)
N-ASE-SP	Space Propulsion	MSc in Astronautics and Space Engineering	

8. How are the ILOs assessed?

The course uses a range of assessment strategies. Depending upon the option studied, students can expect to have up to seven written examinations, four assessments by submitted assignment work and two elements of assessment by individual presentation.

This approach has been adopted to enable students to learn via both formative and summative assessment strategies while simultaneously equipping them with transferrable skills.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.
(Module numbers correspond with those used in the Course module table above.)

Postgraduate Certificate

enter text here – start with lowest award – e.g., Postgraduate Certificate **Award ILOs** **Module No.**	ILO1	ILO2	ILO3
1		EX	EX
2		ICW/IPRES	ICW/IPRES
3	EX	EX	
4		EX	EX
5		EX	EX

enter text here – start with lowest award – e.g., Postgraduate Certificate Award ILOs / Module No.	ILO1	ILO2	ILO3
6		RP	
7			ICW
8	EX	EX	EX
9	ICW	ICW	ICW
10		ICW	ICW
12	ICW		ICW
13		EX	EX
14	ICW		ICW

A. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO4
1	EX
2	
3	EX
4	EX
5	EX
6	
7	ICW
8	EX
9	ICW
10	ICW
12	ICW
13	EX
14	ICW

B. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO5
11	THESIS IPRES

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)
N/A			

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6-year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition, students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational, and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5-year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

Over 90% of the graduates of the course have found employment within the 12 months of completing course. Most of the graduates are employed in the following industries/capacities:

- Gas turbine engine manufacturers
- Airframe manufacturers
- Airline operators
- Regulatory bodies
- Aerospace/energy consultancies
- Power production industries
- Academia: doctoral studies
- Marine Propulsion
- Gas Turbines for Oil and Gas application

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc in Through-life System Sustainment
Course code	MSTLSPTC, PDTLSPTC, PCTLSPTC, MSTLSPAC,
Academic Year	2023-24
Valid entry routes	MSc (apprenticeship and non-apprenticeship)
Additional exit routes	PgDip (non-apprenticeship only), PgCert (non-apprenticeship only)
Mode of delivery	Part-time
Location(s)[1] of Study	Cranfield Campus or remote delivery
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Manufacturing
Centre	Centre for Life-cycle Engineering and Management (CLEM)
Course Director	Dr Isidro Durazo Cardenas
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	N/A
Is this course offered as a Cranfield Apprenticeship?	Yes
Apprenticeship Standard the course is mapped to	Through-life Engineering Services Specialist
Is the Degree apprenticeship integrated or non-integrated?	Integrated
Is the Apprenticeship offered as an open and/or closed course?	Open
Teaching Institution	Cranfield University
Admissions body	Cranfield University

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Part-time MSc - up to three years
Course Start Month(s)	October

Institutions delivering the course

This course is delivered by the School of Aerospace, Transport and Manufacturing, Manufacturing Theme, Centre for Life-cycle Engineering and Management (CLEM) where the research interests include:

Product-service systems and through-life engineering, and teaching interests include "through-life capability thinking".

Teaching may also be provided by external speakers, mostly leading industry practitioners, but may also include invited lecturers from other institutions and other Schools within Cranfield University.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This MSc course is accredited by the Institution of Engineering and Technology (IET) until August 2025 and the Royal Aeronautical Society (RAeS) and The Instruction of Mechanical Engineers (IMechE) until August 2026 on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng). Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

2. What are the aims of the course?

Cranfield University offers this course in order to:

- Establish a leading position for organisations in the field of technical product service systems / engineering system support and maintenance management.
- Establish a route to transfer emerging research into practice.
- Build a cadre of alumni with an interest and capability in system support and through-life thinking to support complex engineering programmes.

This programme is intended for the following range of students:

- Post-experience Science/ Technology/ Engineering/Mathematics (STEM) graduates sponsored by their employer. It may be expected that students will participate as part of a wider leadership development programme.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Evaluate the concepts of long-life equipment support and sustainment service.
ILO 2. Critically analyse specific through-life support solutions.
ILO 3. Critically evaluate factors affecting a long-life system availability and effectiveness.
ILO 4. Assess latest diagnostics and prognostics techniques and practices.
ILO 5. Examine challenges in large scale data management and analysis.
ILO 6. Develop and critically evaluate system support supply network models.
ILO 7. Differentiate cost drivers and develop whole life cost modelling.
ILO 8. Evaluate different leadership roles and change management.

B. **Postgraduate Diploma**

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 9. Assemble key management and personal development skills needed to influence and implement change.
ILO 10. Appraise time and project management skills.
ILO 11. Evaluate team based project skills to develop through-life system sustainment solutions.

C. **MSc**

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 12. Critically evaluate the theory behind, and the selection of appropriate analysis and design tools and apply them to develop new technical and business system sustainment solutions.
ILO 13. Construct an independent project on a subject relevant to through-life system sustainment involving project/service planning, development of new skills, critical evaluation of literature, evaluation of results, and discussion of findings and writing a thesis.

4. How is the course taught?

The course is taught through:

- An unassessed introductory/contextual induction.
- 8 taught modules (6 will be required for the PgCert).
- A multi-sector Group Project – supervised by Cranfield Academics.
- An Individual Project – supervised by Cranfield Academics for students pursuing an MSc only, OR
- An End Point Assessment- supervised by Cranfield Academics as part of an Integrated End Point Assessment for students pursuing both an MSc and Through Life Engineering Services Specialist Apprenticeship.

Students will be supported in their learning and personal development by:

- Individual coaching/mentoring.
- Online learning platform.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 8. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate
The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction Modules 4,5,7 and 9 Any 2 Taught Modules from Modules 2, 3, 6 and 8	0 10 each, 40 total 10 each, 20 total
TOTAL:	60

B. Postgraduate Diploma
The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction Modules 2-9 Group Project	0 80 40
TOTAL:	120

C. MSc
In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Induction Modules 2-9 Group Project Either: • Individual Research Project – for non-apprenticeship students OR • End Point Assessment – for apprenticeship students	0 80 40 80 80
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria
The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;

- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Part-time students register for the course in October or April and are expected to complete the course within 3 years.

Modules will generally be delivered during intensive weeks. Group and Individual Projects will be undertaken mostly off site (at the industrial sponsors' facilities) on a part time basis over a period of 6 months.

7. Course Level Assessment Strategy[4]

The assessment tasks are focused on assessing the learning from the module whilst building evidence of the application of skills and behaviours in the students' own workplaces. Both formative and summative assessment is utilised in the taught modules.

The assessments are work based to align with the purpose of the course – to create employees who can implement through-life system sustainment of complex long-life assets. Taught module assessments are 2500 words. Where relevant, formative feedback is provided during class discussion of both module related aspects and work-based instances relevant to the module content. Formative assessment is also provided as part of in-module activity that requires individual and group presentation of findings to the class.

The group project is a work-based operations issue that requires the students to work in a team to deliver a group based report (8000 words) and presentation. The group project also has an individual component that self-gauges the skill development during the course of the project.

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[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

The MSc students will complete the individual project, which is aligned with the module ILOs. The project will offer a deep-dive in to a technical area that requires in-depth research. This will involve two forms of assessment - 1) an 8000 word thesis report. 2) a short presentation of the research project.

The MSc apprenticeship students will complete an End-point Assessment, which will include three major forms of assessment:
1) Project report: This assessment method will assess the apprentice's ability to generate a viable service improvement proposal, which focuses on technical elements that can yield efficiency improvements on an existing project.
2) Proposal executive summary, presentation and questioning: This assessment method will assess the apprentice's ability to produce a proposal of a new or revised service offering. This assessment will focus on new business model creation, which may offer new customers or business opportunities. The assessment will have a strategic focus on brand new service initiatives rather than making improvements on existing service projects.
3) Discussion underpinned by a portfolio of evidence: This assessment method will assess the apprentice's ability to apply knowledge, skills and behaviours within the workplace, which may not occur naturally in a project.

Assessments are focused on application of learning, within and following the module. They relate module ILOs and to students' own workplace challenges that are used as a basis of analysis, evaluation and synthesis of potential solutions.

Course modules

The following modules outline all parts of the programme leading to **MSc.** Other awards associated with the course include some or all of these modules.

Open Cohort- October 2022 Intake

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%		Weighting within module[8] (%) of Independent	Weighting within module of multi-	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
8	I-CE-A2012-A23	Information Management	Dr Barmak Honarvar	32		10	N	11/09/23	11/09/23	15/09/23	50	ICW	100				23/10/23	At the next available opportunity which may not be until the course runs the following year
9	I-TLS-LSS-A23	Leadership an Change Management	Dr Colin Pilbeam	32		10	N	02/11//23	02/11/23	08/11/23	50	ICW	100				11/12/23	At the next available opportunity which may not be until the course runs the following year
11	I-TLS-THESIS-A23	Individual Research Project	Dr Isidro Duraz Cardenas	20		80	N	04/03/24	04/03/24	02/09/24	50 50	THESIS IPRES	90 10				23/08/24 27/08/24	
12	I-TLS-EPA-A23	End Point Assessment	Dr Isidro Duraz Cardenas	30		80	N	04/03/24	04/03/24	02/09/24	50 50 50	IPROJ IPRES OR	70 20 10				26/07/24 02/09/24 02/09/24	

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)

Open Cohort- October 2023 Intake

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
1	I-TLS-INWK-A23	Induction	Dr Isidro Durazo-Cardenas	15		0	N	03/10/23	03/10/23	04/10/23	N/A	AO	N/A				N/A	
2	I-TLS-A1524-A23	Managing Assets and Value	Prof Andrew Starr	32		10	N	09/10/23	16/10/23	20/10/23	50	ICW	100				04/12/23	At the next available opportunity which may not be until the course runs the following year
3	I-TLS-ETLS-A23	Through-Life Business	Dr Agusmian Ompusunggu	32		10	N	11/03/24	18/03/24	22/03/24	50	ICW	100				29/04/24	At the next available opportunity

[7] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[8] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[9] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[10] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[11] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[12] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*)*. If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[13] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers [8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
		Models and Servitisation																which may not be until the course runs the following year
4	I-TLS-A1525-A23	Through-life System Effectiveness	Dr Ravi Pandit	32		10	Y	22/01/24	29/01/24	02/02/24	50	ICW	100				11/03/24	At the next available opportunity which may not be until the course runs the following year
5	I-IVH-A1514-A23	Diagnostics and Prognostics	Dr Muhammad Khan	25		10	Y	27/11/23	27/11/23	01/12/23	50	ICW	100				22/01/24	At the next available opportunity which may not be until the course runs the following year
6	I-TLS-SNAM-A23	Operational Availability and Risk	Dr Isidro Durazo Cardenas	30		10	N	09/05/24	09/05/24	15/05/24	50	ICW	100				24/06/24	At the next available opportunity which may not be until the course runs the following year

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers [8]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
7	I-TLS-CENG-A23	Optimising Whole Life Cost and Performance Management	Dr Maryam Farsi	28		10	N	01/07/24 `	01/07/24	05/07/24	50	ICW	100				12/08/24	At the next available opportunity which may not be until the course runs the following year	
8	I-CE-A2012-A24	Information Management	Dr Samir Khan	32		10	N	09/09/24	09/09/24	13/09/24	50	ICW	100				21/10/24	At the next available opportunity which may not be until the course runs the following year	
9	I-TLS-LSS-A24	Leadership and Change Management	Dr Colin Pilbeam	32		10	N	31/10/24	31/10/24	06/11/24	50	ICW	100				09/12/24	At the next available opportunity which may not be until the course runs the following year	
10	I-TLS-GP-A23	Group Project	Dr Isidro Durazo-Cardenas	15		40	N	08/01/24	26/02/24	06/09/24	50 50 50	GCW GPRES ICW	70 20 10				02/09/24 06/09/24 02/09/24	At the next available opportunity which may not be until the course runs	

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers [8]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
																			the following year
11	I-TLS-THESIS-A24	Individual Research Project	Dr Isidro Durazo-Cardenas	20		80	N	03/03/25	03/03/25	01/09/25	50 50	THESIS IPRES	80 20				29/08/25 01/09/25		
12	I-TLS-EPA-A24	End Point Assessment	Dr Isidro Durazo-Cardenas	30		80	N	03/03/25	03/03/25	01/09/25	50 50 50	IPROJ IPRES OR	70 20 10				25/07/25 01/09/25 01/09/25		

Please list all modules that are used by another existing course.

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
I-IVH-A1514	Diagnostics and Prognostics	Through-life System Sustainment	Maintenance Engineering and Asset Management
I-TLS-A1525	Through-life System Effectiveness	Through-life System Sustainment	Aircraft Engineering

8. How are the ILOs assessed?

The following assessment types are utilised:

- 8 assignments
- Assessment of the Group Project Report
- Assessment of the Individual Project Report/Thesis for MSc-only students or End Point Assessment (EPA) for apprenticeship students

The methods are proposed based on recent experience with similar courses. The assessment will follow the School standard practices.

This approach has been adopted because:

> The course is heavily applied with the content that is presented and the assignments allows the course to further give the opportunity for students to put in practice the learning from the modules.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8
1								
2	ICW	ICW					ICW	
3	ICW	ICW						
4	ICW	ICW	ICW			ICW		
5	ICW	ICW	ICW	ICW				
6	ICW	ICW	ICW			ICW		
7		ICW			ICW		ICW	
8		ICW			ICW			
9	ICW							ICW

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 9	ILO 10	ILO 11
10	GCW GPRES ICW	GCW GPRES ICW	GCW GPRES ICW

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by one of the following module assessments:

Award ILOs / Module No.	ILO 12	ILO 13
11	THESIS IPRES	THESIS IPRES
12	IPROJ IPRES OR	IPROJ IPRES OR

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)
N/A	N/A		

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

In terms of the likely career paths and employability of graduates completing the course, please refer to section 2. Students are sponsored by a current employer and are generally seeking a change in role that brings higher levels of formal responsibility, a broadening of existing skills and capabilities and a greater level of professionalism.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc Vehicle and Weapon Engineering USA (Defence Engineering Programme
Course code	MSVWEPTR, PDVWEPTR, PCVWEPTR, SPVWEPTR
Academic Year	2023/2024
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	N/A
Mode of delivery	Part-time
Location(s)[1] of Study	Detroit, USA
School(s)	Cranfield Defence and Security
Theme	Defence and Security
Centre	Centre for Defence Engineering
Course Director	Dr Thiru Thirulogasingam
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	No
Is the Degree apprenticeship integrated or non-integrated?	No
Is the Mastership offered as an open and/or closed course?	No
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

UK Qualifications Framework Level	QAA FHEQ level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Maximum of 5 years for MSc, 4 years for PgDip and 3 years for PgCert
Course Start Month(s)	The nature of the programme is such that prospective students can join the course at any time; however for administrative purposes it is preferred that students join the course in June.

Institutions delivering the course

This course is delivered by the Centre for Defence Engineering (CDE) in CDS where the research interests include various aspects of weapon and veicle systems such as mobility, lethality, survivability and systems integration. CDE is already delivering a similar suite of courses in Shrivenham to both UK Ministry of Defence (MOD) and members of Allied countries/forces. In addition, due to their expertise, CDE has provided consultancies to various government departments in the above areas.

The Defence Engineering programme (MS in Vehicle & Weapon Engineering) will be delivered on a part-time basis in Detroit in a flexible manner. The majority of the teaching and/or assessment will be provided by the CDE while two modules will be supported and delivered by the Centre for Systems Engineering (CSE). It's a CDS, Cranfield University initiative and the programme has no partners or collaborators.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)
This MSc course is accredited by the Institution of Engineering and Technology (IET) until August 2023 on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng). Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements

2. What are the aims of the course?

Cranfield University offers this course in order to:

- provide education and training at postgraduate level for military officers, defence industry staff and government servants who may expect to fill technically demanding appointments concerned with the design, development, procurement and operation of weapon systems
- provide graduates with the technical qualities, transferable skills and independent learning ability necessary to make them effective in organisations that design, develop, procure or operate military vehicles and gun systems.

