Course Libraries 2020/21

Courses N – Z

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: 09/03/2020

1. What is the course?

Course information

Course Title	Offshore Engineering
Course code	MSOFFFTC, MSOFFPTC, PDOFFFTC, PDOFFPTC, PCOFFFTC, PCOFFPTC
Academic Year	2020/21
Valid entry routes	PgCert, PgDip, MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time, Part-time
Location(s)[1] of Study	Cranfield
School(s)	School of Water, Energy & Environment
Theme	Energy & Power
Centre	Centre for Thermal Energy Systems and Materials
Course Director	Dr Patrick Verdin
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 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Full-time MSc - one year, Part-time MSc - up to three years
Course Start Month(s)	October

Institutions delivering the course

This course is delivered by the Centre for Thermal Energy Systems and Materials in the Energy and Power theme where the research interests include:

Aero/hydrodynamic design, analysis and testing of novel wind, wave and tidal energy devices;
Materials and Corrosion;
Computational Fluid Dynamics (CFD) for single and multiphase flows, particle transport, sand erosion and phase change;
Analysis and testing of multiphase flows in pipeline systems including horizontal pipes and risers.

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) and the course has recently been approved for accreditation by the Energy Institute.

2. What are the aims of the course?

The main aims of this course are:

> Offshore engineering is a rapidly developing discipline. In addition to its traditional relevance to the oil & gas industry, it is expanding to embrace the novel engineering challenges presented by the offshore renewable energy industry.
> Cranfield's MSc in Offshore Engineering provides students with the new skills needed across this fast-developing sector, together with the fundamental engineering knowledge necessary, to meet the challenges of the offshore renewable energy and oil and gas industries.

This programme is intended for the following range of students:

> New graduates with an engineering, mathematics or science background (dependent upon route chosen)
> Experienced professionals working within the offshore industry, who wish to further their careers within this field.
> Experienced professionals working in other industries who wish to diversify their career toward the offshore renewable energy and oil & gas field.

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 key concepts and issues associated with the construction and maintenance of offshore assets within the renewable energy and oil & gas sectors.

ILO 2. Design and analyse offshore renewable energy and oil & gas assets by applying the engineering principles and technologies that pertain to the maintenance of offshore assets

ILO 3. **Engineering Route specific:** Design and apply modelling solutions to examine impacts of environmental loads on offshore structures and associated structural issues, and design and apply modelling solutions to renewable energy systems.

ILO 4. **Management Route specific**: Identify advanced technology, management and environmental issues, relevant for the offshore energy industry, to enable the development of risk based solutions for a safe and secure industry.

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 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?

The course has been developed, and is delivered, by leading academics in the field of offshore renewable energy and offshore oil & gas. Students have access to some of the technical facilities at Cranfield University.

The taught modules vary in style from traditional lectures for subject based learning to practical sessions with a more problem-based learning style. The different teaching styles are designed to address the need for different learning styles, to reduce gender bias and increase appeal to mid-career change applicants. The course embraces diversity and provides equality of opportunity to all learners.

The taught programme is generally delivered from October to February and is divided into 4 core and 4 applied modules. Each core module is generally delivered over one week, whereas each applied module is delivered over two weeks at Cranfield. Each module is allocated two weeks on the timetable and will be delivered flexible during this time, using a combination of online and face to face interactions. The modules will be assessed by either an exam or an assignment.

The group project work for PgDip and MSc students provides a framework for the development of acquired skills in terms of analysis, presentations, report writing, team working, project management and the use, and/or development, of offshore renewable energy and offshore oil & gas technologies.

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

- The provision of a comprehensive set of course notes
- The use of Blackboard, a virtual learning environment
- Face-to-face meetings with the Course Directors and members of the Course Team as required
- The Course Director, who is the student's main point of contact prior to the course and in the early stages of the course, and supports the student throughout the course
- The Course Administrator, who supports the student throughout the course regarding any administrative matter
- The module leaders, who are available to support the technical content of the taught modules and discuss the assessment of each module
- Course lecturers, who are the primary contact for students on individual lecture content
- The Group Project Supervisor, who provides direction and supervision throughout the duration of the Group Project and its assessment
- The Individual Project Supervisor, who provides direction and personal supervision to a student throughout their MSc project and its assessments

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
ENGINEERING ROUTE - **COMPULSORY MODULES:**	
Induction Materials & Corrosion Core Fluid Mechanics and Loading Engineering Stress Analysis: Theory and Simulations Applied Materials and Corrosion Management for Technology Design of Offshore Energy Structures	0 10 10 10 10 10 10
ELECTIVE MODULES:	
TOTAL:	60

Description	Credits
MANAGEMENT ROUTE - **COMPULSORY MODULES:**	
Induction Materials & Corrosion Core Risk and Reliability Engineering Applied Materials and Corrosion Health, Safety, Sustainability and Environment	0 10 10 10 10

Management for Technology Energy Systems Case Studies	10 10
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**
ENGINEERING ROUTE - **COMPULSORY MODULES:**	
Induction Materials & Corrosion Core Fluid Mechanics and Loading Engineering Stress Analysis: Theory and Simulations Applied Materials & Corrosion Computational Fluid Dynamics for Renewable Energy Structural Integrity Design of Offshore Energy Structures Management for Technology Group Project	0 10 10 10 10 10 10 10 10 40
ELECTIVE MODULES:	
Part time students only select one from the following: Dissertation Group project	 40 40
TOTAL:	120

Description	**Credits**
MANAGEMENT ROUTE - **COMPULSORY MODULES:**	
Induction Materials & Corrosion Core Risk and Reliability Engineering Energy Economics and Policy Applied Materials & Corrosion Health, Safety, Sustainability and Environment Structural Integrity Energy Systems Case Studies Management for Technology Group Project	0 10 10 10 10 10 10 10 10 40
ELECTIVE MODULES:	
Part time students only select one from the following: Dissertation Group 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
ENGINEERING ROUTE - **COMPULSORY MODULES:**	
Induction	0
Materials & Corrosion Core	10
Fluid Mechanics and Loading	10
Engineering Stress Analysis: Theory and Simulations	10
Applied Materials & Corrosion	10
Computational Fluid Dynamics for Renewable Energy	10
Structural Integrity	10
Design of Offshore Energy Structures	10
Management for Technology	10
Group Project	40
Individual Research Project	80
ELECTIVE MODULES:	
Part time students only select one from the following:	
Dissertation	40
Group project	40
TOTAL:	200

Description	Credits
MANAGEMENT ROUTE - **COMPULSORY MODULES:**	
Induction	0
Materials & Corrosion Core	10
Risk and Reliability Engineering	10
Energy Economics and Policy	10
Applied Materials & Corrosion	10
Health, Safety, Sustainability and Environment	10
Structural Integrity	10
Energy Systems Case Studies	10
Management for Technology	10
Group Project	40
Individual Research Project	80
ELECTIVE MODULES:	
Part time students only select one from the following:	
Dissertation	40
Group project	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 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 3 years.

The course comprises three elements:

Coursework – the taught element which is given as a series of one or two week modules. Students are required to complete eight modules. All the modules are determined by the route chosen. The modules comprise lectures, tutorials, case studies, laboratory demonstrations, and workshop exercises in varying proportions as appropriate. The modules are scheduled during the period October to February. Students are expected to spend additional time over and above the contact hours within the week of the module.
For full-time students, a Group Project, in which groups of typically 4 to 6 students work as a team on a multi-disciplinary problem of industrial relevance.
Part time students are required to complete either the group project or a dissertation, which is concerned with a topic of their choice, following consultation with the Course Director.

For full-time students, the Individual Research Project officially starts in May and finishes early in September.

[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 enable students from both options of the Offshore Engineering course to demonstrate a full range of skills and attributes to be applied either to Offshore Engineering or to Offshore Asset Management.

The core modules (Materials and Corrosion Core, Fluid Mechanics and Loading, Structural Integrity, and Engineering Stress Analysis: Theory and Simulations for the Engineering route, and Risk & Reliability Engineering, Materials and Corrosion Core, Structural Integrity, and Energy Economics and Policy for the Management route) will introduce students to all aspects of offshore oil and gas exploration, underwater engineering, risk management in offshore and marine operations, and offshore renewable energy industry. The applied modules (Applied Materials and Corrosion, Design of Offshore Energy Structures, Computational Fluid Dynamics for Renewable Energy, and Management for Technology for the Engineering route, and Applied Materials and Corrosion, Health, Safety Sustainability and Environment, Energy Systems Case Studies, and Management for Technology for the Management route) will give students practical experience on problems and situations encountered in the Offshore field.

Students from the Offshore Engineering course will be assessed through oral presentations, exams, assignments, essays and reports, depending on the modules. Assignment, essays and reports will be of varying lengths. Writing short length documents can be challenging and can develop different skills relevant to professional practice. However, some specific topics cannot be assessed in a short length article as fundamental/simulation work is required prior to discussing results. The length of each assessment task is clearly stated within the module descriptor.

Students will write documents to equip them with the skills they require to succeed in the Offshore Engineering field, and to address the specific award ILOs: 1) Critically evaluate the key concepts and issues associated with the construction and maintenance of offshore assets within the renewable energy and oil & gas sectors. 2), Design and analyse offshore renewable energy and oil & gas assets by applying the engineering principles and technologies that pertain to the maintenance of offshore assets. 3), Engineering Route specific: Design and apply modelling solutions to examine impacts of environmental loads on offshore structures and associated structural issues, and design and apply modelling solutions to renewable energy systems. 4.) Management Route specific: Identify advanced technology, management and environmental issues, relevant for the offshore energy industry, to enable the development of risk-based solutions for a safe and secure industry. 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. 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. 7), To communicate their individual research via a thesis and in an oral presentation in a style suitable for academic and professional audiences. ILOS 1-4 apply to students enrolled in Postgraduate Certificate studies, ILOS 1-5 apply to students targeting a Postgraduate Diploma, and ILOS 1-7 apply to MSc students.

Students then have opportunities to develop their communication skills, as they are required to give a group presentation and individual presentation. The ability to work effectively in groups is a highly desirable skill which has translated into ILOs 1, 5, 6 and 7. Feedback is given immediately after the group presentation. Most modules are supported by a number of formative tasks such case studies. Several modules such as Materials and Corrosion Core, Health, Safety, Sustainability and the Environment, Energy Systems Case Studies, Management for Technology, Applied Materials and Corrosion, Risk and Reliability Engineering, Renewable Energy Structures are also include group discussion 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

[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

peers for presentations. Students will also engage with an interactive learning activity which incorporates formative feedback.

Feedback is given immediately after the group presentation. 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. Students will also engage with an interactive learning activity which incorporates 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 discussions with their course director, supervisor, and relevant staff members. The research project addresses ILOs 1, 2 (3 and/or 4), 5-7 and takes the form of a Thesis.

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 elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1	I-ENE-INWK Occ A	Induction	Gill Drew	24		0	Y		05/10/20	09/10/20	N/A	AO	N/A					
2	N-AME-RR	Risk and Reliability Engineering	Dawid Hanak	27		10	N		12/10/20	2310/20	50	EX	100				Exam week 2 4-8/01/21	05/21
3	I-OOT-A1078	Materials & Corrosion Core	Joy Sumner	32		10	Y		19/10/20	30/10/20	50	EX	100				Exam week 2 4-8/01/21	05/21

[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	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
4	N-AME-FML	Fluid Mechanics and Loading	Liang Yang			10	Y		26/10/20	06/11/20	50	ICW	100				FT 08/11/20 PT 22/11/20	05/21
5	N-RNE-EEP	Energy Economics and Policy	P Mirzania	27		10	Y		09/11/20	20/11/20	50	ICW	100				FT 21/11/20 PT 05/12/20	05/21
6	N-AME-ESA	Engineering Stress Analysis: Theory and Simulations	Ali Mehmanparast	32		10	Y		09/11/20	20/11/20	50	ICW	100				FT 21/11/20 PT 05/12/20	05/21
7	N-AME-SI	Structural Integrity	Ali Mehmanparast	38.5		10	Y		23/11/20	04/12/20	50	EX	100				Exam week 2 4-8/01/21	05/21
8	I-OOT-A1076	Applied Materials and Corrosion	Joy Sumner	32		10	N		07/12/20	18/12/20	50	ICW	100				FT 19/12/20 PT 02/01/20	05/21
9	N-OFF-HSSE	Health, Safety, Sustainability and Environment	Gill Drew	25		10	Y		11/01/21	22/01/21	50	ICW	100				FT 23/01/21 PT 06/02/21	05/21
10	N-RNE-RES	Design of Offshore Energy Structures	D Stagonas	25		10	Y		11/01/21	22/01/21	50	ICW	100				FT 23/01/21 PT 06/02/21	05/21

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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
11	N-REE-CFDR	Computational Fluid Dynamics for Renewable Energy	Patrick Verdin	30		10	Y		25/01/21	05/02/21	50	ICW	100				FT 06/02/21 PT 20/02/21	05/21
12	N-OFF-ESCS Occ A	Energy System Case Studies	Xin Zhang	32		10	Y		08/02/21	19/02/21	50			100% MULTI	GPRES ICW	25% 75%	19/02/21 FT 20/02/21 PT 06/03/21	05/21
13	G-MTI Occ A	Management for Technology	Richard Adams	27		10	Y		22/02/21	26/02/21	50	EX	100				Exam week 4 22-26/03/21	05/21
13	I-ENE-GRPP Occ A	Group Project	Gill Drew	16		40	Y		01/03/21	07/05/21	50 50	GCW GPRES ICW RP	64 16 10 10				05/05/21 30/04/21 08/05/21 NA	
14	I-ENE-DISS Occ A	Dissertation (part-time option)	Gill Drew	10		40	Y		01/03/21	24/09/21	50	IPROJ IPRES	80 20				24/09//21 W/C 20/09/21	
15	I-ENE-THESIS Occ A	Individual Research Project	Gill Drew	20		80	Y		10/05/21	10/09/21	50 50	OR THESIS	10 90				23/08/21- 30/08/21 06/09/21	

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

		Offshore Engineering – Engineering Route			Offshore Engineering – Management Route		
		PgCert	PgDip	MSc	PgCert	PgtDip	MSc
I-ENE-INWK	Induction	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
I-OOT-A1078	Materials & Corrosion Core	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
I-AME-FML	Fluid Mechanics and Loading	Compulsory	Compulsory	Compulsory	N/A	N/A	N/A
N-AME-RR	Risk and Reliability Engineering	N/A	N/A	N/A	Compulsory	Compulsory	Compulsory
G-MTI	Management for Technology	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
N-AME-ESA	Engineering Stress Analysis: Theory and Simulations	Compulsory	Compulsory	Compulsory	N/A	N/A	N/A
N-RNE-EEP	Energy Economics & Policy	N/A	N/A	N/A	N/A	Compulsory	Compulsory
N-AME-SI	Structural Integrity	N/A	Compulsory	Compulsory	N/A	Compulsory	Compulsory
N-REE-CFDR	Computational Fluid Dynamics for Renewable Energy	Elective	Compulsory	Compulsory	N/A	N/A	N/A
N-RNE-RES	Design of Offshore Energy Structures	Compulsory	Compulsory	Compulsory	N/A	N/A	N/A
N-OFF-HSSE	Health, Safety, Sustainability and Environment	N/A	N/A	N/A	Compulsory	Compulsory	Compulsory
I-OOT-A1076	Applied Materials & Corrosion	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
N-OFF-ESCS	Energy System Case Studies	N/A	N/A	N/A	Compulsory	Compulsory	Compulsory
I-ENE-GRPP	Group Project	N/A	Compulsory FT Elective PT	Compulsory FT Elective PT	N/A	Compulsory FT Elective PT	Compulsory FT Elective PT