The syllabus is designed to deliver the aim in a flexible manner over not more than 5 years as a part-time course. Taught modules are offered that provide balanced coverage of the main design aspects of weapon and vehicle systems, with an option to select either weapon or vehicle as a speciality.
The course has significant theoretical content and students are expected to develop skills in independent learning in order to process the quantity of taught material effectively. A group design study in the AFVWSS module is used to build team-working skills and explore the integration and trade-offs required in the design and development of vehicle and weapon systems. Group study is also designed to understand the user requirements and learn to apply a systems engineering approach in optimising the design. Attendees will be required to present their design to a critical audience and defend their design judgement and decisions.
An individual or group project presents the students with the opportunity to gain in-depth knowledge of a particular area of automotive or weapon engineering

This programme is intended for the following range of students:

- Test and evaluation engineers, design and development engineers, manufacturing and industrial engineers, specification engineers, physicists and mathematicians working in the weapon and vehicle design, researchers and analysts working in the design and development of fighting vehicles

- Military personnel, government civil servants, defence industry, acquisition and procurement staff from DoD

- Graduates, who intend to take up a career in defence technology (DoD and industry)

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate in Vehicle and Weapon Engineering

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Demonstrate a systematic understanding of military vehicles and weapon systems technology including their systems engineering.

ILO 2. Critically assess the design and integration of vehicle and cannon systems in the face of conflicting and limited information.

ILO 3. Develop the modelling and simulation of weapon and vehicle components and systems using computer-based techniques; for example: ballistics, recoil, weapon control, ride, performance and handling.

ILO 4. Critically analyse and evaluate the impact of new weapon and vehicle technology on changes and developments in and to the threat.

ILO 5. Apply the management and systems engineering techniques used in the integration of weapons and vehicles systems

B. Postgraduate Diploma in Vehicle and Weapon Engineering

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 6. Explain the engineering and physical limitations to the performance of weapon and vehicle systems in relation to their design.

ILO 7. Illustrate the management and systems engineering techniques used in the integration of weapon and vehicles systems.

ILO 8. Defend the critical requirements of weapon and vehicle systems and be able to critically analyse the design specifications.

C. MSc in Vehicle and Weapon Engineering

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 9. Defend their design of Military Vehicle and Weapons systems.

ILO 10. Formulate a systematic approach and engineering judgement to the design and integration of vehicle and weapon systems in the face of conflicting and limited information.

ILO 11. Present and defend design solutions in an efficient manner.

ILO 12. Generate the key requirements of weapon and vehicle systems and be able to critically analyse the design specifications.

4. How is the course taught?

The programme will provide students with the technical knowledge and understanding of weapon systems and military vehicles to make them effective in specification, design, development and assessment. Special attention will be given to recent advances in defence technology, and to educating students in the analysis and evaluation of systems against changes and developments in the threat.

At the start of the course students will receive an induction programme covering administrative matters such as registration and being a CU student and academic related matters such as Study Skills, student support and use of the VLE via a videoed lecture.

The taught element of the programme will consist of 13 courses (modules) covering major aspects of defence technology, and providing a balanced and broad coverage of key aspects, critical issues and constraints associated with the design, development, performance and integration of weapon and vehicle systems.

The modular teaching programme culminates in an integrated Design Synthesis Course (Armoured Fighting Vehicle & Weapon Systems Study, AFVWSS). This draws together the material taught in the preceding courses and considers the design of the weapons and platform as a system, examining the compromises necessary to achieve optimum operational performance.

In addition to the teaching methods outlined above, students will be supported in their learning and personal development by undertaking computer based exercises specifically developed by the teaching team.

Linking theory to real examples adds credibility and builds confidence; therefore use of current and legacy equipment as a teaching aid to highlight design philosophy, design parameters and issues, constraints and trade-offs will be used as and when required.

To develop their confidence in conducting critical engineering analysis and systems evaluation, independent research and learning, students will undertake an AFVWSS design study.

Course tuition and project supervision will be undertaken as follows:

- The Centre for Defence Engineering (CDE) plans to visit Detroit three times a year in April, June and Nov/Dec for two weeks each visit to deliver two courses per visit and 5 days of project supervision each year. This will allow delivery of 13 courses worth 120 credits, and project study worth 80 credits.
- During each visit, CDE will send a team of 3-6 academics and a module leader/course director to deliver the respective courses and supervision to the students.
- To ensure students are well prepared for courses, where required the course director will provide pre-reading material four weeks prior to the delivery of the course. Pre-reading material will be designed to provide background information necessary for the understanding of the critical design issues taught during the course. This pre-reading material is optional and will require no more than 2 -15 hours of private study.
- Each course will consist of lectures to develop better understanding in the students and will be supported by tutorials, (video) laboratory and computer based exercises to explain the application of engineering and applied science using real life examples.
- Depending upon the type of course, written examination and course work assessment will be undertaken. This element will require 40-45 hours of private study. If the course is assessed by course work, students will be given eight weeks after the delivery of the course to complete their work and submit the assessment.

- Unless discussed and agreed prior to the class, assessment by written examination will be undertaken on the last day of the course. Coursework feedback will be given to students in accordance with University regulations. Project feedback will be given the week following each visit.
- During each visit, the project supervisor along with course director will organise one-to-one meetings with the students to discuss and monitor their progress. Project supervisors will also provide guidance and direction to the student(s). Any concerns and achievements will be documented and appropriate action will be taken to ensure that students' concerns are satisfactorily addressed.

The Individual Project

Aim
The overall aim of the project is to enable an individual student to develop, by first-hand experience, his expertise in engineering research, design or development in the field of military vehicle technology.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Any combination of the PgDip modules with an accumulated credit of 60.	60
ELECTIVE MODULES:	
TOTAL:	**60**

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Module 1a or 1b Module 2 a or 2b Modules 3, 4, 6, 7, 8, 9, 11, 12, and 13	5 5 9 x 10
SPECIALISMS – CHOOSE EITHER VEHICLE OR WEAPONS SPECIALISM	
Vehicle	
Module 5a Module 10a	10 10

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Module 1a or 1b Module 2a or 2b Modules 3, 4, 6, 7, 8, 9, 11, 12, and 13 Projects	5 5 9 x 10 80
SPECIALISMS – CHOOSE EITHER VEHICLE OR WEAPONS SPECIALISM	
Vehicle	
Module 5a Module 10a	10 10
Weapons	
Module 5b Module 10b	10 10
TOTAL:	**200**

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria
The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

6. How is the course structured?

Please see the course structure document for details on the individual elements of the course. Overall, the programme is offered off-campus on a part-time basis only. The programme is divided into 2 main parts: the taught phase and the project/design study. Taught phase of the MSc course will be delivered over 4 years in Detroit. Two modules will be taught per visit with two to three visits per year. The project/design study will be integrated throughout the taught phase. The nature of the programme is such that prospective students can join the course at any time; however for administrative purposes it is preferred that students join the course in June.

7. Course Level Assessment Strategy[4]

The course uses a number of different assessment types, both exam and coursework. With regard to the coursework a range of tasks are set including:
Research and brief – both oral and written
Simulation and analysis tasks
Case studies and design studies (both completed individually and as part of a group – written reports)
The assessment of the final project (MSc only) is completed by written thesis, supplemented by an oral viva and project poster.
Full details can be found in the module descriptors for each aspect of the course.

Course modules

The following modules outline all parts of the programme leading to **MSc.**. Other awards associated with the course include some or all of these modules.

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1a		R-VWE-FVD	Fighting Vehicle Design	Prof Amer Hameed/Prof Gareth Appleby-Thomas	38	1	5	Y	Not running	12/05/25	16/05/25	50	ICW EX	50 50				11/07/25 16/05/25	TBC TBC
1b		R-VWE-FEDE	Finite Elements in Defence Engineering	Stephanie Burrows	35	N/A	5	N	Not running	04/05/26	08/05/26	50	ICW	100				03/07/26	TBC

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%. This will be at the Board of Examiners discretion.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*)*. If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
2a		R-VWE-SEAP	Systems Engineering and Assured Performance	Mr Rick Adcock	35	1	5	N	Not running	08/06/26	12/06/26	50	ICW EX	70 30				07/08/26 12/06/26	TBC TBC
2b		R-VWE-MSCDE	Modelling, Simulation and Control for Defence Engineering	Dr David Galvao Wall	38		5	Y	Not running	17/03/25	21/03/25	50	ICW	100				16/05/25	TBC
3		R-VWE-WST	Weapon Systems Technology	Prof Amer Hameed/Dr Hugh Goyder	38	5	10	Y	Not running	06/04/26	10/04/26	50	ICW EX	50 50				05/06/26 10/04/26	TBC TBC
4		R-VWE-FB	Fundamentals of Ballistics	Dr Clare Knock/ Prof Amer Hameed	38	-	10	Y	Not running	07/04/25	11/04/25	50	ICW EX	50 50				06/06/25 11/04/25	TBC TBC
5a		R-VWE-MVP	Military Vehicle Propulsion (for vehicle speciality)	Dr Thiru Thirulogasingam	38	-	10	N	Not running	10/11/25	14/11/25	50	ICW EX	50 50				30/01/26 14/11/25	TBC TBC
5b		R-VWE MVPD	Military Vehicle Propulsion	Dr Thiru Thirulogasingam	38		10	N	Not running	16/06/25	20/06/25	50	ICW EX	60 40				21/08/25 20/06/25	TBC TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
			and Dynamics (for weapon speciality)																
6		R-VWE-EDT	Electric Drive Technologies	Dr John Economou	35	2	10	N	06/05/24	06/05/24	10/05/24	50	ICW EX	50 50				05/07/24 10/05/24	TBC TBC
7		R-VWE-LWD	Light Weapon Design	Mr Steve Champion	38	3	10	Y	Not running	11/11/24	15/11/24	50	ICW EX	50 50				24/01/25 15/11/24	TBC TBC
8		R-VWE MAV	Military Autonomous Vehicle	Dr John Economou	38	3	10	Y	08/04/24	08/04/24	12/04/24	50	ICW EX	50 50				07/06/24 12/04/24	TBC TBC
9		R-VWE-SURV	Survivability	Dr Gareth Appleby Thomas	38		10	N	10/06/24	10/06/24	14/06/24	50	ICW EX	50 50				09/08/24 14/06/24	TBC TBC
10a		R-VWE MVD	Military Vehicle Dynamics (for Vehicle speciality)	Mr Ajay Kumar	38		10	Y	18/03/24	18/03/24	22/03/24	50	ICW EX	50 50				17/05/24 22/03/24	TBC TBC
10b		R-VWE-GSD	Ordnance Design	Prof Amer Hameed	38		10	N	Not running	09/06/25	13/06/25	50	ICW	100				08/08/25	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number		Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
													Independent Assessment		Multi-part Assessment			Submission dates	
									Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
11		R-VWE-VSI	Vehicle Systems Integration	Mr David Diskett	38		10	N	Not running	16/03/26	20/03/26	50	ICW EX	70 30				15/05/26 20/03/26	TBC TBC
12		R-VWE-RSE	Reliability and System Effectiveness	Laura Lacey / Dr Aimee Helliker	38		10	N	13/11/23	13/11/23	17/11/23	50	ICW	100				26/01/24	TBC
13		R-VWE-AFVWSS	Armoured Fighting Vehicle and Weapon Systems Study (2 weeks course)	Prof Amer Hameed / David Diskett	55		10	N	Not running	05/05/25	16/05/25	50	ICW	100				11/07/25	TBC
14		R-VWE-THESIS	Project	Prof Amer Hameed	100		80	N		01/07/24	31/07/25	50	THESIS	100				31/07/25	TBC

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
R-VWE-FB	Fundamentals of Ballistics	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-MAV	Military Autonomous Vehicles	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-FVD	Fighting Vehicle Design	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-MSCDE	Modelling, Simulation and Control for Defence Engineering	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-LWD	Light Weapon Design	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-WST	Weapon Systems Technology	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-MVP	Military Vehicle Propulsion	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-MVD	Military Vehicle Dynamics	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology

8. How are the ILOs assessed?

The following assessment types are utilised:

The course uses a range of assessment types including written examination, coursework, thesis and oral examination.

This approach has been adopted to assess the intended learning outcomes and the weighting of assessment, particularly the use of written examinations addresses the educational expectation of the USA market.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO 1.	ILO2.	ILO3	ILO4	ILO5
1a	X	X		X	X

Award ILOs / Module No.	ILO 1.	ILO2.	ILO3	ILO4	ILO5
1b	X		X		
2a	X			X	X
2b	X	X	X	X	X
3	X	X	X	X	
4	X	X		X	
5a	X	X		X	
5b	X	X		X	
6	X			X	X
7	X			X	X
8	X		X	X	X
9	X			X	
10a	X	X		X	
10b	X	X		X	
11				X	X
12	X		X		X
13	X	X	X	X	X

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO6	ILO7	ILO8
1a			
1b	X		
2a	X		
2b			
3	X		
4	X		
5a	X	X	X
5b	X	X	X
6	X		X
7	X	X	X
8	X		X
9	X	X	X
10a	X	X	X
10b	X	X	X
11	X		X

Award ILOs / Module No.	ILO6	ILO7	ILO8
12	X	X	X
13	X	X	X

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO9	ILO10	ILO11	ILO12
1a		X	X	
1b		X	X	
2a		X	X	
2b		X	X	
3		X	X	
4		X	X	
5a			X	
5b			X	
6			X	
7			X	
8			X	
9	X	X	X	X
10a	X	X	X	X
10b	X	X	X	X
11				X
12	X	X		
13	X	X	X	X
14	X	X	X	X

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	**Modules Covered**	**Assessment**	
		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels

are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

This programme is intended for the following range of students as part of their continuing professional development to improve their skills in their current role and to enhance career progression opportunities within their current organisations:

- Test and evaluation engineers, design and development engineers, manufacturing and industrial engineers, specification engineers, physicist and mathematicians working in the weapon and vehicle design, researchers and analysts working in the design and development of fighting vehicles

- Military personnel, government civil servants, defence industry, acquisition and procurement staff from DoD

- Graduates, who intend to take up a career in defence technology (DoD and industry

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	Water and Sanitation for Development
Course code	MSWVDFTC, MSWVDPTC, PDWVDFTC, PDWVDPTC, PCWVDFTC, PCWVDPTC
Academic Year	2023/24
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time, Part-time
Location(s)[1] of Study	Cranfield Campus
School(s)	School of Water, Energy and Environment
Theme	Water
Centre	Cranfield Water Sciences Institute
Course Director	Dr May Sule
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/a
Is the Degree apprenticeship integrated or non-integrated?	N/a
Is the Mastership offered as an open and/or closed course?	N/a

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Minimum 2nd class UK honours degree or equivalent or relevant industrial experience. Language proficiency for non-UK students: TOEFL: 237 (computer version), 580 (paper version), or TOEIC: 830, or IELTS: 6.5 minimum, or Cambridge Certificate: C or above
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Full-time MSc - one year, Part-time MSc - up to three years, Full-time PgCert - one year, Part-time PgCert - two years, Full-time PgDip - one year, Part-time PgDip - two years
Course Start Month(s)	Full-time: September. Part-time: throughout the year (September preferred, other times on case by case basis)

Institutions delivering the course

This course is delivered by the School of Water, Energy and Environment. Water research in the Cranfield Water Science Institute and the Centre for Water, Environment and Development focuses on the science, engineering and management of water in municipal, industrial and natural environments, encompassing treatment technologies, engineering, irrigation, socioeconomics and policy. Research also focuses on soil and water sciences in the context of land management for food, fibre and bio-energy crops, environmental services and biodiversity, using expertise in biophysical and social sciences and agricultural engineering.

Cranfield University actively engages external speakers from across the water sector to deliver the Water and Sanitation for Development course, including from: RedR, Oxfam, Medicin Sans Frontier, Action Contre la Faim, WaterAid, WEDC and CAWST. Cranfield University also actively seeks sponsorship and support for individual thesis projects from water sector employers to provide professional experience and development opportunities for students. Thesis sponsors and supporters include: WaterAid, WSUP and Loowatt.