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

I-ENE-DISS	Dissertation (part-time option)	N/A	Elective PT	Elective PT	N/A	Elective PT	Elective PT
I-ENE-THESIS	Individual thesis project	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**
N-AME-ESA	Engineering Stress Analysis: Theory and Simulations	Advanced Mechanical Engineering	Advanced Mechanical Engineering Offshore Engineering (Engineering route) Renewable Energy (Engineering route)
N-AME-SI	Structural Integrity	Advanced Mechanical Engineering	Advanced Mechanical Engineering Offshore Engineering (Engineering and Management route) REMS EngD
N-OFF-HSSE	Health, Safety, Sustainability and Environment	Offshore Engineering	Offshore Engineering (Management route) Renewable Energy (Management route)
N-AME-RR	Risk and Reliability Engineering	Advanced Mechanical Engineering	Advanced Mechanical Engineering Offshore Engineering (Management route) Advanced Process Engineering
I-OOT-A1076	Applied Materials & Corrosion	Offshore Engineering	Advanced Mechanical Engineering Offshore Engineering (Engineering and Management route)
N-RNE-RES	Design of Offshore Energy Structures	Renewable Energy	Offshore Engineering (Engineering route) Renewable Energy (Engineering route)
I-AME-FML	Fluid Mechanics and Loading	Advanced Mechanical Engineering	Offshore Engineering (Engineering route) Renewable Energy (Engineering route)
N-RNE-EEP	Energy Economics & Policy	Renewable Energy	Offshore Engineering (Management route)
G-MTI	Management for Technology	School of Management	Advanced Mechanical Engineering REMS EngD Energy Systems and Thermal Processes Energy Systems and Thermal Processes (Muscat) Advanced Process Engineering Process Systems Engineering (Muscat) Advanced Chemical Engineering (General route) Advanced Chemical Engineering (Biorefining route)

			Offshore Engineering (Engineering route) Offshore Engineering (Management route) Thermal Power Computational and Software Techniques in Engineering
N-OFF-ESCS	Energy Systems Case Studies	Offshore Engineering	Renewable Energy (Engineering route) Renewable Energy (Management route) Energy Systems and Thermal Processes (Muscat) Offshore Engineering route (Management route) Advanced Digital Energy Systems
N-REE-CFDR	Computational Fluid Dynamics for Renewable Energy	Advanced Mechanical Engineering	Offshore Engineering (Engineering route)

8. How are the ILOs assessed?

The following assessment types are utilised:

The assessment methods used on the course are designed to enable students to achieve the learning outcomes of the course in the following ways:

Written examination and coursework assignments (100% of PgCert, 66.7% of PgDip and 40% of MSc)
Each of the 8 modules undertaken by the student is assessed by a written examination or coursework assignments.

Formal written examinations are designed to demonstrate each student's level of understanding and knowledge of the subject area, through their ability to select and apply this knowledge to the questions set.

Coursework assignments take the form of reports and the output from the practical application of software. These assignments will demonstrate skills in the areas including information retrieval, problem solving and analysis, writing style and computer application competence.

Group Project (33.3% of PgDip and 20% of MSc)
For the Group Project (full time students) are assessed by means of a written group report, presentations and an individual contribution component.

Dissertation (33.3% of PgDip and 20% of MSc)
For the dissertation (part time students) an individual assessment for each student is done, based on a written report and an oral presentation with the support of a poster. 90% of the mark is based on the written report, while 10% on the oral presentation.

Individual Research Thesis (40% or MSc)
The individual project thesis is assessed by taking into account the quality of its introduction and literature review, the work carried out and results, the analysis/discussion and its style and presentation. The application and effort of the student is taken into account. Students are also required to undertake an oral presentation that has a 10% weighting within the individual project assessment.

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	EX	EX		EX
3	EX	EX		
4			ICW	
5				ICW
6			ICW	
7		EX	EX	EX
8		ICW		ICW
9				ICW
10			ICW	
11			ICW	
12				ICW
13	EX	EX		

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.
14	GCW GPRES ICW RP
15	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.
16	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?

Students successfully completing the course should have gained the knowledge and skills required to enable them to gain employment at a professional level within the offshore engineering industrial sector. Offshore engineering is a rapidly developing discipline. In addition to its traditional relevance to the oil & gas industry, it is expanding to embrace the novel engineering challenges presented by the offshore renewable energy industry.

Cranfield's MSc in Offshore Engineering is able to provide the new skills needed across this fast-developing sector, together with the fundamental engineering understanding necessary, whatever the application.

Students applying for this MSc will be able to choose between two routes: one focusing on detailed engineering aspects, and the other focusing on offshore asset management.

Graduates with an MSc in Offshore Engineering will be able to work in a range of different industries including offshore renewables and offshore oil & gas, and beyond. Also, suitable graduates may have the opportunity of continuing their studies in a related area in pursuance of a research degree such as a PhD.

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

1. What is the course?

Course information

Course Title	MSc in Operations Excellence
Course code	MSOPXPTC, PDOPXPTC, PCOPXPTC, MSOPXPAC, PDOPXPAC, PCOPXPAC
Academic Year	2020/21
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Part-time
Location(s)[1] of Study	Cranfield University and University of Cambridge
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 Mastership?	Yes
Apprenticeship Standard the course is mapped to	Senior Leadership
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	Part-time MSc - up to three years
Course Start Month(s)	Part-time: 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:

- 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 course is accredited formally by the Institution of Engineering and Technology (IET), the Institution of Mechanical Engineers (IMechE) and the Royal Aeronautical Society (RAeS) until October 2019.

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.

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:

- 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.

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 understanding 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 understanding of 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. Collate, analyse and discuss information from a variety of sources.

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.
- Online delivery where appropriate
- 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 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 9	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.

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?

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

[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%).

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) Individual Research 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 individual project is aligned with the module ILOs but will also add an end-point-assessment component that evaluates the implementation of the project based findings in the students' own workplaces. This evaluation will then form the basis of the end-point project presentation. 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		0	N	13/10/20	13/10/20	1510/20	N/A	AO	N/A				N/A	
2	I-OPX-EF	Effective Factories	Mr John Patsavellas	35		10	N	02/11/20	02/11/20	13/11/20	40	ICW	100				15/01/21	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	11/01/21	11/01/21	15/01/21	40	GCW	100				05/03/21	At the next available opportunity which may not be until the course runs the following year	
4	I-OPX-TMT	Team Management	Dr Sandeep Jagtap	35	15	10	N	15/02/21	15/02/21	26/02/21	40	ICW	100				09/04/2021	At the next available opportunity which may not be until the course runs the following year	
5	I-OPX-IM	Innovation Management	Dr Mohamed Shararah	35	15	10	N	12/04/21	12/04/21	23/04/21	40	ICW	100				04/06/21	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 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-B20	Technology Management (delivered at Cambridge)	Dr Patrick McLaughlin	35	10	10	N	21/06/21	21/06/21	02/07/21	40	ICW	100				27/08/21	At the next available opportunity which may not be until the course runs the following year	
8	I-OPX-SCM	Supply Chain Management	Dr Hamid Moradlou	35	10	10	N	06/09/21	06/09/21	17/09/21	40	ICW	100				29/10/21	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	22/11/21	22/11/21	03/12/21	40	GCW	100				21/01/22	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	07/02/22	07/02/22	18/02/22	40	ICW	100				01/04/2022	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	29/03/21	29/03/21	27/08/21	50			100	GCW GPRES ICW	64 16 20	27/08/21 06/09/21 27/08/21		
12	I-OPX-THES	Thesis Project	Dr Patrick McLaughlin	40		80	N	29/11/21	29/11/21	26/08/22	50	THESIS OR	90 10				26/08/22 05/09/22		

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.)