Cranfield University has agreements with a number of top quality European higher education institutions through its European Partnership Programme (EPP). Within these agreements students from partner institutions have the opportunity to take a Master of Science (MSc) at Cranfield University as an alternative to the final year of their home university programme. The EPP provides a feeder stream of European students to Water and Sanitation for Development and in doing so contributes to the diversity of the class.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is accredited formally by Chartered Institution of Water and Environmental Management (CIWEM) until October 2027

2. What are the aims of the course?

Cranfield University offers this course in order to:

- equip engineers and other development workers to plan and implement water supply and sanitation projects and programmes in any part of the world, particularly in low income countries.

This programme is intended for the following range of students:

- graduates with science, engineering, geography or related degrees keen to pursue careers in water management
- graduates currently in employment keen to extend their qualifications or to pursue a career change
- individuals with other qualifications but who possess considerable relevant experience.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate in Water and Sanitation for Development

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Plan, design and evaluate water source infrastructure and management methods for lower-income countries, so the quality and quantity of water available is sustained.

ILO 2. Plan, design and evaluate sanitation infrastructure and management methods for lower-income countries, so as to promote health and wellbeing.

ILO 3. Explain different management and finance models for water, sanitation and hygiene services and evaluate how these might ensure access for the poorest.

ILO 4. Critically assess how water, sanitation and hygiene infrastructure and services might vary in different contexts, specifically rural, urban and emergencies.

B. Postgraduate Diploma in Water and Sanitation for Development

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 5. Integrate knowledge, understanding and skills from the taught modules in a real-life situation to address problems faced by industrial clients; creating new problem diagnoses, designs, or system insights; and communicating findings in a professional manner in written, oral and visual forms.

C. MSc in Water and Sanitation for Development

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 6. Define a research question, develop aim(s) and objectives, select and execute a methodology, analyse data, evaluate findings critically and draw justifiable conclusions, demonstrating self-direction and originality of thought.

ILO 7. To communicate their individual research via a thesis and in an oral presentation in a style suitable for academic and professional audiences.

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Being provided with the opportunity to undertake externally sponsored or supported thesis project research
- Undertaking field and laboratory work to integrate and apply knowledge and skills
- Understanding is developed through the application of knowledge from the taught modules and fieldwork to be able to address water supply and sanitation challenges in different settings across the world.
- Research and private/independent study is necessary for the successful completion of group and thesis projects which also enhance knowledge and individual study abilities.
- Assessments are considered to be part of the learning process and formative feedback given on the assessed assignments enhances the learning process. Further opportunities for formative feedback are strategically built into all modules.
- Course Director and Module Convenors are available for advice on course study and additional reading material.
- Academic staff are readily available for informal advice and feedback.
- Each student is allocated at least one thesis project supervisor to guide and direct the research.
- Students have interaction with industrial practitioners during the modules and wider opportunities are made available by the course team throughout the whole course.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits[3] through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
Induction	0
ELECTIVE MODULES:	
60 credits from the following modules: Water Resource Engineering Water, Society and Development Public Health, Hygiene and Sanitation Resilience, Shocks and Emergencies	 20 20 20 20
TOTAL:	60

[3] Senate Regulations require a minimum of 60 learning credits to be accumulated for the Award of PgCert. The number of learning credits for individual courses is set during course validation

B. Postgraduate Diploma

The accumulation of 120 credits[4] through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction	0
Water Resource Engineering	20
Water, Society and Development	20
Public Health, Hygiene and Sanitation	20
Resilience, Shocks and Emergencies	20
Group Project (Full Time Students)	40
ELECTIVE MODULES:	
Part Time Students: Group Project OR Dissertation	 40 40
TOTAL:	**120**

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Induction	0
Water Resource Engineering	20
Water, Society and Development	20
Public Health, Hygiene and Sanitation	20
Resilience, Shocks and Emergencies	20
Group Project (Full Time Students)	40
Thesis	80
ELECTIVE MODULES:	
Part Time Students: Group Project OR Dissertation	 40 40
TOTAL:	**200**

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

[4] Senate Regulations require a minimum of 120 learning credits to be accumulated for the Award of PgDip. The number of learning credits is set during course validation

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [5]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Please see the course structure document for details on the individual elements of the course. Each module is taught over four weeks, with one week largely free of structured teaching to allow time for more independent learning and reflection. Group projects are located after the taught modules, between February and May. Individual thesis research projects are run from May till the end of August with thesis submission and oral assessment in early September.

Full-time students register for the course in October and are expected to complete the course within 12 calendar months.

All options are also offered on a part-time basis and such students are expected to complete the course within 2 to 3 years. Part-time students are not restricted to starting in October but this is a preferred option. Instead they are offered individual guidance on the best sequence of study based on their prior knowledge and availability to attend.

7. Course Level Assessment Strategy[6]

Students on this course will be assessed by a variety of assessments during modules, group project and thesis period. The summative assessment plan for the modules is outlined in the table below. For the four taught modules, independent coursework will be used to assess the modules. The assessments have been mapped against the course level ILOs to ensure they cover the core learning across the

[5] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

[6] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

course. Summative assessment will be complimented by on-going formative assessment and feedback within modules. Anything written beyond the stated word/page limit will not be marked.

Module	***Assessment Details***	***Course Level ILOs***
Water Resources Engineering	100% Individual Course Work - A technical report providing hydraulic calculations and design justification for three components including including (i) a conduction line, (ii) borehole, and (iii) rural water supply distribution network. Report not to exceed 8 pages plus appendices. Anything written beyond stated word/page limit will not be marked.	ILO1, ILO4
Water, Society and Development	100% Individual Course Work - a. 1500-word, individual essay incorporating critical discussion of topics from the module. Essay includes optional titles that require the student to critically discuss the socio-economic, behavioural and political enablers and barriers to the provision of water, sanitation and hygiene services in resource constrained contexts. b. Up to 1500 words, individual policy brief essay incorporating critical discussion around the practice of WASH development discussed in the module. The essay requires student to critically reflect on the expression of interest (EOI) provided, research on the given context, identify political, socio-economic and developmental barriers and opportunities and suggest appropriate and contextualised policy responses to policymakers. c. Design social research for a research project in a defined context.	ILO1, ILO3, ILO4
Public Health, Hygiene and Sanitation	100% Individual Course Work 1. Selection of an applicable sanitation technology or hygiene provision framework in a given context. 2. Use a total systems approach and causal loop diagram to design a sanitation plan for a given context. 3. A written essay analysing the policy and practice of sanitation development in a selected LMIC case study city. The essay should link this specific case study to current thinking on public health and sanitation generally (2000 word limit).	ILO2, ILO3, ILO4
Resilience, Shocks and Emergencies	Group Course Work (GCW) (20% of overall module mark) - A group written assignment in the form of a planning document describing your plan of action for providing emergency WASH services to a group of displaced people. 3000 words maximum Individual Course Work (ICW) (80% of overall module mark) – Firstly an individual written assignment in the form of a planning document describing your plan of action for providing one component of emergency WASH services to a group of displaced people. 600 words maximum. Weighted at 30% of the overall module mark Secondly a report on an innovation for WASH service delivery in a refugee camp. Weighted at 50% of overall module mark. Max 1500 words.	ILO1, ILO2, ILO4
Group Project	Group and Individual Course Work - The students work in small consultancy teams typically on a client sponsored project for a period of 10 weeks. The students are responsible for interpreting the brief, developing a project plan, selecting and implementing a methodology, deriving results, analysing the results and drawing conclusions in alignment with the aims and objectives. All students participate in a peer review activity providing them with the opportunity to reflect on the practices of their colleagues as well as their own. Peer review feedback is provided individually by an independent member of academic staff. A single group report is produced and the project is presented orally during the group	ILO 5

	project presentation. Both elements are summatively assessed by independent markers and a group mark is assigned for each element. Individual assessment is derived from supervisor observation and meeting minute actions and an individual reflective report where the students reflect on the development of three soft skill competencies based on objectives that they set for themselves. The team working competency is mandatory as one of the three skills for each student.	
Dissertation (Part-time students only)	Individual Course Work - Part time students are not required to complete the Group Project undertaken by the full time registered students on a SWEE MSc course. An alternative assignment takes the form of a dissertation or design project which in most situations will be based around a topic relevant to the work of the part-time student. It is evident that some aspects of the Group Project experience that the work-based dissertation replaces – for example the client interaction and group dynamics components will not directly replicated by undertaking this assignment. It is expected that these experiences would normally be a part of the normal working life of the part-time student. It is expected that the dissertation will normally consist of the following elements: Abstract, Background context, Introduction to the theme(s) addressed within the dissertation, setting out the issues that will be covered, Methodology, In depth analysis/discussion of the topics discussed, Concluding remarks, References, Appendices (if relevant). Two supervisors are allocated to the dissertation and supervision follows the model used for the independent research project. The student will submit a 6,000 word report and will give an oral presentation of their work. Both elements of assessment will be marked by independent assessors.	ILO 5
Thesis	Individual Course Work -The individual research project requires students to further develop problem definition, hypothesis setting, select and execute a methodology, analyse data, and evaluate findings and draw appropriate conclusions in the context of research questions relevant to the course followed by a student. The student is required to communicate their findings successfully via a thesis, written in the style of a scientific paper and an oral presentation based around a poster. The projects are designed to integrate knowledge, the taught modules, and apply understanding and skills from the group project, to deliver a high quality written thesis and oral presentation. The individual research project/thesis is typically delivered through collaboration with an industrial sponsor, or it may be an ‘internal’ project reflecting the research interests of the School.	ILO 6 and 7

Course modules

The following modules outline all parts of the programme leading to the MSc. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar		Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
1	I-WAT-INWK	Induction Week	Jitka MacAdam	24		0	Y	02/10/23	02/10/23	06/10/23	N/A	AO	N/A				N/A	

[7] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[8] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[9] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[10] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[11] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.
[12] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[13] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar		Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
2	I-WAM-WRE	Water Resource Engineering	Jerry Knox	74	6	20	Y	09/10/23	09/10/23	03/11/23	40	ICW	100				FT - 04/11/23 PT – 18/11/23	May 2024
3	I-WAM-WSD	Water, Society and Development	Alesia Ofori	60	6	20	Y	06/11/23	06/11/23	01/12/23	40	ICW	100				FT - 02/12/23 PT – 06/01/24	May 2024
4	I-WAM-PHHS	Public Health, Hygiene and Sanitation	May Sule	60	6	20	Y	04/12/23	04/12/23	19/01/24	40	ICW	100				FT - 20/01/24 PT – 03/02/24	May 2024
5	I-WAM-RSE	Resilience, Shocks and Emergencies	Alison Parker	47	6	20	Y	22/01/24	22/01/24	16/02/24	40	GCW ICW	20 80				FT & PT - 17/02/24 FT – 17/02/24 PT – 02/03/24	May 2024

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar		Assessment									
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
PROJECTS																		
6	I-SWEE-GRPP	Group Project	Jitka MacAdam	16		40	Y	26/02/24	26/02/24	03/05/24	50	GCW	64				26/04/24 @ 16:00	May 2025
											50	GPRES	16				23/04/24 @ 16:00	May 2025
											50	ICW	10				03/05/24 @ 16:00	May 2025
											50	RP	10				04/05/24 23:59	May 2024
7	I-SWEE-DISS	Dissertation (PT MSc and PgDip only)	Jitka MacAdam	10		40	Y	26/02/24	26/02/24	20/09/24	50	IPROJ	80				20/09/24 @ 16:00	Sept 2025
											50	IPRES	20				W/C 23/09/24	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar		Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent assessments	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
8	I-SWEE-THES	Thesis	Jitka MacAdam	20		80	Y	07/05/24	07/05/24	06/09/24	50 50	THESIS OR	90 10				02/09/24 @ 16:00 27/08/24 to 04/09/24	Sept 2025

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
I-WAT-INWK	Induction Week	Advanced Water Management	Water and Sanitation for Development Water and Wastewater Engineering
I-WAM-WRE	Water Resources Engineering	Water and Sanitation for Development	Water and Waste Infrastructure Systems Engineered for Resilience (Water-WISER) CDT
I-WAM-WSD	Water, Society and Development	Water and Sanitation for Development	Water and Waste Infrastructure Systems Engineered for Resilience (Water-WISER) CDT
I-WAM-PHHS	Public Health, Hygiene and Sanitation	Water and Sanitation for Development	Water and Waste Infrastructure Systems Engineered for Resilience (Water-WISER) CDT
I-WAM-RSE	Resilience, Shocks and Emergencies	Water and Sanitation for Development	Water and Waste Infrastructure Systems Engineered for Resilience (Water-WISER) CDT
I-SWEE-GRPP	Group Project	Advanced Water Management	All SWEE courses
I-SWEE-DISS	Dissertation	Advanced Water Management	All SWEE courses
I-SWEE-THES	Thesis	Advanced Water Management	All SWEE courses

8. How are the ILOs assessed?

The following assessment types are utilised:

The MSc course is assessed as three elements:

- the taught modules (40%) are assessed by in-module assessment (including coursework, which focuses on application of principles studied and class tests, which support underpinning knowledge);
- group projects (20%) are assessed by means of a written group report and presentations.
- the research project (40%), is assessed by a thesis and an oral examination

This approach has been adopted because:

Different types of assessments enable the evaluation of a range of M-level skills. A mixture of both individual and group assessments is important in helping students to develop both individual skill and team work related skills. Group and thesis projects follow the completion of the taught part of the course and at this stage more emphasis is on enquiry based learning and problem solving.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4					
1									
2	ICW			ICW					
3	ICW		ICW	ICW					
4		ICW	ICW	ICW					
5	ICW GCW	ICW GCW		ICW GCW					
6									

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO5								
6	GCW GPRES ICW RP								
7	IPROJ IPRES								

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO6	ILO7							
8	THESIS OR	THESIS OR							

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the

University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

On completion, graduates have a broader network of global contacts, increased opportunities for individual specialism in their chosen career, and the capability to make an immediate and real contribution to improved water supply and sanitation. Cranfield Water and Sanitation for Development graduates are highly sought after by employers. Typical employers include:

- NGOs e.g. CAFOD, Concern Worldwide, ACTED, Pure Water for the World, Unicef, Medair, World Vision, WaterAid, MSF, CARE WSUP, World Toilet Organisation
- Government and pan-government agencies e.g. the European Commission, JICA,
- Small sanitation companies e.g. SOIL, Loowatt
- Water utilities e.g. Anglian Water, United Utilities, Scottish Water
- International engineering consultancies (e.g. Atkins, Mott MacDonald)

The MSc course is assessed as three elements:

COURSE SPECIFICATION

Cranfield University: Course Specifications
Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

COURSE TITLE: MSc in Water and Wastewater Engineering

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	Water and Wastewater Engineering
Course code	MSWWEFTC, MSWWEPTC, PDWWEFTC, PDWWEPTC, PCWWEFTC, PCWWEPTC
Academic Year	2023-24
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	MSc, PgDip, PgCert
Mode of delivery	Full-time, Part-time
Location(s)[1] of Study	Cranfield Campus
School(s)	School of Water, Energy and Environment
Theme	Water
Centre	Cranfield Water Sciences Institute
Course Director	Dr. Heather Smith
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	N/a
Is the Degree apprenticeship integrated or non-integrated?	N/a

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Is the Mastership offered as an open and/or closed course?	N/a
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	•1st or 2nd class UK honours degree or equivalent; in a science or engineering subject; • Candidates with other qualifications will be considered according to experience • Language proficiency for non -UK students: TOEFL: 237 (computer version), 580 (paper version), or TOEIC: 830, or IELTS: 6.5 minimum, or Cambridge certificate: C or above
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Full-time MSc - one year, Part-time MSc - up to three years, Full-time PgCert - one year, Part-time PgCert - two years, Full-time PgDip - one year, Part-time PgDip - two years
Course Start Month(s)	October: Full-time Part-time: throughout the year (October preferred, other times on case by case basis)

Institutions delivering the course

This course is delivered by the Cranfield Water Science Institute where the research interests include the science, engineering and management of water in municipal, industrial and natural environments. Water Science's activities encompass treatment technologies, engineering, irrigation, socioeconomics and policy where these relate to the improvement of water quality, and the protection and enhancement of the natural, human and industrial environments.

Cranfield University interacts with the following institutions and in the following ways:

- A number of lectures are delivered by representatives from UK water utilities, regulators and consultancies.
- Some of the students undertake their research and/or project work off campus, or at another institution.
- Teaching is provided from utility companies, other external agencies, or jointly with other institutions.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is accredited formally by the Chartered Institution of Water and Environmental Management (CIWEM) until October 2027.

2. What are the aims of the course?

Cranfield University offers this course in order to:

- Develop suitably trained and qualified process engineers and design engineers in all aspects of water and wastewater treatment, enabling them to make a significant contribution to their future or current

employee's performance and operation, with the potential to progress further into senior management positions.
- Deliver graduates whose acquired understanding of process engineering and design of treatment works will enable them to work within organisations involved in water treatment technology and process design for improving water quality to meet environmental and industrial standards (full-time students).
- Deliver graduates whose acquired understanding will enable them to develop their existing capability within organisations involved in water treatment technology and process design to improve water quality to meet environmental and industrial standards (part-time students).

Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) exit routes are provided for students who wish to access only parts of the course provided.

This programme is intended for the following range of students:

- Graduates with an undergraduate degree with a strong science and engineering element keen to pursue careers within companies and organisations involved in water and wastewater treatment, including utilities, contractors, consultants, equipment manufacturers, suppliers and industrial water users.
- Graduates currently working in the water sector keen to extend their qualifications.
- Individuals with other qualifications who possess considerable relevant experience.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate in Water and Wastewater Engineering

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Identify the design principles, practice and operational experience of conventional and advanced treatment processes together with practical design considerations and calculate water & wastewater treatment flowsheets

ILO 2. Select the appropriate scientific management and engineering strategies which promote environmental good practice and sustainable development in the water sector and which contribute to tackling new challenges.

ILO 3. Systematically and critically apply scientific and engineering principles to the design, interconnection and sustainable operation of processes for water quality improvement in municipal, environmental and industrial water and wastewater treatment contexts.

B. Postgraduate Diploma in Water and Wastewater Engineering

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 4. Integrate knowledge, understanding and skills from the taught modules in a real-life situation to address problems faced by industrial clients; creating new problem diagnoses, designs, or system insights; and communicating findings in a professional manner in written, oral and visual forms.

C. MSc in Water and Wastewater Engineering

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 5. Define a research question, develop aim(s) and objectives, select and execute a methodology, analyse data, evaluate findings critically and draw justifiable conclusions, demonstrating self-direction and originality of thought.

ILO 6. To communicate their individual research via a thesis and in an oral presentation in a style suitable for academic and professional audiences.

4. How is the course taught?

Students will be supported in their learning and personal development by:

- Understanding is developed through the application of knowledge from the taught modules and laboratory practicals to deliver optimum solutions to specified process design briefs. The practical sessions will be live streamed or recorded for those students who are located remotely and/or students who are unable to access the physical facilities.
- The case study-based design brief is used to develop independent research and presentation skills that are later applied at an advanced level in the design and thesis project.
- Research and private/independent study is necessary for the successful completion of design and thesis projects which also enhance knowledge and individual study abilities.
- Formative feedback on assessed assignments enhances the learning process and informal feedback on non-assessed individual or group exercises are also used.
- Course Directors and Module Convenors are available for advice on course study and additional reading material.
- Academic staff are readily available for informal advice and feedback.
- Each student is allocated a thesis project supervisor to guide and direct the research.
- Students have interaction with industrial practitioners during the lectures and wider opportunities made available by the course team
- The course will be taught with some elements of face to face teaching and hybrid/online delivery depending on the needs of the students.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits[3] through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction	0
Science and Engineering Principles in Water and Wastewater Treatment	30
Treatment Processes for Water and Wastewater	30
ELECTIVE MODULES:	

[3] Senate Regulations require a minimum of 60 learning credits to be accumulated for the Award of PgCert. The number of learning credits for individual courses is set during course validation.

TOTAL:	**60**

B. Postgraduate Diploma

The accumulation of 120 credits[4] through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
Induction Science and Engineering Principles in Water and Wastewater Treatment Treatment Processes for Water and Wastewater Water and Wastewater Assets: Lifecycles, Risks and Futures Group Project (Full-time students)	0 30 30 20 40
ELECTIVE MODULES:	
Part Time Students: Group Project OR Dissertation (Individual Design Project)	 40 40
TOTAL:	**120**

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Induction Science and Engineering Principles in Water and Wastewater Treatment Treatment Processes for Water and Wastewater Water and Wastewater Assets: Lifecycles, Risks and Futures Group Project (Full-time students) Thesis	0 30 30 20 40 80
ELECTIVE MODULES:	
Part Time Students: Group Project OR Dissertation (Individual Design Project)	 40 40
TOTAL:	**200**

[4] Senate Regulations require a minimum of 120 learning credits to be accumulated for the Award of PgDip. The number of learning credits is set during course validation

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria
The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [5]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in October and are expected to complete the course within 12 calendar months.

All options are also offered on a part-time basis and such students are expected to complete the course within 2 to 3 years. Part-time students will be expected to start in October, however if requesting to start outside of this period, it will be considered on a case-by-case basis. They are also offered individual guidance on the best sequence of study based on their prior knowledge and availability to attend. Flexible learning options will be made available to part time students including online attendance as well as access to recordings, based on individual needs and circumstances.

Please see the course structure document for details on the individual elements of the course. The 20 credit module is taught over four weeks, where the contact time is generally taking place from Tuesdays to Thursdays. The rest of the time is largely focussed on guided independent learning and reflection.

[5] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

The two 30 credit modules are taught over six weeks, with most of the contact time again taking place from Tuesdays to Thursdays and the rest of the time largely focussed on guided independent learning, reflection on the previous work and preparation for module assessment (completing individual coursework).

7. Course Level Assessment Strategy[6]

Students on WWE MSc will be assessed by a variety of assessments during modules, group project and thesis period. The assessment tasks are challenging and enable students to demonstrate a full range of skills and attributes. The summative assessment plan for the modules is outlined in the table below mapped against the course level ILOs to ensure they cover the core learning across the course. For the three modules, independent coursework will be used to assess all modules. All modules are supported by a number of formative tasks including group discussion, quizzes, case studies and oral presentations; with formative feedback provided by the lecturers in the class. Students should note that for summative assignments anything written beyond the stated word/page limit will not be marked.

The group project phase is assessed by a group report and presentation, with the latter being attended by a wide-ranging audience (academics, industrialists…) which helps the students develop presentation skills relevant to succeed in their future careers. Students have opportunities to develop their communication skills before their summative assessment, as they are required to give group presentations on project progress where they receive immediate formative feedback. Students are generally expected to be more self-directed in their learning during their individual research project, which is assessed by thesis submission and delivering a presentation. Formative feedback and guidance is provided through the thesis in preparation for the summative assessment by regular interaction with the thesis supervisor.

Module	***Assessment Details***	***Course Level ILOs***
Science and Engineering Principles in Water and Wastewater Treatment	Assignment 1 (15 credits) - The assignment will comprise a series of questions (8-10) on the different topics covered in the weeks 1 to 3 of the module to be answered in an individual report (maximum 12 pages). Anything written beyond the stated word/page limit will not be marked. The answers to these questions will include mostly descriptive parts with some mathematical and engineering calculations. The assignment brief will be available from the start of the module and the report will have to be submitted on the Monday of week 4 of the module. Assignment 2 (15 credits) - The assignment will comprise a series of questions (15-20) on the different topics covered in the weeks 3 to 6 of the module to be answered in an individual report (maximum 15 pages). Anything written beyond the stated word/page limit will not be marked. The answers to these questions will include mostly mathematical and engineering calculations with some descriptive parts. The assignment brief will be available from the start of the module and the report will have to be submitted on the Saturday of week 6 of the module.	ILO1, ILO3
Treatment Processes for Water and Wastewater	Assignment 1 – Individual Course Work (15 credits) -	ILO 1, ILO2, ILO3

[6] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

	The assessment will consist of an individual assignment (15 credits) weighting individually 50% of the module marks. This assignment will cover wastewater treatment. This features designing a wastewater treatment plant requiring a combination of descriptive, mathematical solutions and costing. There is no word limit, but the overall submission length is limited to a maximum of 12 pages Assignment 2 - Individual Course Work (15 credits). The remaining 15 credits and other 50% of the module marks are obtained through a second individual assignment. This assignment will cover water treatment. This features designing a water treatment plant requiring a combination of descriptive, mathematical solutions and costing. There is no word limit, but the overall submission length is limited to a maximum of 12 pages	
Water and Wastewater Assets: Lifecycles, Risks and Futures	100% Individual coursework - Students will be required to submit an assignment following the module (stage 3 proposal final submission). Report evaluating information related to a specific treatment works and recommending a strategy based around 'future - proofing' of the site (maximum 5000 words). Anything written beyond the stated word/page limit will not be marked.	ILO 2, ILO 3, ILO 4
Group Project	Group and Individual Course Work - The students work in small consultancy teams typically on a client sponsored project or internal project relevant to industry for a period of 10 weeks. The students are responsible for interpreting the brief, developing a project plan, selecting and implementing a methodology, deriving results, analysing the results and drawing conclusions in alignment with the aims and objectives. All students participate in a peer review activity providing them with the opportunity to reflect on the practices of their colleagues as well as their own. Peer review feedback is provided individually by an independent member of academic staff. A single group report is produced and the project is presented orally during the group project presentation. Both elements are summatively assessed by independent markers and a group mark is assigned for each element. Individual assessment is derived from supervisor observation and meeting minute actions and an individual reflective report where the students reflect on the development of three soft skill competencies based on objectives that they set for themselves. The team working competency is mandatory as one of the three skills for each student.	ILO4
Dissertation / Individual Design Project (Part-time students only)	Individual Course Work - Part time students are not required to complete the Group Project undertaken by the full time registered students on a SWEE MSc course. An alternative assignment takes the form of a dissertation or individual design project (IDP) which in most situations will be based around a topic relevant to the work of the part-time student. It is evident that some aspects of the Group Project experience that the IDP replaces – for example the client interaction and group dynamics components - will not directly replicated by undertaking this assignment. It is expected that these experiences would normally be a part of the normal working life of the part-time student. It is expected that the structure of the IDP will be agreed between the student and the supervisors in alignment with the marking guidance. Two supervisors are allocated to the IDP and supervision follows the model used for the independent research project. The student will submit a 6,000 word report and will give an oral presentation of	ILO 4

	their work. Both elements of assessment will be marked by independent assessors.	
Thesis	Individual Course Work -The individual thesis project requires students to further develop problem definition, hypothesis setting, select and execute a methodology, analyse data, and evaluate findings and draw appropriate conclusions in the context of research questions relevant to the course followed by a student. The student is required to communicate their findings successfully via a thesis, written in the style of a scientific paper and an oral presentation based around a poster. The projects are designed to integrate knowledge from the taught modules, and apply understanding and skills from the group project, to deliver a high quality written thesis and oral presentation. The individual research project/thesis is typically delivered through collaboration with an industrial sponsor, or it may be an 'internal' project reflecting the research interests of the School.	ILO 5, ILO 6

Course modules

The following modules outline all parts of the programme leading to MSc. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or 50%	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments[11]	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
1	I-WAT-INWK	Induction Week	Jitka MacAdam	24		0	Y	02/10/23	02/10/23	06/10/23	N/A	AO	N/A				N/A	
2	I-WSC-SEP	Science and Engineering Principles in Water and	Marc Pidou	90		30	Y	09/10/23	09/10/23	17/11/23	40	ICW 1 ICW 2	50 50				FT 30/10/23 PT 13/11/23 FT 18/11/23 PT 02/12/23	May 2024

[7] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[8] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[9] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[10] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[11] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.
[12] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[13] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or [illegible]	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments [illegible]	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
		Wastewater Treatment																
3	I-WSC-TPWW	Treatment Processes for Water and Wastewater	Francis Hassard	90		30	Y	20/11/23	20/11/23	19/01/24	40	ICW 1 ICW 2	50 50				FT 06/01/24 PT 20/01/24 FT 20/01/24 PT 03/02/24	May 2024
4	I-WSC-A1099	Water and Wastewater Assets: Lifecycles, Risks and Futures	Jitka MacAdam	60		20	Y	22/01/24	22/01/24	16/02/24	40	ICW	100				FT 17/02/24 PT 02/03/24	May 2024
PROJECTS																		
5	I-SWEE-GRPP	Group Project	Jitka MacAdam	16		40	Y	26/02/24	26/02/24	03/05/24	50 50	GCW GPRES	64 16				26/04/24 @ 16.00hrs 23/04/24 @ 16.00hrs	MAY 2025

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[7]	Total hours delivered by Visiting Lecturers[8]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[9] - 40% or [illegible]	Type of Assessment	Weighting within module[10] (%) of Independent	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[12]	Assessment Submission and/or exam date[13]	Assessment / Exam Retake date
											50	ICW	10				03/05/24 @ 16.00hrs	
											50	RP	10				04/05/24 23.59hrs	MAY 2024
6	I-SWEE-DISS	Dissertation (Individual Design Project, PT MSc and PgDip only)	Jitka MacAdam	10		40	Y	26/02/24	26/02/24	20/09/24	50	IPROJ	80				20/09/24 @ 16.00hrs	Sept 25
											50	IPRES	20				W/C 23/09/24	
7	I-SWEE-THES	Thesis	Jitka MacAdam	20		80	Y	07/05/24	07/05/24	06/09/24	50	THESIS	90				02/09/24 @ 16.00hrs	Sept 2025
											50	OR	10				27/08/24 to 04/09/24	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
I-WAT-INWK	Induction week	Advanced Water Management	• Water and Sanitation for Development • Water and Wastewater Engineering
I-SWEE-GRPP	Group project	Advanced Water Management	• Water and Sanitation for Development • Water and Wastewater Engineering • Environmental Engineering • Environmental Management for Business • Geographical Information Management • Global Environmental Change • Applied Bioinformatics • Future Food Sustainability • Food Systems Management • Design Thinking
I-SWEE-DISS	Dissertation	Advanced Water Management	• Water and Sanitation for Development • Water and Wastewater Engineering • Water and Waste Infrastructure for Resilience • Advanced Mechanical Engineering • Advanced Chemical Engineering • Advanced Digital Energy Systems • Renewable Energy • Environmental Engineering • Environmental Management for Business • Geographical Information Management • Global Environmental Change • Applied Bioinformatics • Future Food Sustainability • Food Systems Management • Design Thinking
I-SWEE-THES	Thesis	Advanced Water Management	• Water and Sanitation for Development • Water and Wastewater Engineering • Water and Waste Infrastructure for Resilience • Advanced Mechanical Engineering

			• Advanced Chemical Engineering • Advanced Digital Energy Systems • Renewable Energy • Environmental Engineering • Environmental Management for Business • Geographical Information Management • Global Environmental Change • Applied Bioinformatics • Future Food Sustainability • Food Systems Management • Design Thinking
I-WSC-SEP	Science and engineering principles in water and wastewater treatment	Water and Wastewater Engineering	• Water and Waste Infrastructure Systems Engineered for Resilience (Water-WISER) CDT • Water Infrastructure and Resilience (WIRe) CDT
I-WSC-TPWW	Treatment processes for water and wastewater treatment	Water and Wastewater Engineering	• Water and Waste Infrastructure Systems Engineered for Resilience (Water-WISER) CDT • Water Infrastructure and Resilience (WIRe) CDT
I-WSC-A1099	Water and wastewater assets: lifecycles, risks and futures	Water and Wastewater Engineering	• Water and Waste Infrastructure Systems Engineered for Resilience (Water-WISER) CDT

8. How are the ILOs assessed?

The following assessment types are utilised:

The course uses a range of assessment types, where all exams have been excluded and independent course work is instead preferred for the taught component as a more suitable assessment for master level courses. Students can expect to have 5 pieces of assessment by submitted work in the taught modules, a group report/dissertation, an individual reflective review (FT), an individual research thesis and 2 elements of assessment by presentation or viva. The course is assessed as three elements:

- The taught modules (40%) are assessed by in-module assessment (including coursework, which focuses on application of principles studied and class tests, which support underpinning knowledge) ;
- Group projects for FTs (20%) are assessed by means of a written group report and presentations. Individual design projects (PTs) are assessed by means of a written dissertation.
- The individual thesis project (40%) is assessed by a written thesis and an oral examination.