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	
8	ICW	ICW	ICW	ICW	ICW	
9			GCW	GCW	GCW	
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:	September 2020

1. What is the course?

Course information

Course Title	Pre-Masters Course in Engineering
Course code	QPSOEFQC
Academic Year	2020/21
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

[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	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 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)	October

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 Master's 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 electronic Blackboard.

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).

6. How is the course structured?

Full-time students register for the course in September/beginning of October and are expected to complete the course by August 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 August. The individual project will end by submitting an individual report and presenting the work to panel of staff members and supervisors.

[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]

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 basic modules (such as Basic Aerodynamics and Mathematics) to align with the learning outcome 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							
												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 of Independent assessments[8] (%)	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	Jack Stockford	20		10	N	18/01/21	18/01/21	29/01/21	40	ICW	100				16/04/21	19/06/21
2	N-PY-ESA	Engineering Stress Analysis	Dr Shijun Guo	20		10	N	02/11/20	02/11/20	12/11/20	40	ICW	100				04/12/20	16/04/21

[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	19/10/20	26/10/20	20/11/20	40	EX	100				14-18/12/20	04/2021
4	N-PY-BAEM	Basic Aerodynamics	Dr Amir Zare Shahneh	28		10	N	05/10/20	05/10/20	20/10/20	40	EX	100				14-18/12/20	04/2021
5	N-PY-PP	Propulsion and Power	Prof Pericles Pilidis	20		10	N	14/01/21	14/01/21	18/03/21	40	EX	100				22-26/03/21	06/2021
6	N-PY-M1	Mathematics I	Peter Sherar	40	40	20	N	02/11/20	02/11/20	08/12/20	40	EX	100				14-18/12/20	04/2021
7	N-PY-M2	Mathematics II	Peter Sherar	40	40	20	N	25/01/21	25/01/21	16/03/21	40	EX	100				22-26/03/21	06/2021
8	N-PY-EMF	An Introduction to Engineering Materials and Failure Analysis	Dr David Ayre	30		10	N	22/02/21	22/02/21	19/03/21	40	EX	100				22-26/03/21	06/2021
9	N-PY-T	Thermofluids	Dr Ioannis Goulos	22		10	N	23/11/20	23/11/20	11/12/20	40	EX	100				14-18/12/20	03/2021
10	N-PY-CAD	Computer Aided Design (CATIA)	Dr Adrian Clarke	16		10	N	11/01/21	11/01/21	15/01/21	40	ICW	100				19/02/21	08/05/21
11	N-PY-CF90	Computing Course	Dr Jafar Jamshidi	30		10	N	26/10/20	26/10/20	27/11/20	40	ICW	100				15/01/21	28/05/21

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 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
12	N-PY-RM	Research Methods	Dr Amir Zare Shahneh	24		10	N	19/01/21	19/01/21	18/02/21	40	ICW OR	40 60				12/02/21 18/02/21	04/2021
13	N-PY-IP2	Individual Project	Dr Amir Zare Shahneh	30		60	N	15/01/21	15/01/21	09/07/21	50	THESIS OR	90 10				09/07/21 02/07/21	

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 9 written examinations, 6 pieces of assessment by written assignments. 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			ICW		ICW	ICW	
13	THESIS	THESIS	THESIS		THESIS	OR	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: February 2021

1. What is the course?

Course information

Course Title	PG Certificate in Supply Chain Practice
Course code	PCSCPPTC
Academic Year	2020-2021
Valid entry routes	PgCert
Additional exit routes	None
Mode of delivery	Part-time
Location(s)[1] of Study	Cranfield University
School(s)	School of Management
Theme	Leadership and Management
Centre	Logistics, Procurement and Supply Chain Management
Course Director	Mike Bernon
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	N/A
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 - closed
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	One year
Course Start Month(s)	April

Institutions delivering the course

This course is delivered by School of Management, Leadership and Management, Centre for Logistics, Procurement and Supply Chain Management where the research interests include:

Supply Chain Management, Logistics and Procurement

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

- Students undertake their individual work based project within their own organisation or field of business, which builds further contacts and opportunities for collaboration with those organisations
- The course may contain talks by external speakers from organisations such as: consultancies, industrial practice or partner academic institutions
- One of the two external examiners for the course is always from the non-academic sector, the other being an academic
- The course has an industrial Advisory Board

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

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

The MSc in Logistics and Supply Chain Management is formerly accredited by the Chartered Institute of Logistics and Transport and the Chartered Institute of Purchasing and Supply.

The current PgCert is not accredited by a PSRB. The course is closely aligned using module material from both the FT and PT MSc Logistics and SCM which are accredited by CILT, CIPS and ELA and options are being explored. There is also an opportunity to use accredited prior learning to transfer credit from this PGCert onto which provides an accreditation route.

2. What are the aims of the course?

The aim of the course is to bridge a gap for accredited executive education programmes, in order to fill a market demand for highly capable practitioners in the field of logistics and supply chain management. The course further aims to offer personal and specialised skills development for candidates with extensive industrial experience. These objectives are addressed through the aims of the course which are to provide students with:

- An overall appreciation of logistics and supply chain management and their importance to business
- Appropriate technical knowledge in the key areas of logistics and supply chain management practice
- An understanding of the analytical skills that will enable them to apply this knowledge within a business environment
- An understanding of the key operational elements needed to effectively manage and plan logistics and distribution systems

This is a closed programme intended for the following range of students from the client organisation and their supply chain network:

1. Candidates with a minimum of 5 years' business or organisation experience in supply chain related role
2. Candidates with a similar level of experience in a non-supply chain area who are intending to move into the supply chain field.

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 logistics and supply chain knowledge in general, and a critical awareness of current supply chain problems and new thinking at the forefront of the discipline.
- ILO 2. Identify and apply appropriate techniques to address specific challenges in supply chain management.
- ILO 3. Analyse and solve supply chain problems systematically.
- ILO 4. Make reasoned judgements in the absence of complete data.
- ILO 5. Critically evaluate the application of current logistics and supply chain management research and evaluate its relevance to organisational practice.
- ILO 6. Effectively communicate their work clearly to specialist and non-specialist audiences via oral, written presentations and reports.

4. How is the course taught?

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

Conventional taught lectures, business simulations, case studies, group working which will compromise four ten credit taught modules. Tutorial support will also be provided throughout the course including a meeting with a personal tutor during each module. Additional learning and personal development will be achieved through a 20 credit company based project which will be supervised by a Cranfield academic. Further, use will be made of Blackboard 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

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

Description	Credits
COMPULSORY MODULES:	

Module 1 Module 6	10 20
ELECTIVE MODULES:	
30 credits from modules 2, 3 and 5	30
TOTAL:	60

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 at a time agreed and are expected to complete the course within 1 year.