This approach has been adopted because:

Different types of assessments enable the evaluation of a range of M-level skills. A mixture of both individual and group assessments is important in helping students to develop both individual skill and team work related skills. Group and thesis projects follow the completion of the taught part of the course and at this stage more emphasis is on enquiry based learning and problem solving.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate in Water and Wastewater Engineering

Award ILOs / Module No.	ILO 1.	ILO 2.	ILO 3.
1			
2	ICW ICW		ICW ICW
3	ICW ICW	ICW ICW	ICW ICW

B. Postgraduate Diploma in Water and Wastewater Engineering

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 1.	ILO 2.	ILO 3.	ILO 4.
4		ICW	ICW	ICW
5				GCW GPRES ICW RP
6				IPROJ IPRES

C. MSc in Water and Wastewater Engineering

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 5.	ILO 6
7	THESIS OR	THESIS OR

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	**Modules Covered**	**Assessment**	
		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

Graduates will leave the course well educated, skilled and experienced to operate and manage vital water and wastewater treatment services. The demand for such graduates is already high and will only increase over coming years as environmental standards for water quality increase, and pressures on our water supplies continue to grow. Graduates from the course are highly employable within companies and organisations involved in water and wastewater treatment, including utilities, contractors, consultants, equipment manufacturers, suppliers, regulators and industrial water users.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision:	June 2024

1. What is the course?

Course information

Course Title	Water and Waste Infrastructure and Services Engineered for Resilience - Water-WISER
Course code	DPWISFRC and DPWISPRC
Academic Year	2023/ 24
Valid entry routes	PhD
Additional exit routes	MPhil
Mode of delivery	Full Time and Part Time
Location(s)[1] of Study	Cranfield
School(s)	School of Water, Energy and Environment
Theme	Water
Centre	Cranfield Water Science Institute
Course Director	Sean Tyrrel and Alison Parker
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	No
Is the Degree apprenticeship integrated or non-integrated?	No
Is the Mastership offered as an open and/or closed course?	No

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University Entry Requirements
UK Qualifications Framework Level	QAA FHEQ Level 8
Benchmark Statement(s)	NA
Registration Period(s) available	4 years FT; 7 years PT
Course Start Month(s)	October

Institutions delivering the course

This course is delivered by the Water and Waste Infrastructure and Services Engineered for Resilience - Water-WISER Centre for Doctoral Training in the School of Water, Energy and Environment in the Water theme in the Cranfield Water Science Institute where the research interests include:

Water science and engineering

Cranfield University interacts with the following institutions and in the following ways:

The Water-WISER programme is co-ordinated by the University of Leeds and is delivered by three UK academic institutions: University of Leeds, Loughborough University and Cranfield University

Cranfield University remains partly responsible for the quality of the delivery of the course.

2. What are the aims of the course?

To facilitate a four year programme during which the PhD students undertake a research degree awarded for industrially relevant research and supported by a programme of professional development courses.

This programme is intended for the following range of students:

Doctoral level researchers

4. How is the course taught?

Students will be supported in their learning and personal development by:

Students are required to undertake a programme of structured training comprising credit-bearing M-level modules and non-credit-bearing training designed specifically for this CDT. The modules for credit will normally be selected from Cranfield's MScs in Water and Sanitation for Development, and in Water & Wastewater Engineering. Should a student fail one of these modules at the first attempt, the outcome will be reported to the CDT management board. In consultation with the student's supervisor(s), the board will recommend whether students should resit the module assessment or be re-assessed by a viva or continue progression without re-assessment. The non-credit-bearing training will be designed and delivered by the three university CDT partners and their associates to support PhD development. PhD supervision follows the standard Cranfield model.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

The award of a PhD is determined by examination of a PhD thesis and by viva voce.
However, in order to progress to the production and submission of a PhD thesis, students must also complete a programme of structured training. The programme of structured training comprises credit-bearing modules from Cranfield University plus non-credit-bearing training designed specifically for this CDT. The requirements for the achievement of credit alone is described in this specification document. Students must accumulate at least 60 credits in the first year.

Description	**Credits**
COMPULSORY MODULES: M-Level	
1) Annual cohort support and development programme comprising team-building event (September), Challenge Week (January), Summer Conference (July), Networking events (November and May) 2) Candidates are required to complete a compulsory non-credit-bearing research skills module: Water WISER Research Skills	Non-credit bearing (Attendance only) Non-credit bearing (Attendance only)
ELECTIVE MODULES:	
3) M-level technical modules from Cranfield MSc courses as determined by the training needs of the student (and agreed as being suitable by the CDT Management Board). Normally 60 credits would be completed in year 1 of the PhD programme, but additional modules may be taken in years 1 and 2 by agreement. The 60 credits may be accumulated from standard 10 or 20 credit modules and 40 credit project modules (e.g. a group project or dissertation) in any combination agreed by the CDT Management Board. The selection of modules should be driven by two principal factors: 1: to meet the goal of the CDT which is to create a cohort of practitioner-scholar engineers and scientists with a track record in transdisciplinary research and responsible innovation to achieve resilient infrastructure. The training approach is designed to transform students into leaders, who possess appropriate critical problem-solving skills as well as business acumen and a knowledge of the commercial considerations and processes to enable successful new business directions and ventures. Specifically this requires training to build the foundations of excellence, focusing on interdisciplinary skills in core engineering, planning, finance and institutions. 2: to tailor the training to the needs of the student, building on their extant technical and professional skillset and where possible taking into account the needs of their PhD project. The Water-WISER CDT is particularly well-aligned to the MSc in Water and Sanitation for Development and it is expected that the 60 credits will normally be drawn from that course or from the course in Water & Wastewater Engineering. Exceptionally modules may be drawn from elsewhere in the MSc Water Programme or SWEE depending upon the training needs of the individual student and by agreement with the CDT Management Board.	60
TOTAL:	60

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates a standard pass criteria which can be found in the Senate Handbook on Assessment rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee);10 11
- For Taught Assessments, the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for up to 30 learning credits, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for any additional learning credits over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- For Substantial pieces of assessment (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);

For the thesis, a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in September and are expected to complete the course within 48 calendar months.

Part-time students register for the course in September and are expected to complete the course within 7 years.

60 credits of approved module training must normally be completed within the first year of the PhD. Candidates are also required to complete a compulsory non-credit-bearing research skills module: Water WISER Research Skills in year 1. A non-credit bearing cohort support and development programme is undertaken each year.

The PhD students will commence the development of their research proposal during Year 1. A draft research plan will be submitted at Month 6 for review by the CDT Management board. The students will submit a final draft PhD proposal, as agreed by their supervisory team, along with a budget at Month 12 for approval by the CDT management team. In addition to the standard PGR progression requirements at Cranfield, satisfactory progress on the structured training programme will be assessed by the CDT Management Board at Month 12 and subsequently at approximately 12 month intervals.

7. Course Level Assessment Strategy[3]

[3] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

enter text here in respect of your course level assessment strategy – each course should have an assessment strategy which includes a diverse range of assessments.

Course modules

The following modules outline all parts of the programme leading to PhD. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[4]	Total hours delivered by Visiting Lecturers[5]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[6] - 40% or 50%	Type of Assessment	Weighting within module[7] (%) of Independent assessments	Weighting within module of multi-part assessments[8] (100%)	Type of Assessment	Weighting of individual elements of multi-part[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
1	I-AWM-SGH	Surface and Groundwater Hydrology: Processes, Measurement and Modelling	Ian Holman	53		20	Y	09/10/23	09/10/23	03/11/23	50	ICW	100				FT 04/11/23 PT 18/11/23	May 2024
2	I-WSC-SEP	Science and Engineering Principles in Water and	Marc Pidou	90		30	Y	09/10/23	09/10/23	17/11/23	50	ICW 1	50				FT 30/10/23 PT 13/11/23 FT 18/11/23	May 2024

[4] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[5] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[6] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[7] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[8] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.
[9] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[10] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[4]	Total hours delivered by Visiting Lecturers [5]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[6] - 40% or 50%	Type of Assessment	Weighting within module[7] (%) of Independent assessments	Weighting within module of multi-part assessments [8](100%)	Type of Assessment	Weighting of individual elements of multi-part [9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
		Wastewater Treatment										ICW 2	50				PT 02/12/23	
4	I-AWM-GES	Good Ecological Status	Pablo Campo Moreno	60		20	Y	06/11/23	06/11/23	01/12/23	50	ICW	100				FT 02/12/23 PT 06/01/24	May 2024
6	I-WSC-TPWW	Treatment Processes for Water and Wastewater	Francis Hassard	90		30	Y	20/11/23	20/11/23	19/01/24	50	ICW 1 ICW 2	50 50				FT 06/01/24 PT 20/01/24 FT 20/01/24 PT 03/02/24	May 2024
7	I-AWM-MFDR	Managing Flood and Drought Risk	Jerry Knox	60		20	Y	04/12/23	04/12/23	19/01/24	50	ICW	100				FT 20/01/24 PT 03/02/24	May 2024
9	I-AWM-WCC	Water in Cities and Catchments	Bob Grabowski	60		20	Y	22/01/24	22/01/24	16/02/24	50	ICW	100				FT 17/02/24 PT 02/03/24	May 2024
10	I-WSC-A1099	Water and Wastewater Assets: Lifecycles, Risks and Futures	Jitka MacAdam	60		20	Y	22/01/24	22/01/24	16/02/24	50	ICW	100				FT 18/02/24 PT 02/03.24	May 2024
12	I-SWEE-DISS	Dissertation	Jitka MacAdam	10		40	Y	26/02/24	26/02/24	20/09/24	50	IPROJ IPRES	80 20				20/09/24 @ 16.00hrs	SEPT 25

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[4]	Total hours delivered by Visiting Lecturers [5]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[6] - 40% or 50%	Type of Assessment	Weighting within module[7] (%) of Independent assessments	Weighting within module of multi-part assessments [8](100%)	Type of Assessment	Weighting of individual elements of multi-part [9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
																	W/C 23/09/24	
3	I-WAM-WRE	Water Resource Engineering	Jerry Knox	60	6	20	Y	09/10/23	09/10/23	03/11/23	50	ICW	100				FT - 04/11/23 PT – 18/11/23	MAY 2024
5	I-WAM-WSD	Water, Society and Development	Alison Parker	60	6	20	Y	06/11/23	06/11/23	01/12/23	50	ICW	100				FT - 02/12/23 PT – 06/01/24	MAY 2024
8	I-WAM-PHHS	Public Health, Hygiene and Sanitation	May Sule	60	6	20	Y	04/12/23	04/12/23	19/01/24	50	ICW	100				FT - 20/01/24 PT – 03/02/24	MAY 2024
11	I-WAM-RSE	Resilience, Shocks and Emergencies	Alison Parker	60	6	20	Y	22/01/24	22/01/24	16/02/24	50	ICW GCW	50 50				FT & PT - 17/02/24 FT – 17/02/24 PT – 02/03/24	MAY 2024

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
I-WSC-A1099	Water and Wastewater Assets: Lifecycles, Risks and Futures	Water and Wastewater Engineering	• Water WISER CDT
I-WAT-DISS	Dissertation	Water and Sanitation for Development	• All Water Programme • Water WISER CDT
I-AWM-SGH	Surface And Groundwater Hydrology: processes, measurement and modelling	Advanced Water Management	• Water WISER CDT
I-WAM-WRE	Water Resource Engineering (including Drilling week)	Water Sanitation and Development	• Water WISER CDT
I-WCS-SEP	Science and Engineering Principles in Water and Wastewater Treatment	Water and Waste Water Engineering	• Water WISER CDT
I-AWM-GES	Good Ecological Status	Advanced Water Management	• Water WISER CDT
I-WAM-SD	Water, Society and Development	Water and Sanitation for Development	• Water WISER CDT
I-WSC-TPWW	Treatment Processes for Water and Wastewater	Water and Wastewater Engineering	• Water WISER CDT
I-AWM-MFDR	Managing Flood and drought risk	Advanced Water Management	• Water WISER CDT
I-WAM-PHHS	Public Health, Hygiene and Sanitation	Water and Sanitation for Development	• Water WISER CDT
I-AWM-WCC	Water in Cities and Catchments	Advanced Water Management	• Water WISER CDT
I-WAM-RSE	Resilience, Shocks and Emergencies	Water and Sanitation for Development	• Water WISER CDT

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

Primarily for the UK Water Industry and Infrastructure companies in various roles: research, engineering, process science, and regulation.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information. Courses are under constant review, however, and the University reserves the right, without notice, to withdraw, update or amend this course specification at any time.

COURSE TITLE:	Weapon and Vehicle Systems Programme (WVSP): Military Vehicle Technology (MVT) Gun Systems Design (GSD)

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	Weapon and Vehicle Systems Programme (WVSP): Military Vehicle Technology (MVT) Gun Systems Design (GSD)
Course code	MSMVTFTR–PDMVTFTR-PCMVTFTR MSMVTPTR–PDMVTPTR-PCMVTPTR MSGSDFTR–PDGSDFTR–PCGSDFTR MSGSDPTR–PDGSDPTR-PCGSDPTR
Academic Year	**2023 - 24**
Valid entry routes	MSc, PgDip, PgCert
Exit routes	MSc, PgDip, PgCert
Mode of delivery	Full time & Part time
Location of Study	Shrivenham
School(s)	Cranfield Defence and Security
Theme	N/A
Centre	Centre for Defence Engineering
Course Director	Thiru Thirulogasingam
Awarding Body	Cranfield University
Is this and AP Contract course?	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	No
Is the Degree apprenticeship integrated or non-integrated?	No
Is the Mastership offered as an open and/or closed course?	No

Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Up to 1 year Full Time; Part Time: MSc 3 Years, PGDip and PGCert 2 Years
Course Start Month(s)	September

Institutions delivering the course
This course is delivered by Centre for Defence Engineering at Cranfield Defence and Security, where the research interests include Vehicle Dynamics – Ride and Handling of Military Vehicles, Vehicle Protection, Vehicle Design – including the development of parametric modelling tools, hybrid military vehicles, modelling of threat mechanisms for vehicles, ground interaction of military vehicles – terramechanics, dynamics of tracked vehicles, integration of weapon systems on military vehicle, internal, external and terminal ballistics, gun design and survivability.

Cranfield University interacts with the following institutions and in the following ways:

Teaching and assessment is also provided by the Department of Informatics and Systems Engineering at Cranfield Defence and Security.

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)
This course is accredited by the Institute of Mechanical Engineers (IMechE – until the 2023) and the Institution of Engineering and Technology (IET – until 2022) on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer. Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

2. What are the aims of the course?

Cranfield University offers this programme in order to:

- Provide graduates with the technical qualities, transferrable skills and independent learning ability necessary to make them effective in organisations that design, develop, procure or operate military vehicles and gun systems.
- Postgraduate Diploma and Postgraduate Certificate exit routes are provided for students who wish to access only parts of the course provided.

This programme is intended for the following range of students:

Engineers, Managers and Military Officers/Non-commissioned Officers working in
- Weapon systems design, development and procurement
- Military vehicle design, development and procurement
- Weapons and vehicle systems engineering and integration

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).
Note GSD students will concentrate on Weapon subjects, while MVT students will concentrate on Vehicle topics.

A. Postgraduate Certificate in Military Vehicle Technology/Gun Systems Design

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Demonstrate a comprehensive understanding of military vehicles and/or gun systems and be able to critically assess the mechanical design using appropriate methods.
ILO 2. Explain the engineering and physical limitations to the performance of gun or vehicle systems in relation to their design
ILO 3. Apply the appropriate techniques and tools to analyse and evaluate mechanical system problems, propose solutions and implement them – demonstrating a systematic approach and the use of engineering judgement.
ILO 4. Demonstrate a practical and sound engineering approach to problem solving.