7. Course Level Assessment Strategy[4]

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.

[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 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.

Course modules

The following modules outline all parts of the programme leading to **Postgraduate Certificate**.
This is a closed PgCert being offered to individual client organisations. As such, this course does not have fixed (recurrent) module dates so the dates below are purely illustrative. However, the elapse time between modules will not normally be less than 6 weeks to allow for sufficient time for assessment and feedback prior to the next module.

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		M-S/INWK	Registration and Induction	Mike Bernon	4		0		22nd April 2021	22nd April 2021	22nd April 2021								
1		M-S /SCP	Supply Chain Practice	Mike Bernon	25	0	10	N	27th April 2021	27th April 2021	29th April 2021	40	ICW	100				31st May 2021	

[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
2		M-S /IOM	Inventory and Operations Management Practice	Emel Aktas	25		10	N	2nd Nov 2021	2nd Nov 2021	4th Nov 2021	40	ICW	100				3RD DEC 2021	
3		M-S /WDC	Logistics Management – Warehousing and DC Design	Hendrik Reefke	25		10	N	29th June 2021	29th June 2021	1st July 2021	40	ICW	100				30th July 2021	
4		M-S /FT	Logistics Management – Freight Transport	Melvyn Peters	NOT RUNNING														
5		M-S /PSP	Principles of Procurement	Farooq Habib	25		10	N	21st Sept 2021	21st Sept 2021	23rd Sept 2021	40	ICW	100				22nd Oct 2021	
6		M-S /IP	Independent Project- Supply Chain Practice	Mike Bernon			20	N	06th Dec 2021	06th Dec 2021	10th Dec 2021	50	IPROJ	100				28TH JAN 2022	

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:

The course uses two assessment types. These include 4 individual written assessments and an independent project. The written assessments are based on practical case studies requiring the application of both qualitative and quantitative approaches. The independent project builds upon this by evaluating student's ability to apply their learnt knowledge to an industrial based project. It further tests their presentation and communication skills.

This approach has been adopted because:

This approach conforms to School of Management norms for post graduate programmes study and aligns to the MSc in logistics and Supply Chain Management.

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	ICW1	ICW1				
2		ICW2	ICW2			
3		ICW3	ICW3	ICW3		
4		ICW4	ICW4	ICW4		
5		ICW	ICW		ICW	
6		IPROJ	IPROJ	IPROJ	IPROJ	IPROJ 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 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.

The PgCert programme will be incorporated into the Supply Chain Management & Logistics programme review process given the high level of commonality across programmes.

Module feedback forms will be completed through the Evasys systems used in SoM. Feedback is then distributed to the Course Director. Module Leader/Lecturers and the Dir. Of Education. These are reviewed and any actions communicated back to students by the Course Director. The same module feedback is used for the Annual Course Reviews and any actions reported through the Graduate Programmes Board (Quarterly). As a “closed” programme the sponsoring company will also be able to provide any additional feedback directly to the Course Director.

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

The graduates from the PgCert in Supply Chain Practice will typically have significant work experience but not possess a higher (M) level degree. Further, this experience is often within one area of their business. By successfully completing the programme, graduates will have a deeper understanding and technical ability within their business area, along with an improved appreciation of wider supply chain management principles leading to opportunities for rapid career progression.

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

1. What is the course?

Course information

Course Title	MSc in Procurement and Supply Chain Management
Course code	MSPSCFTC, PDPSCFTC, PCPSCFTC
Academic Year	2020/21
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 Denyse Julien
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 2021 and The Chartered Institute of Purchasing and Supply annually until August 2021.

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 BlackBoard (VLE) as a means of delivering material to support and augment classroom learning
- Library induction, referencing and plagiarism sessions
- PDP 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

[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%).

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 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.

[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

Feedback for all assessments is given in a timely fashion, dependent on the type of assessment, but always within 20 working days.

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
1	M-L/PSP	Principles of Strategic Procurement	Dr Farooq Habib	20		10	Y	02/11/20	02/11/20	10/12/20	40	ICW	100				13/01/21	
2	M-L/SCSS	Supply Chain Strategy and Sustainability	Dr Heather Skipworth	20		10	Y	05/10/20	05/10/20	29/10/20	40	ICW	100				26/11/20	
3	M-L/ACF	Accounting and Finance	Dr Simon Templar	20		10	Y	05/10/20	05/10/20	11/12/20	40	EX	100				TBC 14-18/12/20	
4	M-L/ATS	Analytical Techniques for	Prof Emel Aktas	20		10	Y	07/10/20	07/10/20	11/12/20	40	ICW	100				08/02/21	

[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
		Supply Chain Management																
5	M-L/FRT	Freight Transport	Prof Melvyn Peters	20		10	Y	21/10/20	21/10/20	09/12/20	40	ICW	100				20/01/21	
6	M-L/IOM	Inventory and Operations Management	Dr Anurag Tewari	20		10	Y	12/10/20	12/10/20	16/11/20	40	GCW	100				11/12/20	
7	M-L/ISB	Information Systems and e-Business	Dr Abhijeet Ghadge	20		10	Y	11/01/21	11/02/21	05/03/21	40	GCW	100				30/03/21	
8	M-L/PMI	Project Management Introduction	Dr Denyse Julien	20		10	Y	Occ-A 8/02/21 Occ-C 15/02/21 Occ-D 22/02/21	 08/02/21 15/02/21 22/02/21	 10/02/21 17/02/21 24/02/21	40 40 40 40 40 40			MULT 100 MULTI 100I MULTI 100	GCW GPRAC GCW GPRAC GCW GRPAC	75 25 75 25 75 25	10/02/21 10/02/21 17/02/21 17/02/21 24/02/21 24/02/21	
9	M-P/SSE	Supplier Selection and Evaluation	Dr Soroosh Saghiri	20		10	N	14/01/21	14/01/21	31/01/21	40	ICW	100				28/02/21	
10	M-P/NCM	Negotiation and Contract Management	Dr Farooq Habib	20		10	N	13/01/21	13/01/21	27/01/21	40 40	GPRAC ICW	30 70				24/02/21 24/02/21	

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	Dr Soroosh Saghiri	12		5	Y	18/02/21	18/02/21	02/03/21	40			MULTI	GCW ICW	75 25	23/03/21	
12	M-P/RSC	Designing and Managing Resilient Supply Chains	Dr Uta Jüttnerr	12		5	Y	22/03/21	22/03/21	24/03/21	40	GCW	100				21/04/21	
13	M-L/OUT	Logistics Outsourcing	Prof Melvyn Peters	12		5	Y	20/01/21	20/01/21	22/01/21	40	ICW	100				19/02/21	
14	M-L/PRR	Planning and Resourcing Road Freight Transport	Prof Melvyn Peters	12		5	Y	15/02/21	15/02/21	17/02/21	40			MULTI	GPRES GCW ICW	10 40 50	17/03/21	
15	M-L/HLR	Humanitarian Logistics	Dr Hendrik Reefke	12		5	Y	08/03/21	08/03/21	10/03/21	40	ICW	100				07/04/21	
16	M-L/SIM	Simulation	Dr Nicky Yates	12		5	Y	10/03/21	10/03/21	12/03/21	40	ICW	100				09/04/21	
17	M-L/SXS	Six Sigma	Hamid Moradlou	12		5	Y	28/01/21	28/01/21	29/01/21	40	GCW	100				26/02/21	
18	M-L/PFM	Performance Measurement in the Supply Chain	Dr Andrey Pavlov	12		5	Y	25/01/21	25/01/21	27/01/21	40	GCW	100				24/02/21	

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	18/03/21	18/03/21	19/03/21	40	ICW	100				12/04/21	
20	M-L/RLO	Retail Logistics	Prof Michael Bourlakis	12		5	Y	25/03/21	25/03/21	26/03/21	40	ICW	100				23/04/21	
22	M-L/BMG	Business Model Generation	Dr Denyse Julien	12		5	Y	01/03/21	01/03/21	03/03/21	40	GCW	100				31/03/21	
23	M-P/FDP	Future of Digital Procurement	Dr Farooq Habib	12		5	Y	15/03/21	15/03/21	16/03/21	40	GCW	100				15/04/21	
24	M-L/BDA	Big Data Analytics for Supply Chain Management	Prof Emel Aktas	12		5	Y	03/02/21	03/02/21	05/02/21		ICW	100				05/03/21	
25	M-L/CSC	Circular Supply Chains	Dr Denyse Julien	12		5	Y	18/01/21	18/01/21	19/01/21				MULTI	GCW GPRC	60 40	16/02/21 16/02/21	
26	M-L/RSM	Research Methods	Dr Denyse Julien	12		0	Y	29/03/21	29/03/21	03/09/21	N/A	AO	N/A				N/A	
27	M-L/THS	Thesis	Supervisors	0		80	Y	12/04/21	12/04/21	03/09/21	50	THESIS	100				03/09/21	

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/PSP	Principles of Strategic Procurement	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/SCSS	Supply Chain Strategy and Sustainability	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/ACF	Accounting and Finance	Logistics and Supply Chain Management	Procurement and Supply Chain Management; Management; Management and Corporate Sustainability; Management and Entrepreneurship; Strategic Marketing; Exec LSCM
M-L/ATS	Analytical Techniques for Supply Chain Management	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/FRT	Freight Transport	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/IOM	Inventory and Operations Management	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/ISB	Information Systems and e-Business	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/PMI	Project Management Introduction	Logistics and Supply Chain Management	Logistics and Supply Chain Management
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	Logistics and Supply Chain Management
M-L/PRR	Planning and Resourcing Road Freight Transport	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/HLR	Humanitarian Logistics	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/SIM	Simulation	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/SXS	Six Sigma	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/PFM	Performance Measurement in the Supply Chain	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/SOP	Sales and Operations Planning	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/RLO	Retail Logistics	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/SNCC	Social Network Analysis in a Supply Chain Context	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/BMG	Business Model Generation	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/PDV	Personal Development	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/RSM	Research Methods	Logistics and Supply Chain Management	Logistics and Supply Chain Management
M-L/THS	Individual Thesis	Logistics and Supply Chain Management	Logistics 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.

COURSE TITLE: MSc in Programme and Project Management

Date of first publication/latest revision: January 2021

1. What is the course?

Course information

Course Title	MSc in Programme and Project Management
Course code	MSPPMPTR, PDPPMPTR, PCPPMPTR, SPPPMPTRD
Academic Year	2020-2021
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	PgDip, PgCert
Mode of delivery	Part-time
Location(s)[1] of Study	Shrivenham
School(s)	Cranfield School of Management and Cranfield Defence and Security
Theme	Leadership and Management
Centre	Cranfield University, School of Management
Course Director	Pete Ito
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	Yes
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	UK 1st or 2nd class honours degree in relevant subject areas or international equivalent or relevant work experience in combination with or without a degree below 2nd class honours
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	Pg Cert – 2 years Pg Dip – 2 years MSc – 3 years
Course Start Month(s)	January

Institutions delivering the course

This course is delivered by Cranfield University School of Management and Cranfield Defence and Security where the research interests include a wide range of private and public sector management issues.

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

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

The MSc is accredited formally by Association for Project Management APM until April 2020. The application for reaccreditation until April 2023 is currently being processed by APM.

2. What are the aims of the course?

Cranfield University aims to bring together programme and project managers to maximise their understanding, develop new skills and competences and encourage new solutions for previously unsolved project and programme related problems. In particular:

1. To equip students so that upon completion of their MSc dissertation, students will be able to facilitate the development of future knowledge in the subject area from a practice perspective.
2. To develop the capabilities to conduct independent research into an aspect of programme management, strategic project management or programme leadership in a defence management or government context.
3. To enable students to demonstrate critical awareness and evaluation of current research and advanced practice in the field of managing programmes of projects.

This post-experience programme is intended for project/programme professionals or those who are actively involved in projects/programmes in their organisations. A typical participant would normally:

1. Have been in a management or command position for at least 2 years and have had relevant experience for a minimum of 5 years **and**
2. Hold a relevant recognised UK degree with honours in class 1 or 2 **or**
3. Hold academic or professional qualifications judged equivalent to a degree **or**
4. Have met specific standards, as prescribed by Cranfield University, designed to assess numeracy, verbal reasoning, report writing, presentation and interview skills to MSc entrance level.

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. to apply the basic theoretical concepts that underpin programme and project management
ILO 2. to analyse programme and project management literature to ensure competence in a wide range of related project management techniques
ILO 3. to demonstrate a critical application of the general theory of strategic management and to understand its implementation through the strategic management of programmes and projects
ILO 4. to be able to evaluate ways of planning and implementing project progress through monitoring and control, configuration management and the ways of accelerating a project
ILO 5. to be able to carry out the financial analysis and value management of programmes and projects
ILO 6. to make effective oral and written presentations.

B. **Postgraduate Diploma**

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

ILO 7. to apply the basic concepts of defining project authority, contractual agreements and procurement theory
ILO 8. to analyse the roles and responsibilities within project work groups and the relationship between organisation and culture
ILO 9. to analyse the fundamental principles underpinning effective teams, motivation and leadership
ILO 10. to be able to differentiate between programme and project management and to evaluate the managerial competencies required for each
ILO 11. to identify and analyse the key management issues that affect the success of programmes
ILO 12. to demonstrate a critical application/analysis of current problems in the execution of programmes especially in the context of Defence related programmes
ILO 13. to demonstrate their ability to synthesize qualitative and quantitative data from theory and practice to reach conclusions and implementable solutions
ILO 14. exercise initiative in developing and scoping suitable projects /programmes and carrying them out in a real-world context
ILO 15. to participate in the various activities during the programme and the work in group projects to help them develop interpersonal skills including team working, the ability to make and argue their case, presentation skills both written and oral, individually and in teams, and interaction skills

C. **MSc**

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

ILO 16. To integrate their learning from the PgCert and PgDip and apply it to a research topic appropriate to their organisation
ILO 17. To critically evaluate the techniques and literature applicable to their own research and scholarship
ILO 18. To make professional judgements about how established techniques of enquiry are used to create and interpret knowledge that is applicable to a practical context

4. <u>How is the course taught?</u>

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

Each of the course modules is delivered via two, 2 ½-days residential workshops at Cranfield Defence and Security which is based at the Defence Academy of the United Kingdom in Shrivenham.

Students will be supported in their learning and personal development by a varied and stimulating learning environment. A typical session will consist of a mix of formal lectures, in-class case discussions, scenario simulation and role-play, 'hot-topic' debate, group work and self-study. Group project work, reflective practice, and class exercises are used to develop problem solving and communication skills. Additional practical expertise will be provided through visiting lecturers and guest speakers. Demonstrations, role plays and simulations are also part of the learning experience.

Assessments for the course come in the form of written coursework and presentations. All pieces of coursework for all modules on the MSc have a submission deadline of 1200hrs.

Students have access to the extensive library and on-line facilities both at Shrivenham and at the Management Information and Resources Centre at the School of Management. Students are encouraged to make regular contact by e-mail or phone with the relevant module leader. During the thesis phase, students are encouraged to meet with supervisors at least twice per six month cycle.