B. Postgraduate Diploma in Military Vehicle Technology/Gun Systems Design

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 5. Demonstrate knowledge of modelling and simulation of gun or vehicle components and systems using computer-based techniques: for example; ballistics, recoil, weapon control, vehicle ride, performance and handling
ILO 6. Critically analyse and evaluate the impact of new gun or vehicle technology on changes and developments in, and to the threat
ILO 7. Solve problems using a system approach, allowing the vehicle student to gain an understanding of the weapon system (and its impact on the vehicle), and the gun student to demonstrate an appreciation of vehicle design and therefore the implications for the integration of the weapon system onto a platform.
ILO 8. Demonstrate the ability to learn independently, work effectively under time pressure and present their results, proposals and conclusions in written and oral form.
ILO 9. Critically appraise technical and commercial literature and select appropriate technologies and methods to suit particular problems and projects.
ILO 10. Demonstrate the ability to critically assess their own technical performance and that of others

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 11. Demonstrate self-direction and originality in developing and delivering successful independent research to include informed judgements regarding incomplete and/or fuzzy data, and then being able to define problems, propose suitable hypotheses and complete the appropriate analysis in order to draw the required conclusions.

4. How is the course taught?

Lectures, tutorials and practical exercises are used to develop the necessary knowledge. Formal feedback on assessed assignments enhances the learning process and informal feedback on non-assessed individual or group exercises is used.

Supervision is provided for projects, which provides guidance for the students taking the MSc. Students will be supported in their learning and personal development by:

- The use of the 'Virtual Learning Environment' (VLE) where additional resources will be added to complement those used directly in the taught modules
- The use of 'Research and Briefing' exercises where students study a topic while undertaking one of the modules and then presenting the topic back to the group
- Discussion sessions regarding new technology and developments of current military equipment
- Participation on the modules of serving Military Officers, who are able to raise current issues and comment on the latest developments

Students will be supported in their learning and personal development by:
Interaction with specialist staff – mostly from within the Centre for Defence Engineering. The small cohort on the Programme allows for personal discussion regarding material taught, areas of research and development of topics of interest to individual students.

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 7. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.
In brief, students will normally need to achieve the following in order to be awarded the qualifications:

Note: The module codes / names used throughout the following tables can be found in the Course Module Timetable that follows on page 7-9

A. Postgraduate Certificate in Gun Systems Design

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Modules: FB and WST	20
ELECTIVE MODULES	
Modules to make up 40 credits, excluding MVD and MVP modules	40
TOTAL:	60

B. Postgraduate Diploma in Gun Systems Design

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Modules: IS and CAD Modules: MSC, FE, FB, WST, ED, SURV, MVPD, VSI and AFVWSS Module: GSD	0 90 20
ELECTIVE MODULES	
Modules to make up 10 credits	10
TOTAL:	**120**

C. **MSc in Gun System Design**

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Modules: IS and CAD Modules: MSC, FE, FB, WST, ED, SURV, MVPD, VSI and AFVWSS Module: GSD Thesis	0 90 20 80
ELECTIVE MODULES	
Modules to make up 10 credits	10
TOTAL:	**200**

D. Postgraduate Certificate in Military Vehicle Technology

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
Module: MVD or MVP Plus one of the modules: SURV, UMVS, VSI or RSE	20 10
ELECTIVE MODULES:	
Modules to make up 30 credits, excluding FB module	30
TOTAL:	60

E. Postgraduate Diploma in Military Vehicle Technology

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
COMPULSORY MODULES:	
Modules: IS and CAD Modules: MSC, FE, WST, SURV, VSI and AFVWSS Module: MVD and MVP	0 60 40
ELECTIVE MODULES	
Modules to make up 20 credits, excluding MVPD	20
TOTAL:	**120**

F. **MSc in Military Vehicle Technology**

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	**Credits**
COMPULSORY MODULES:	
Modules: IS and CAD Modules: MSC, FE, WST, SURV, VSI and AFVWSS Module: MVD and MVP Thesis	0 60 40 80
ELECTIVE MODULES	
Modules to make up 20 credits, excluding MVPD	20
TOTAL:	**200**

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

For Reference Only (please see the relevant Senate Handbook for definitive details):
In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee);[1] [2]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will

[1] For students who were registered before 1 August 2015, the requirement to obtain a minimum mark for a taught assessment will not apply for taught assessment taken before 31 August 2015 (unless the assessment was designated as a "key assessment" under the previous Assessment Rules).

[2] For reference only – see Senate Handbook for definitive definition:
Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
    - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the MSc course in September and are expected to complete the course within a maximum of 13 months calendar months. PgCert and PgDip students will be shorter than this depending on module choice; typically 12-15 weeks for PgCert and 26 weeks for PgDip.

For reference only - see Section 1:
This course is also offered on a part-time basis. Students have up to 3 years (MSc) to complete the degree. PgDip and PgCert have up to 2 years.

7. Course Level Assessment Strategy

The course uses a number of different assessment types, both exam and coursework. With regard to the coursework a range of tasks are set including:
Research and brief – both oral and written
Simulation and analysis tasks
Written reports related to experiemental tasks
Case studies and design studies (both completed individually and as part of a group
The assessment of the final project (MSc only) is completed by written thesis, supplemented by an oral viva and project poster.
Full details can be found in the module descriptors for each aspect of the course.

Course modules

The following modules outline all parts of the Programme leading to an **MSc**. Other awards associated with the course include a selection of these modules.

Module Number	Module code	Title	Module Leader	Contact hours	Total hours delivered by Visiting Lecturers	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' End Date	Minimum Mark - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module (%) of Independent assessments	Weighting within module of multi-part assessments (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment	Assessment Submission and/or exam date	Assessment / Exam Retake date
1	R-ESD-IS	Introductory Studies (IS)	Thiru Thirulogasingam	30	0	0	N	N/A	04/09/23	08/09/23	N/A	N/A					N/A	N/A
2	R-ESD-CAD	Solid Modelling and CAD (CAD)	Sam Harper	30	0	0	N	N/A	11/09/23	15/09/23	N/A	N/A					N/A	N/A
3	R-ESD-MSC	Modelling Simulation and Control (MSC)	Thiru Thirulogasingam	35	0	10	Y	N/A	18/09/23	22/09/23	50	ICW	100				03/11/23 FT 17/11/23 PT	By individual arrangement
4	R-ESD-WST	Weapon Systems Technology (WST)	Hugh Goyder	30	0	10	Y	N/A	25/09/23	29/09/23	40	ICW	100				10/11/23 FT 24/11/23 PT	By individual arrangement
5	R-ESD-FB	Fundamentals of Ballistics (FoB)	Clare Knock	32	0	10	Y	N/A	02/10/23	06/10/23	50	ICW	100				17/11/23 FT 01/12/23 PT	By individual arrangement (Block 2 exams)
6	R-ESD-FE	Finite Elements in Engineering (FEE)	Stephanie Burrows	35	0	10	N	N/A	23/10/23	27/10/23	40	ICW	100				05/01/24 FT 19/01/24 PT	By individual arrangement
7	R-ESD-MVD	Military Vehicle Dynamics (MVD)	Ajay Kumar	70	0	20	N	N/A	06/11/23	17/11/23	50	ICW	100				12/01/24 FT 26/01/24 PT	By individual arrangement (Block 2 exams)
8	R-ESD-GSD	Ordnance Design (OD)	Stephen Champion	70	0	20	N	N/A	06/11/23	17/11/23	50	ICW	100				FT & PT 01/03/24	By individual arrangement

Module Number	Module code	Title	Module Leader	Contact hours	Total hours delivered by Visiting Lecturers	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' End Date	Minimum Mark - 40% or 50%	Type of Assessment	Weighting within module (%) of Independent assessments	Weighting within module of multi-part assessments (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment	Assessment Submission and/or exam date	Assessment / Exam Retake date
9	R-ESD-MVP	Military Vehicle Propulsion (MVP)	David Simner	70	0	20	N	N/A	04/12/23	15/12/23	50	ICW	100				09/02/24 FT 23/02/24 PT	By individual arrangement
10	R-ESD-SURV	Survivability (Surv)	Gareth Appleby-Thomas	35	0	10	Y	N/A	08/01/24	12/01/24	50	ICW	100				23/02/24 FT 08/03/24 PT	By individual arrangement
11	R-ESD-ED	Element Design (ED)	David Simner	35	0	10	Y	N/A	04/03/24	08/03/24	50	ICW	100				15/03/24 FT & PT	By individual arrangement
12	R-ESD-MVPD	Military Vehicle Propulsion and Dynamics (MVP&D)	David Simner	32	0	10	Y	N/A	04/12/23	15/12/23	50	ICW	100				09/02/24 FT 23/02/24 PT	By individual arrangement
13	R-MAA-GW	Guided Weapons (GW)	David Galvao-Wall	32	0	10	Y	N/A	15/01/24	19/01/24	50	ICW	100				29/02/24 FT 15/03/24 PT	By individual arrangement
14	R-ESD-UMVS	Uninhabited Military Vehicle Systems (UMVS)	John Economou	35	0	10	N	N/A	29/01/24	02/02/24	50	ICW	100				15/03/24 FT 29/03/24 PT	By individual arrangement
15	R-MAA-MA	Military Avionics - STA, Communications and Navigation (MA)	Alessio Balleri	32	0	10	Y	N/A	22/01/24	26/01/24	50	ICW	100				24/03/24 FT & PT	By individual arrangement
16	R-ESD-VSI	Vehicle Systems	David Diskett	32	0	10	Y	N/A	12/02/24	16/02/24	50	ICW	100				29/03/24 FT 12/04/24 PT	By individual arrangement

Module Number	Module code	Title	Module Leader	Contact hours	Total hours delivered by Visiting Lecturers	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' End Date	Minimum Mark - 40% or 50%	Type of Assessment	Weighting within module (%) of Independent assessments	Weighting within module of multi-part assessments (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment	Assessment Submission and/or exam date	Assessment / Exam Retake date
		Integration (VSI)																
17	R-ESD-RSE	Reliability and Systems Effectiveness (RSE)	Aimee Helliker	31	0	10	Y	N/A	26/02/24	01/03/24	50	ICW	100				12/04/24 FT 26/04/24 PT	By individual arrangement
18	R-EOS-RMP	Rocket Motors and Propellants (RMP)	Tracey Temple/ Philip Gill/ Paul Rostron	28	0	10	Y	N/A	05/02/24	09/02/24	50	EX	100				19/03/24	31/05/23
19	R-ESD-LWD	Light Weapon Design (LWD)	Stephen Champion	34	0	10	N	N/A	19/02/24	23/02/24	50	OR EX	20 80				23/02/24 FT & PT 03/04/24 FT & PT	By individual arrangement
20	R-ESD-AFVWS	Armoured Fighting Vehicle and Weapon Systems Study (AFVWSS)	David Diskett	40	0	10	N	N/A	08/07/24	12/07/24	50	ICW	100				19/07/24 FT & PT	By individual arrangement
21	R-ESD-THESIS	Thesis	Aimee Helliker	10	0	80	N	N/A	06/03/24	29/07/24	50	THESIS	100				09/08/24 FT 04/09/24 PT	By individual arrangement
PRESENTATION DAY – Wednesday 17th July 2024 (Planning assumption) – To include a meeting of the Industrial Advisory Panel – Date will be confirmed nearer to the time. PROJECT VIVA VOCE EXAMS – INTERNAL / DEPARTMENTAL EXAMINATION BOARD – Oct 24 – FORMAL EXAMINATION BOARD – To be arranged by Registry with other Eng. MSc Courses (Planning assumption)																		

Please note that all module contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice

The information contained within this table is For Reference Use Only – it is included here to show the planned dates for the modules. For all other information (for example assessment details) see Module Descriptor pages for definitive information. Also, students must use the information provided at the time of the module for planning submission dates; it is **those dates that are definitive**.

Note - For Information Only (Refer to Senate Handbook on Assessment Rules for definitive information):
A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.

Assessment Types: ICW – Individual Coursework; OR – Viva Voce / Oral Examination; EX – Examination; THESIS - thesis

Note – For the Ordnance Design module, a second Part-Time assessment hand-in date (PT2) has been set for the student cohort from the Royal School of Artillery.

Please list all modules that are shared with another existing course.

Module code	**Module title**	**Course that owns the module**	**Course(s)/programme(s) that share the module**
R-EOS-RMP	Rocket Motors and Propellants	MSc Explosives Ordnance Engineering	MSc Explosives Ordnance Engineering
R-MAA-GW	Guided Weapons	MSc Military Aerospace and Airworthiness	MSc Military Aerospace and Airworthiness
R-MAA-MA	Military Avionics	MSc Military Aerospace and Airworthiness	MSc Military Aerospace and Airworthiness
R-ESD-RSE	Reliability and System Effectiveness	MSc Military Vehicle Technology	MSc System Engineering for Defence Capability (Part Module only – the assessment is different) MSc Defence and Security Programme – Assessment will be slightly different.
R-ESD-ED	Element Design	MSc Gun Systems Design	MSc Defence and Security Programme – Assessment will be slightly different.
R-ESD-FB	Fundamentals of Ballistics	MSc Gun Systems Design	MSc Defence and Security Programme – Assessment will be slightly different.
R-ESD-MVPD	Military Vehicle Propulsion and Dynamics	MSc Gun Systems Design	MSc Defence and Security Programme – Assessment will be slightly different.
R-ESD-MSC	Modelling Simulation and Control	MSc Military Vehicle Technology	MSc Defence and Security Programme – Assessment will be slightly different.
R-ESD-SURV	Survivability	MSc Military Vehicle Technology	MSc Defence and Security Programme – Assessment will be slightly different.
R-ESD-VSI	Vehicle Systems Integration	MSc Military Vehicle Technology	MSc Defence and Security Programme – Assessment will be slightly different.
R-ESD-WST	Weapon Systems Technology	MSc Gun Systems Design	MSc Defence and Security Programme – Assessment will be slightly different.

7. How are the ILOs assessed?

The following assessment types are utilised:

Students will undertake a range of examinations, assessed coursework and project work. The mix of coursework and examinations will depend on the modules undertaken. Coursework (and to some extent examinations) will cover a range of question styles, including descriptive, technical discussions, analysis of engineering problems, and simulation of systems using computer aided engineering tools. In the final module (PgDip and MSc) students have to present their findings and defend their solution to a system problem. In addition to the above, the MSc students are also assessed in their ability to orally present and defend the findings of their project in a viva voce examination.

Assessment and ILO Mapping

A. Postgraduate Certificate

Award ILOs / Module Name / No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9	ILO 10	ILO 11
FoB (5)	ICW	ICW	ICW		ICW						
WST (6)	ICW	ICW	ICW	ICW							
MVD (7)	ICW	ICW	ICW	ICW	ICW		ICW				
MVP (10)	ICW	ICW	ICW	ICW	ICW	ICW	ICW				ICW

Not all the listed modules are compulsory for both GSD and MVT PGCert. See Section 5 for details. Optional modules will allow some PGDip ILOs to be satisfied. Introductory modules (1 and 2) are not assessed so are not included in this matrix. Note that MVD and MVP will not both be taken by PGCert students.

The types of assessment are shown here for reference only – the Module Descriptor pages contain definitive information regarding the assessment of each module.