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 1-4	15 credits per module
ELECTIVE MODULES:	
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 1-8	15 credits per module
ELECTIVE MODULES:	
N/A	
TOTAL:	120

C. MSc

In addition to the requirement for the Postgraduate Diploma outlined above, students must successfully complete module 9 and the thesis. An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Modules 1-8 Module 9 Research Methods Module 10 Thesis	120 15 65
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 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. Whilst students are registered for five years, the normal time to complete the course is three. The first four modules are delivered in year 1 (Certificate level) and the next four modules are delivered

[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%).

in year 2 (Diploma level). Year 3 is set aside for the final module on Research Methods and for students to work on their thesis. To achieve the award of Diploma the Certificate level must be completed successfully. To be considered for the award of MSc the Certificate and Diploma must be completed successfully.

7. Course Level Assessment Strategy

The assessment tasks are challenging and enable students to demonstrate a full range of skills and attributes. The pre-requisite modules will introduce students to critical aspects of Masters level work. In individual modules, those skills will be assessed through essays and reports reflecting individual work or group work. 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. Students will write employability relevant policy briefing documents to equip them with the skills they require to succeed in their particular work areas and to address the specific award ILOs. Some students then have opportunities to develop their communication skills, as they are required to give a group presentation and individual presentation. The ability to work effectively in groups is a highly desirable skill which has translated into ILOs on certain modules. Feedback is given immediately after the group presentation. Some modules have assessments which are supported by a number of formative tasks including group discussion or other presentations. In some modules, students will also engage with an interactive learning activity which incorporates formative feedback. In some modules, peer review informs practice and tutorials guide progress. Students are generally encouraged to support each other by asking and answering questions via the VLE. 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 the research project and guidance will be provided. The final requirement for the student takes the form of a Thesis accessed at the end of the period of study.

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[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 assessment[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
1	R-PPM-FPPM	Foundations of Programme and Project Management	Pete Ito	40	Variable	15	N	11/01/21	Part 1: 11/01/21	15/01/21	40	ICW	80				17/02/21	
	R-PPM-FPPM2								Part 2: 17/02/21	19/02/21	40	ICW	20				29/03/21	
2	R-PPM-BCFM	Business Case and Financial Management	Dr Robert Lambert	40	Variable	15	N	29/03/21	Part 1: 29/03/21	31/03/21	40	GCW	80				10/05/21	

[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%. This will be at the Board of Examiners discretion.
[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 assessment[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
	R-PPM-BCFM2								Part 2: 10/05/21	12/05/21	40	ICW	20				07/06/21	
3	R-PPM-PC R-PPM-PC2	Planning, Control and Performance Management	Dr Liz Lee-Kelley (Peter Simon)	40	Variable	15	N	07/06/21	Part 1: 07/06/21 Part 2: 20/09/21	09/06/21 22/09/21	40 40	ICW GCW	70 30				20/09/21 25/10/21	
4	R-PPM-ROM R-PPM-ROM2	Risk and Uncertainty Management	Dr Elmar Kutsch	40	Variable	15	N	25/10/21	Part 1: 25/10/21 Part 2: 29/11/21	27/10/21 01/12/21	 40	 ICW	 100				Part 1: No submissions 10/01/22	
5	R-PPM-OI R-PPM-OI2	The Reflective Manager: The Craft of Managing Projects and Programmes	Jeremy Hilton	40	Variable	15	N	06/01/21	Part 1: 06/01/21 Part 2: 10/02/21	08/01/21 12/02/21	40 40	ICW ICW	50 50				10/02/21 22/03/21	
6	R-PPM-SCSM	Supply Chain and Strategic Management	Part 1: Prof Michael Bourlakis	40	Variable	15	N	22/03/21	Part 1: 22/03/21	24/03/21	40	ICW	50				05/05/21	

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 assessment[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
	R-PPM-SCSM2		Part 2: Sergey Portyanko						Part 2: 05/05/21	07/05/21	40	ICW	50				21/06/21	
7	R-PPM-LTCOL R-PPM-LTCOL 2	Organisational Learning and Leading Transformational Change	Part 1: Dr Neil Turner Part 2: Dr Jacquie Drake	40	Variable	15	N	21/06/21	Part 1: 21/06/21 Part 2: 18/10/21	23/06/21 20/10/21	40 40	ICW ICW	50 50				18/10/21 17/01/22	
8	R-PPM - AP	Group Action Project	Dr Liz Lee-Kelley	40	Variable	15	N	13/09/21	Part 1: 13/09/21 Part 2: N/A	15/09/21 Part 2: N/A	40 40	GCW ICW	85 15				15/12/21 15/12/21	
9	R-PPM-RM R-PPM-RM2	Research Methods and Developing Personal Performance	Dr Abdelkader Aoufi	40	Variable	15	N	26/04/21	Part 1: 26/04/21 Part 2: 24/05/21	Part 1: 28/04/21 Part 2; 26/05/21	 50	 ICW	 100				 02/07/21	
10	R-PPM-THESIS	Thesis	Dr Abdelkader Aoufi	0	0	65	N	26/04/21	02/07/21	18/02/22	50	THESIS	100				18/02/22	

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

8. How are the ILOs assessed?

The following assessment types are utilised:

The course uses a range of assessment types. Students can expect to have a mixture of individual and group written assessments and presentations with a final thesis dissertation.

This approach has been adopted in order to create a fit with the module contents, the mix assessment approaches and to enable formative assessment (with feedback, for instance, supporting students in their group projects and theses work).

This approach has been adopted because:

The variety of modules involved in this course requires a broad variety of ILO assessment methods and flexibility in application. It would be inappropriate to try a "one size fits all" approach for this course, and module managers are best placed to decide which method or combination of methods would be most appropriate for the particular ILOs for any module. Finally, students are given every opportunity to comment on the assessment methods which have been utilised, and module managers have been encouraged to keep that feedback in mind in deciding whether a modification of assessment is warranted.

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. PgCert

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6
1	ICW	ICW	ICW			ICW
2	GCW		GCW	ICW	ICW	
3		ICW		ICW		GWC
4			ICW	ICW		ICW

B. PgDip

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

Award ILOs / Module No.	ILO7	ILO8	ILO9	ILO10	ILO11	ILO12	ILO13	ILO14	ILO15
5		ICW	ICW		ICW	ICW			
6	ICW	ICW		ICW	ICW				
7	ICW	ICW		ICW		ICW	ICW		
8	ICW		ICW	ICW			GWC	GWC	GWC

C. MSc

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

Award ILOs / Module No.	ILO16	ILO17	ILO18
9	ICW	ICW	
10	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 was originally developed in response to the Ministry of Defence's need for quality project and programme personnel. Central funding was available for MOD civilians and military personnel each year. The anticipation was that the students would move to project/programme management roles upon completion of the course. The MOD have recognised the benefits from previous graduates and have identified PPM as a key skill by increasing the number of students they sponsor on the course.

Cranfield University and this programme also provide opportunities for you to network with fellow professionals, leading figures from industry and academic experts.

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: 05/03/2020

1. What is the course?

Course information

Course Title	Renewable Energy
Course code	MSRNEFTC, MSRNEPTC, PDRNEFTC, PDRNEPTC, PCRNEFTC, PCRNEPTC
Academic Year	2020/21
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	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 Energy Systems
Course Director	Dr Mounia Karim 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	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)	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

Institutions delivering the course

This course is delivered by the Centre for Renewable Energy Systems 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
Aero/hydrodynamic design, analysis and testing of novel wind, wave and tidal energy devices
Structural Integrity of offshore structures including inspection and testing
Computational Fluid Dynamics (CFD)
Finite Element Analysis (FEA)
Thermal energy storage
Energy harvesting
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)

The course is accredited by the Institute of Mechanical Engineers (IMechE) until 2019 (with reaccreditation scheduled for early 2020) and has recently been approved for accreditation from the Energy Institute.