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module Name / No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9	ILO 10	ILO 11
MSC (3)					ICW					ICW	
FEE (6)			ICW		ICW			ICW			
OD (8)	ICW					ICW					ICW
SURV (10)		ICW				ICW					
ED (11)			ICW		ICW		ICW				
MVP&D (12)							ICW		ICW		
GW (13)						ICW	ICW		ICW		
UMVS (14)			ICW		ICW	ICW					
MA (15)			ICW		ICW	ICW					
VSI (16)				ICW		ICW	ICW				
RSE (17)							ICW	ICW		ICW	
RMP (18)						EX		EX		EX	
LWD (19)	OR	OR					EX	EX			
AFVWS (20								ICW	ICW		ICW

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module Name / No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9	ILO 10	ILO 11
THESIS (21)	Thesis			Thesis	Thesis	Thesis		Thesis		Thesis	Thesis

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)
Not Applicable on MVT or GSD	Not applicable	N/A	N/A
		N/A	N/A

8. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review. For collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focussed Review which looks at each course in depth. In addition occasional site inspection visits are made.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guidance provided by the QAA particularly in Chapter B7 (External Examining) which emphasises that external examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

9. What opportunities are graduates likely to have on completing the course?

Invariably, students are sponsored on the course by their employer. The main reason for the sponsor providing this support is to ensure they (the students) are equipped to undertake senior positions within weapon or vehicle engineering teams in the organisation. This may be within procurement teams for government / ministry sponsored students or system design and development teams for industrially sponsored students.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

Date of first publication/latest revision: June 2024

1. What is the course?

Course information

Course Title	MSc in Welding Engineering
Course code	MSWEEFTC, MSWEEPTC, PDWEEFTC, PDWEEPTC, PCWEEFTC, PCWEEPTC
Academic Year	2023-24
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	N/A
Mode of delivery	Full-time, Part-time
Location(s)[1] of Study	Cranfield University
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Manufacturing
Centre	Welding Engineering and Additive Manufacturing Centre
Course Director	Dr Wojciech Suder
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	NA
Is the Degree apprenticeship integrated or non-integrated?	NA
Is the Mastership offered as an open and/or closed course?	NA
Teaching Institution	Cranfield University
Admissions body	Cranfield University

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	One year full-time, two/three years part-time
Course Start Month(s)	Full-time: September. Part-time: throughout the year

Institutions delivering the course

This course is delivered by the School of Aerospace, Transport and Manufacturing, Manufacturing Theme, Welding Engineering and Additive Manufacturing Centre where the research interests include:

- Pipeline Welding
- Aerospace Welding
- Laser Micro-Joining
- High Power Laser Welding
- Hybrid Laser/Arc Welding
- Other laser processing e.g. peening
- Wire plus arc additive manufacture
- Weld Repair and Modelling
- Friction-based Welding

Cranfield University interacts with the following institutions and in the following ways:

- students may undertake their research and/or project work off campus, or at another institution if suitable
- some teaching is provided by external agencies, or jointly with other institutions

Cranfield University remains fully responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This MSc course is accredited by The Institution of Mechanical Engineering (IMechE), The Institute of Materials, Minerals and Mining (IOM3), The Royal Aeronautical Society (RAeS) and The Welding Institute (TWI) until August 2026 and The Institution of Engineering and Technology (IET) until August 2025 on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer (CEng). Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

2. What are the aims of the course?

Cranfield University offers the MSc course in order to deliver graduates who are able to hold positions of significant engineering responsibility in the wide range of organisations using welding and joining technologies. The graduates will be qualified to act as responsible persons as defined by European and International quality standards, will have met a major part of the requirements for membership of the appropriate professional organisations, and will have experience and skills in the management of research and development projects. The MSc course will prepare graduates for positions of management responsibility, in the operation of welding manufacturing activities, and in acting as their company's representative to ensure that fabricated products meet quality and safety standards.

This programme is intended for the following range of students:

Students with a background in Engineering, Materials Science as well as those from an industrial background who are currently working as a Welding Engineer.

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. Postgraduate Certificate

In completing this course, and achieving the associated award, a diligent student should be able to:

- ILO 1. Evaluation and critical awareness of the scientific principles and industrial application of several areas of welding engineering, selected from the effect of welding on materials, welding processes, the design and analysis of welded structures, and the management of weld quality by the application of codes and standards.
- ILO 2. Extract data on welding engineering from a wide range of sources, including hard copy, electronic databases and internet based sources.
- ILO 3. Evaluate the quality of data, and determine its relevance in research and industrial contexts.
- ILO 4. Use independent learning skills to continuously advance their knowledge and understanding of welding engineering.
- ILO 5. Critically appraise material, manage operation and fabrication for welding processes and understand weld design principles for a particular application. Evaluate welding procedures, materials and methods to ensure fitness for purpose and compliance with National and International standards in specific areas of welding technology.
- ILO 6. Formulate the requirements of health and safety legislation in relation to welding, and manage knowledge of National, European and International standards relating to quality assurance in welding.

B. Postgraduate Diploma

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

- ILO 7. Use conceptual thinking to critically evaluate previous and current research, to reach logical conclusions on the basis of their analysis of research data, to determine the potential for industrial application of research data, and to analyse commercial significance.
- ILO 8. Plan, organise, undertake, and analyse research and industrial projects to increase knowledge and understanding of welding engineering, and to evaluate the application of welding technology in industrial applications.
- ILO 9. Develop initiatives in proposing new developments, and in solving welding technology problems, both individually and as part of a team. Design effective mode of dissemination of results of developments, proposals and analyses to specialist and non-specialist audiences, both orally and in writing.

C. MSc

In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

- ILO 10. Plan and manage research projects at the cutting edge of welding technology, show self-direction in the ability to perform controlled experimentation related to welding research and adopt scientific approach in analysis of data, and show on-going interest in advancing their knowledge and skills.

4. How is the course taught?

The Welding Engineering course is unique in its use of flexible learning for part-time students which is used for four of the seven modules and involves providing the students a set of notes which contains a

summary of the different topics covered in the course as well as additional readings for the students to refer to. The topics contain a series of Self-Assessment Questions (SAQs) which are used as a form of formative assessment, to help the students reflect on what they have learned, as well as providing them with problems that can aid learning. In delivering this material, the full-time students have two to four hours of tutorial session a day over a period of one week. Before each tutorial session, it is expected that the students will have read through the tutorial material and attempted all the SAQs. The part-time students go through the material in their own time at home and are provided answers to the questions, once they have provided evidence of having made an attempt. Tutorial session, using web based facilities e.g. Zoom, Microsoft Teams for part time students are also arranged (till now separately but in the future will be merged with the tutorial session of the full time students) with more integration of the web based tools for online delivery of teaching.

In addition to the teaching methods outlined students will be supported in their learning and personal development by:

- Comprehensive course materials are provided, as well as a web-site using the Canvas Virtual Learning Environment (VLE).
- Students are guided through the use of study texts and use of interactive exercises.
- Full-time students have face to face discussions.
- Part time students can have web-based sessions for distant learning modules

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 8. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. Postgraduate Certificate

The accumulation of 60 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Introduction (Module 1) Taught modules 3,4 and 7	0 40
ELECTIVE MODULES:	
Choose one of 5 and 6, and one of 2 and 8	20
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) through the assessment of taught modules as detailed below:

FULL TIME STUDENTS

Description	Credits
COMPULSORY MODULES:	
Introduction (Module 1) Taught modules 2-8 Group Project (9a)	0 80 40
ELECTIVE MODULES:	

None	
TOTAL:	120

PART TIME STUDENTS

Description	**Credits**
COMPULSORY MODULES:	
Introduction (Module 1) Taught modules 2-8	0 80
ELECTIVE MODULES:	
Group Project (9a) or Dissertation (9b)	40
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

FULL TIME STUDENTS

Description	**Credits**
COMPULSORY MODULES:	
Introduction (Module 1) Taught Modules 2-8 Group Project (9a) Individual Research Project (10)	0 80 40 80
ELECTIVE MODULES:	
None	
TOTAL:	200

PART TIME STUDENTS

Description	**Credits**
COMPULSORY MODULES:	
Introduction (Module 1) Taught Modules 2-8 Individual Research Project (10)	0 80 80
ELECTIVE MODULES:	
Group Project (9a) or Dissertation (9b)	40
TOTAL:	200

If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria

The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time MSc students register for the course in September and are expected to complete the course within 11 calendar months.

The taught modules and group project are delivered between October and April, thereafter the full-time students undertake an individual research project. Both taught and flexible learning modules are taught over two weeks. The second week for the taught modules is largely free of structured teaching to allow time for more independent learning and reflection.

Full-time PgDip students register for the course in September and are expected to complete the course within 7 calendar months. The taught modules and group project are delivered between October and April.

Full-time PgCert students register for the course in September and are expected to complete the course within 5 calendar months. The taught modules are delivered between October and April.

The courses are also offered on a part-time basis. The overall duration of the part-time course would normally be 2-3 years; the maximum overall duration normally permitted will be 5 years. Both face to face and distance learning modules are taught over one to two weeks. Students are invited to choose which modules they wish to complete before each academic year begins. Most part-time students complete 40 credits of taught modules and the group project in year one followed by the final 40 credits of taught modules and the thesis in year two. Students are encouraged to choose Welding Systems and Research Methods in their first year. It is also recommended to that students complete Introduction to Materials for Welding Engineering and Welding Metallurgy in the same year, usually the second year.

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

7. Course Level Assessment Strategy[4]

The assessment tasks in the Masters, post graduate diploma and post graduate certificate courses in Welding Engineering are challenging and enable students to demonstrate a full range of skills and attributes. The Masters course has in total 7 taught modules, a group project and an individual research project. The summative assessments of the taught modules are carried out either by written exams or by individual course work. However, a range of formative assessment were designed to prepare a student for the exam or submission of an assessment. The modules which are assessed by written exam are a) Welding Processes and Equipment; b) Welding Metallurgy; c) Design of Welded Structure; d) Introduction to Materials and e) Advanced Welding Processes [ILO 1-5]. Of these modules, the first three are distant learning which means the part time students study the course material provided to them via Canvas before appearing in an exam. The fulltime students were tutored over one week on the course content. The summative assessment is carried out by creating an exam which reflects the intended learning outcomes specified in these modules. The students need to answer three out of five questions which covers most of the course content. The course material contains a range of self-assessment questions (SAQs) which help both the fulltime and part time students to contemplate on their understanding. The correct answers for the SAQs were provided to the students later which give them the opportunity to understand their level of preparation and general understanding on the subject. Apart from this past one to two years exams were made available to the students via Canvas and the part time students are encouraged to write them as mock exam and send it back to the module leader for comments. The fulltime students were participated in the discussion during the tutoring session. The remaining two modules, Management of Weld quality and Welding System and Research Methods [ILO 3-5], are assessed by individual course work. In the Welding System and Research Method module (20 credits) the students are given feedback through a formative assessment on performing critical literature review. In this module the students participated in group exercise through experiment and lab work and then write a report for assessment. Management of Weld Quality is assessed through a written submission on a specific project for which a student needs to demonstrate understanding on quality assurance systems and how to apply international standards in real life problems. The group project for enable students to demonstrate transferable skill set such as communication, planning, team building etc., in addition to technical understanding in the area developing welding and related processes [ILO 7-9]. Part-time students are expected to participate in a group project with other part-time students. In some circumstances, where participation in a group project is not feasible, a part time student may be permitted to complete a dissertation which complies with all the learning outcomes except working as a part of a team. Through the individual research project students demonstrate their ability to perform critical review, design methodology, controlled experimentation related to welding research, adopt scientific analysis of data and draw scientific conclusions [ILO 10].

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

The following modules outline all parts of the programme leading to **MSc**. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1	I-MAT-INWK	Introduction	Dr Sue Impey	39		0	Y	27/09/23	27/09/23	06/10/23	N/A	AO	N/A				N/A	
2	I-WEE-WPE	Welding Processes and Equipment [FL]	Dr Nguyen Van Anh	30		10	N	06/11/23	06/11/23	10/11/23	40	EX	100				15/12/23	Manufacturing resit exams will be during week commencing: 20/05/24
3	I-WEE-A1108	Welding Systems and Research	Dr Surya Krishnaswamy	34		20	N	27/11/23	27/11/23	01/12/23	50	ICW	100				22/01/24 FT 18/03/24 PT	TBC If required

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear andragogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate*).* If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
		Methods [Conv]																
4	I-WEE-A1101	Design of Welded Structures [FL]	Dr Wojciech Suder	28		10	Y	22/01/24	22/01/24	26/01/24	50	ICW	100				19/02/24	TBC If required
5	I-WEE-A1103	Welding Metallurgy [FL]	Dr Graeme Barritte	22		10	N	23/10/23	23/10/23	27/10/23	50	EX	100				11/12/23	Manufacturing resit exams will be during week commencing: 20/05/24
6	I-WEE-A1109	Introduction to Materials for Welding Engineering [Conv]	Dr Supriyo Ganguly	32		10	Y	09/10/23	09/10/23	13/10/23	40	EX	100				03/11/23	Manufacturing resit exams will be during week commencing: 20/05/24
7	I-WEE-A1102	Management of Weld Quality [FL]	Dr Graeme Baritte	42		10	N	08/01/24	08/01/24	12/01/24	50	ICW	100				05/02/24	TBC If required
8	I-WEE-A1110	Advanced Welding Processes [Conv]	Dr Wojciech Suder	27		10	Y	20/11/23	20/11/23	24/11/23	50	EX	100				05/01/24	Manufacturing resit exams will be during week commencing: 20/05/24

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
9a	I-MAT-GRPP	Group Project	Dr David Ayre	20		40	Y	05/02/20	05/02/24 Occ A FT	29/04/24 FT	50 50 50	GPRES GCW ICW	16 64 20				26/04/24 29/04/24 29/04/24	
			Dr David Ayre (Dr Iva Chianella)						04/03/24 Occ B PT	23/08/24 PT	50 50 50	GPRES GCW ICW	16 64 20				16/08/24 23/08/24 23/08/24	
9b	I-MAT-DISS	Dissertation	Dr David Ayre	20		40	Y	05/02/24	05/02/24	23/08/24	50 50	ICW (1) ICW (2)	80 20				23/08/24 23/08/24	
10	I-MNU-THESIS	Individual Research Project	Dr Muhammad Khan	20		80	Y	05/02/24	cc A = PT 05/02/24	PT 23/08/24	50 50	THESIS IPRES	90 10				23/08/24 29/08/24	
			Dr Muhammad Khan					26/04/24	Occ B = FT	FT 23/08/24	50 50	THESIS IPRES	90 10				23/08/24 29/08/24	

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Please list all modules that are used by another existing course.

Module code	**Module title**	**Course that owns the module**	**Other course(s)/ programme(s) that use the module**
I-MAT-INWK	Introduction	Advanced Materials	Aerospace Manufacturing, Aerospace Materials, Manufacturing Technology and Management, Aerospace Manufacturing, Engineering and Management of Manufacturing Systems, Global Product Development and Management, Management and Information Systems, Maintenance Engineering & Asset Management, Metal Additive Manufacturing
I-WEE-A1101	Design of Welded Structures	Welding Engineering	Renewable Energy Marine Structures EngD
I-WEE-A1110	Advanced Welding Processes	Welding Engineering	Aerospace Manufacturing, Renewable Energy Marine Structures EngD
I-MAT-GRPP	Group Project	Advanced Materials	Aerospace Materials, Manufacturing Technology and Management, Aerospace Manufacturing, Engineering and Management of Manufacturing Systems, Global Product Development and Management, Management and Information Systems, Maintenance Engineering & Asset Management
I-MAT-DISS	Dissertation	Advanced Materials	Advanced Materials, Aerospace Materials, Manufacturing Technology and Management, Aerospace Manufacturing, Engineering and Management of Manufacturing Systems, Global Product Development and Management, Management and Information Systems, Maintenance Engineering & Asset Management
I-MNU-THESIS	Individual Research Project	Advanced Materials	Engineering and Management of Manufacturing Systems, Global Product Development and Management, Management and Information Systems, Advanced Materials, Aerospace Materials, Manufacturing Technology and Management, Maintenance Engineering & Asset Management

8. How are the ILOs assessed?

The following assessment types are utilised:

Students can expect to have either examinations or assessment by submitted work and elements of assessment by presentation or viva.

This approach has been adopted in order to ensure that students demonstrate their understanding through a wide range of learning techniques but are not disadvantaged through any one approach.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

A. Postgraduate Certificate

Award ILOs / Module No.	ILO 1.	ILO 2.	ILO 3	ILO 4.	ILO 5.	ILO 6.
1						
2	EX				EX	EX
3	ICW	ICW	ICW	ICW		
4	ICCW				ICW	ICW
5	EX				EX	EX
6	EX				EX	EX
7	ICW					ICW
8	EX				EX	EX

B. Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by either of the following module assessments:

Award ILOs / Module No.	LO 1.	ILO 2.	LO 3.	LO 4.	LO 5.	LO 6.	LO 7.	LO 8.	LO 9.
9a	GCW	GCW	GCW	GCW		GCW	GCW	GCW	GCW GPRES
9b	ICW (1) ICW (2)	ICW (1) ICW (2)	ICW (1) ICW (2)	ICW (1) ICW (2)		ICW (1) ICW (2)	ICW (1) ICW (2)	ICW (1) ICW (2)	ICW (1) ICW (2)

C. MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 1.	ILO 2.	ILO 3.	ILO 4.	ILO 5.	ILO 6.	ILO 7.	ILO 8.	ILO 9.	ILO 10.
10	THESIS	THESIS	THESIS	THESIS		THESIS	THESIS	THESIS	THESIS IPRES	THESIS

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)

9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

Course changes are approved by the School's Director of Education on behalf of Education Committee and Senate. Significant changes to a course will be referred to a Course Review Panel at the discretion of the Director of Education.

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guiding principles to meet the Expectations and Core Practices of the UK Quality Code for Higher Education. External examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

Each course has a formally constituted Examination Board, which includes the External Examiner, and which is responsible for ensuring that awards are made within the Regulations of the University and that students are made awards on the basis of meeting the specified Intended Learning Outcomes of a course at the appropriate standard.

Each course has a formally constituted Course Committee which meets at least twice a year to discuss, inter alia, programme design and planning, the student experience (including feedback) and student progress.

Each course has an Industry Advisory Panel (or similar) which meets at least once a year to engage with external stakeholders on curriculum design and currency of course content.

Student feedback both qualitative and quantitative is collected for each module studied. In addition students are invited to participate in the University's annual New Student Survey and Student

Satisfaction Survey along with the annual national Postgraduate Taught Student Experience Survey. The results of all feedback are considered by the Course Committee and additionally, in respect of the University and national surveys, issues of quality are considered by and acted on where appropriate by the Education Committee, Senate, School and University Executives.

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the UK Quality Code for Higher Education. The delivery of new partnership provision is ultimately approved by the Universities Education Committee, on behalf of Senate.

Year one partnership reviews are undertaken one year after the initiation of a new partnership involving academic (award bearing) provision. The aim is to provide a supportive framework to assist the Sponsoring School and its new Partner Institution to work collaboratively to ensure that: the learning and teaching provision and associated student experiences are of a high standard; and that those responsible for delivering the provision are undertaking their respective roles and responsibilities in an appropriate way.

As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

Successful students develop diverse and rewarding careers in engineering management in a wide range of organisations deploying welding technologies. Roles include the management of welding manufacturing operations, and management of design and fabrication of welded structures. The international nature of such activities means that career opportunities are not restricted to the UK. Cranfield graduates develop careers around the world.

COURSE SPECIFICATION

Cranfield University: Course Specifications

Course specifications outline the content and structure of a course leading to an award of Cranfield University. This version of the course specification has been approved by Education Committee and every effort has been made to ensure the accuracy of the information.

COURSE TITLE:	Water Infrastructure and Resilience - WIRe

Date of first publication/latest revision:	June 2024

1. What is the course?

Course information

Course Title	Water Infrastructure and Resilience
Course code	DPWIRFRC and DPWIRPRC
Academic Year	2023/2024
Valid entry routes	PhD
Additional exit routes	MPhil
Mode of delivery	Full Time and Part Time
Location(s)[1] of Study	Cranfield Campus, University of Sheffield, Newcastle University
School(s)	School of Water, Energy and Environment
Theme	Water
Centre	Cranfield Water Science Institute
Course Director	Peter Jarvis and Luca Alibardi
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No
Apprenticeship Standard the course is mapped to	No
Is the Degree apprenticeship integrated or non-integrated?	No
Is the Mastership offered as an open and/or closed course?	No

[1] If any part of this course is delivered at another site, please note which one(s) here
[2] AP Contract courses are provided by Cranfield University to the MoD as part of the Academic Provider contract

Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University Entry Requirements
UK Qualifications Framework Level	QAA FHEQ Level 8
Benchmark Statement(s)	NA
Registration Period(s) available	4 years FT; 7 years PT
Course Start Month(s)	October

Institutions delivering the course

This course is delivered by the EPSRC Centre for Doctoral Training in Water Infrastructure and Resilience (WIRe) in the School of Water, Energy and Environment in the Water theme in the Cranfield Water Science Institute where the research interests include:

Water science and engineering

Cranfield University interacts with the following institutions and in the following ways:

The WIRe programme is co-ordinated by Cranfield University but is delivered by three UK academic institutions: Cranfield University, University of Sheffield, Newcastle University

Cranfield University remains partly responsible for the quality of the delivery of the course.

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is not accredited by any external bodies.

2. What are the aims of the course?

To facilitate a four year programme during which the PhD students undertake a research degree awarded for industrially relevant research and supported by a programme of professional development courses.
PhD students may leave with an MPhil at the discretion of the PhD review panel

This programme is intended for the following range of students:

Doctoral level researchers

3. What should students expect to achieve in completing the course?

Award intended learning outcomes (ILOs) (skills and knowledge).

A. PhD

In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Initiate and create new knowledge, through original research, delivered to a quality to satisfy peer review.

ILO 2. Apply a systematic approach to acquisition and interpretation of knowledge in an academic discipline.

ILO 3. Conceptualise, design and implement methods for the collection of new knowledge.

ILO 4. Apply expert knowledge in one or more specialist fields and be able to deploy methods and techniques that balance social, environmental, economic, scientific and engineering considerations

ILO 5. Appraise the resilience, complexity and interconnectivity of water infrastructure system through completion of a taught programme of study

4. How is the course taught?

Students will be supported in their learning and personal development by:

This is a research degree. However, four year PhD students will undertake a taught semester in their first year, from October until December, undertaking three taught technical M-Level modules. Students are expected to undertake two additional M-Level technical modules from MSc courses available at any one of the three partnering Universities (Cranfield University, The University of Sheffield, Newcastle University) or at other national and international Universities (ensuring M-Level status and transferability of credits) in years 2 and 3 of their PhD. Students are expected to undertake the assessment for each of the M-Level technical modules. Should a student fail one of these modules at the first attempt, the outcome will be reported to the CDT management board. In consultation with the student's supervisor(s), the board will recommend whether students should re-sit the module assessment or be re-assessed by a viva or continue progression without re-assessment. Students are also expected to undertake three assessed group exercises during an annual summer challenge (in years one to three). The PhD students are also expected to undertake a non-assessed Transferable Skills Programme (TSP), with one TSP module undertaken during each year of registration. Delivery of the TSP modules is spread across the partner universities as well as an external organisation (Wetsus, Netherlands).

5. What do students need to achieve in order to graduate?

Notwithstanding University Regulations and the authorities and powers exercised by examiners, students will normally need to demonstrate achievement in the elements of the course, as laid out in Section 6. Courses are structured through the accumulation of credit, where 1 credit represents 10 notional learning hours.

In brief, students will normally need to achieve the following in order to be awarded the qualifications:

A. PhD

The accumulation of the equivalent of 80 credits (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES: M-Level	
1) Water & Wastewater Treatment Principles 2) Water in Cities 3) Water Resilience 4) Summer Challenge 1 (taken in Year 1) 5) Summer Challenge 2 (taken in Year 2) 6) Summer Challenge 3 (taken in Year 3) 7) Transferable Skills Programme	10 10 10 10* 10* 10* 0
ELECTIVE MODULES:	
Additional M-level technical modules from an approved list of MSc courses to the value of 20 credits	20**
TOTAL:	80

B. *Two out of the three group exercises are taught at the partnering universities.
C. **Modules can be undertaken from any one of the three partnering universities.

:
If a student does not meet the required standards for the award, the examiners for the programme may decide to offer a lower award associated with the programme, providing that a lower exit award exists and the student meets the requirements of that lower award.

Pass Criteria
The University operates standard pass criteria which can be found in the Senate Handbook on Assessment Rules.

In order to achieve your award, you are required to achieve:

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does not have discretion to overrule this limit, but can refer a case to Senate's Education Committee); [3]
- **For Taught Assessments,** the minimum mark for each individual taught assessment on the first attempt for the significant majority of the taught assessments, noting that:
  - if you fail to attain the minimum mark for **up to 30 learning credits**, you will be permitted to re-take all of those assessments (except for circumstances where a resit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **any additional learning credits** over the course of your studies you will be disqualified from the right to re-take the assessments: this will normally result in intended award failure. (Please note the board of examiners may at its discretion overrule this limit, but this is not an automatic right);
  - it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.
- **For Substantial pieces of assessment** (corresponding to ≥40 credits, which are not part of the taught assessment average), the pass mark of ≥50% (where they exist);
- **For the thesis,** a mark of ≥50% in order to receive a pass (where it exists).

6. How is the course structured?

Full-time students register for the course in October and are expected to complete the course within 48 calendar months.

Part-time students register for the course in October and are expected to complete the course within 7 years.

PhD students will spend their first semester (Oct-Dec) at Cranfield, attending modules on core technical competencies and early stage transferable skills. Attendance on the Induction Semester and the completion of associated assessments are both compulsory elements of the training programme. The attendance and completion of three Group Exercises are also compulsory in years 1-3 of PhD registration. Subsequent to the induction semester, all PhD students must complete two M-level modules which are part of recognised MSc courses. Students will attend these modules in years 2 and 3 of their PhD, with

[3] Providing the minimum mark is met, a mark of 40-49% will be automatically compensated if a student's overall average taught assessment mark (including the failed assessment) is greater than 50%. Students are advised, however, that they retain the right to re-take an assessment with a mark of <40% (but should note that a re-take attempt will be capped at 50%), as long as they haven't failed more than 30 credits. At the discretion of the Board of Examiners or by Board of Examiners Chair's Actions a student may be permitted a re-take attempt of modules in the range of 40-49% only if the average mark of their other taught modules would not allow them to qualify for their award (<50%).

the approval of the student's principal supervisor. Students will undertake the assessment for these elective modules. Students will receive an accreditation certificate from the institution offering the module.

The TSP component of the WIRe programme comprises attendance at one module at Cranfield during the induction semester, plus one course at the University of Sheffield during year 2, one course at the Wetsus campus (Netherlands) in year 3, and one course at Newcastle University in year 4. Attendance on the TSP components are compulsory. Records of attendance will be recorded on student CDP logs.

Doctoral level research: candidates will conduct a single study to be reported in a thesis. Formal assessment will involve a Viva Voce defence of the thesis with one internal examiner and one external examiner, where none of the examiners can have served on the student's supervisory panel.

7. Course Level Assessment Strategy[4]

enter text here in respect of your course level assessment strategy – each course should have an assessment strategy which includes a diverse range of assessments.

[4] Guidance to aid colleagues writing or updating a course-level assessment strategy for inclusion in the Course Specification can be found as Appendix K in either the Senate Handbook on Setting up a New Taught Course or the Senate Handbook on Managing Taught Courses https://intranet.cranfield.ac.uk/EducationServices/Pages/SenateHandbooksA-Z.aspx

Course modules

The following modules outline all parts of the programme leading to **enter highest award here**. Other awards associated with the course include some or all of these modules.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1	I-WIR-IND	Induction	Pete Jarvis	37		AO	N		25/09/23	06/10/23	AO	-					-	-
2	I-WSC-A1096	Water and Wastewater Treatment Principles	Marc Pidou	40		10	N		09/10/23	24/10/23	50	ICW	100				30/10/23	May 24

[5] Please note that all contact hours are indicative and represent scheduled teaching, which is subject to minor changes and variation at short notice
[6] Visiting Lecturer = a member of staff (with RTS) but not on a permanent contract (does not include those acting as occasional guest speakers)
[7] A mark of 50% is required to pass the assessment however, where the stated minimum mark is 40%, a mark of 40-49% may be compensated by good performance in other modules providing that the overall average is ≥50%.
[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually. 10 credit modules should be designed to allow assessment through a single independent summative assessment. Deviations will require approval by the School Director of Education
[9] For **multi-part assessments** please record the overall weighting of module which should be 100%. Multipart assessments should only be included in courses where there is a clear androgogical reason and where each element forms part of a continuous learning and assessment experience for students.
[10] Failure to submit an element of a **multi-part assessment** will **not** require remedial action if the absence of the marks for the assignment still results in a pass for the assessment (whether 40 or 50% as appropriate). If, however, the absence of marks fails to meet the minimum mark for the module then **all** elements of the assessment must be re-taken.
[11] Please ensure you include submission dates for both FT and PT students and that you give details of the submission date for each individual element of a multi-part assessment.

Assessment Types: AO – Attendance only; ICW – Individual Coursework; GCW – Group Coursework; IPRES – Individual Presentation; GPRES – Group Presentation; IPRAC – Individual Practical; GPRAC – Group Practical; IPROJ – Individual Project (>20 credits); GPROJ – Group Project (>20 credits); EX – Examination ; RP – Reflective Portfolio; OR- Viva Voce examination; THESIS – Thesis; MULTI – Multi-part Assessment

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date (eg Pre-course task)	Module Delivery Start Date	Module Delivery End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
3	I-WIR-WR	Water Resilience	Peter Jarvis	25		10	N		06/11/2023	17/11/23	50	ICW	100				18/11/23	MAY 24
4	I-WAM-WC	Water in Cities	Luca Alibardi	30	0	10	N		27/11/23	08/12/23	50	IPRES	100				08/12/23	May 24
5	I-WIR-TSEL	Transferable Skills Programme	Peter Jarvis	25		AO	N		11/12/23	15/12/23	AO	-					-	-
6	I-WIR-SC1 A23	Summer Challenge 1 (22/23 intake)	Peter Jarvis	26		10	N		02/07/24	06/07/24	50	GPRES	100				22/07/24	TBC
7	I-WIR-SC2 A23	Summer Challenge 2 (21/22 intake)	Peter Jarvis	26		10	N		02/07/24	06/07/24	50	GPRES	100				22/07/24	TBC
189	I-WIR-SC3 A23	Summer Challenge 3 (20/21 intake)	Peter Jarvis	26		10	N		02/07/24	06/07/24	50	GPRES	100				22/07/24	TBC

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Please list all modules that are used by another existing course.

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
			•
			•

8. How are the ILOs assessed?

The following assessment types are utilised:

The PhD students are expected to undertake five taught modules, three group exercises, and a transferable skills programme.
There is a requirement for students to undertake these modules, however the overall PhD is assessed by a viva in-line with the university regulations for a doctorate level research degree

This approach has been adopted because:

It is a requirement of the EPSRC Centre for Doctoral Training that all students undertake an assessed training programme. However, the only requirement for passing a PhD is the completion of a thesis and a successful viva examination as per the university regulations for doctoral level research.

Assessment and ILO Mapping

Complete the grid below by inserting in the boxes which assessments from the modules directly assess the Award ILOs.

(Module numbers should correspond with those used in the Course module table above.)

For Example:

Award ILOs / Module No.	***ILO 1.***	***ILO 2.***	***ILO 3.***	***ILO 4.***	***ILO 5.***	***ILO 6.***	***ILO 7.***	***ILO 8.***	
98	*ICW*				*EX*	*EX*	*ICW*		
99	*ICW1*		*ICW1*	*ICW2*					

A. enter text here – start with lowest award – e.g., Postgraduate Certificate

Award ILOs / Module No.									
	Not applicable for this Course								

Award ILOs / Module No.									

B.

Award ILOs / Module No.									
	Not applicable for this Course								

C. enter text here – list next award – e.g., Postgraduate Diploma

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.									

D. enter text here – list next award – e.g., MSc

In addition to those outlined above, the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.									

Award ILOs / Module No.									

CROSS-MODULAR ASSESSMENT (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
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9. How will the University assure the quality of the provision?

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who provides authoritative guidance on policy and procedure to the Panel. Proposals are reviewed in line with the UK Quality Code for Higher Education. New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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As part of the regular monitoring procedures for established collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focused Review which looks at each partnership in depth. Occasional site inspection visits are also made.

10. What opportunities are graduates likely to have on completing the course?

Primarily for the UK Water Industry and Infrastructure companies in various roles: research, engineering, process science, and regulation