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 electronic Blackboard 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 flexible during

this time, using a combination of online and face to face interactions. The modules will be assessed by either an exam or an assignment.

The group project is delivered between February and April. 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 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 (or more) through the assessment of taught modules as detailed below:

Description	**Credits**
Engineering Route -**COMPULSORY MODULES:**	
Induction Renewable Energy Technologies 1 Renewable Energy Technologies 2 Engineering Stress Analysis: Theory & Simulations Fluid Mechanics and Loading	0 10 10 10 10
Engineering Route - **ELECTIVE MODULES:**	
SELECT 2 MODULES FROM: Energy Entrepreneurship Solar Energy Engineering Design of Offshore Energy Structures Energy Systems Case Studies	 10 10 10 10

TOTAL:	60

Description	**Credits**
Management Route - **COMPULSORY MODULES:**	
Induction Renewable Energy Technologies 1 Renewable Energy Technologies 2 Health Safety Sustainability and Environment Energy Economics and Policy	0 10 10 10 10
Management Route - **ELECTIVE MODULES:**	
SELECT 2 MODULES FROM: Energy Entrepreneurship Sustainability and Environmental Assessment Research Methods and Project Management Energy Systems Case Studies	 10 10 10 10
TOTAL:	60

B. Postgraduate Diploma

The accumulation of 120 credits (or more) 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 Energy Systems Case Studies Fluid Mechanics and Loading Design of Offshore Energy Structures Group Project	0 10 10 10 10 10 10 10 10 40
Engineering route - **ELECTIVE MODULES:**	
Part time students only select one from the following: Dissertation Group project	 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 Energy Systems Case Studies Health Safety Sustainability and Environment Research Methods and Project Management Energy Economics and Policy	0 10 10 10 10 10 10 10 10

Group Project	40
Management Route - **ELECTIVE MODULES:**	
Part time students only select one from the following: Dissertation Group 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**
Engineering Route - **COMPULSORY MODULES:**	
Induction Renewable Energy Technologies 1 Renewable Energy Technologies 2 Engineering Stress Analysis: Theory & Simulations Solar Energy Engineering Energy Entrepreneurship Energy Systems Case Studies Fluid Mechanics and Loading Design of Offshore Energy Structures Group Project Individual Research Project	0 10 10 10 10 10 10 10 10 40 80
Engineering Route - ELECTIVE MODULES:	
Part time students only select one from the following: Dissertation Group project	 40 40
TOTAL:	200

Description	**Credits**
Management route - **COMPULSORY MODULES:**	
Induction Renewable Energy Technologies 1 Renewable Energy Technologies 2 Research Methods and Project Management Energy Entrepreneurship Energy Systems Case Studies Energy Economics and Policy Health Safety Sustainability and Environment Sustainability and Environmental Assessment Group Project Individual Research Project	0 10 10 10 10 10 10 10 10 40 80
Management route - **ELECTIVE MODULES:**	
Part time students only select one from the following: Dissertation Group project	 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); [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 12 calendar months.

Part-time students register for the course in October and are expected to complete the course within 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[4]

Taught modules:

[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

This course offers 8 taught modules that are delivered using a combination of short online lectures, case studies, workshops, and practical sessions. The assessment for each module depends on the nature of the module. Some modules have an exam based assessment while others 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 modules 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 10 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.

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[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-ENE-INWK Occ A	Induction	Gill Drew	24		0	Y		05/10/20	09/10/20	N/A	AO	N/A				N/A	
2	N-BPE-PRET	Renewable Energy Technologies 1	Chris Sansom	30		10	N		19/10/20	23/10/20	50	ICW	100				FT 24/10/20 PT 07/11/20	05/21
3	N-AME-FML	Fluid Mechanics and Loading	Liang Yang	30		10	Y		26/10/20	06/11/20	50	ICW	100				FT 08/11/20 PT 22/11/20	05/21

[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
4	N-APE-RMPM	Research Methods and Project Management	Gill Drew	20		10	Y		26/10/20	06/11/20	50	ICW	100				FT 07/11/20 PT 21/11/20	05/21
5	N-RNE-EEP	Energy Economics & Policy	Pegah Mirzania	27		10	Y		09/11/20	20/11/20	50	ICW	100				FT 21/11/20 PT 05/12/20	05/21
6	N-AME-ESA	Engineering Stress Analysis: Theory & Simulations	Ali Mehmanparast	32		10	Y		09/11/20	20/11/20	50	ICW	100				FT 21/11/20 PT 05/12/20	05/21
7	N-RNE-PGERE	Renewable Energy Technologies 2	Jerry Luo	40		10	N		23/11/20	04/12/20	50	ICW	100				FT 05/12/20 PT 19/12/20	05/21
8	N-RNE-SEE	Solar Energy Engineering	Peter King			10	N		07/12/20	18/12/20	50	ICW	100				FT 19/12/20 PT 02/01/21	05/21
9	N-ACE-SEA	Sustainability and Environmental Assessment	Gill Drew			10	Y		07/12/20	18/12/20	50	ICW	100				FT 19/12/20 PT 02/01/21	05/21
10	N-RNE-RES	Design of Offshore Energy Structures	Dimitrios Stagonas	25		10	Y		11/01/21	22/01/21	50	ICW	100				FT 23/01/21 PT 06/02/21	05/21

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	N-OFF-HSSE	Health, Safety, Sustainability and Environment	Gill Drew	25		10	Y		11/01/21	22/01/21	50	ICW	100				FT 23/01/21 PT 06/02/21	05/21
12	N-RNE-EE	Energy Entrepreneurship	Stephanie Hussels	28		10	Y		25/01/21	05/02/21	50	GCW	100				FT 06/02/21 PT 20/02/21	05/21
13	N-OFF-ESCS Occ A	Energy Systems Case Studies	Xin Zhang	32		10	Y		08/02/21	19/02/21	50			100% MULTI	ICW GPRES	75% 25%	FT 20/02/21 PT 06/03/21 19/02/21	05/21
14	I-ENE-GRPP Occ A	Group Project	Gill Drew	16		40	Y		01/03/21	07/05/21	50 50	GCW GPRES ICW RP	64 16 10 10				05/05/21 30/04/2021 08/05/21 NA	
15	I-ENE-DISS Occ A	Dissertation (part-time option)	Gill Drew	10		40	Y		01/03/21	24/09/21	50	IPROJ IPRES	80 20				24/09//21 W/C 20/09/21	
16	I-ENE-THESIS Occ A	Individual Research Project	Gill Drew	20		80	Y		10/05/21	10/09/21	50 50	OR THESIS	10 90				23/08/21-30/08/21 06/09/21	

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	Compulsory	Compulsory	Compulsory	Compulsory	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
Research Methods and Project Management	N/A	N/A	N/A	Elective	Compulsory	Compulsory
Engineering Stress Analysis: Theory & Simulations	Compulsory	Compulsory	Compulsory	N/A	N/A	N/A
Energy Entrepreneurship	Elective	Compulsory	Compulsory	Elective	Compulsory	Compulsory
Energy Systems Case Studies	Elective	Compulsory	Compulsory	Elective	Compulsory	Compulsory
Fluid Mechanics and Loading	Compulsory	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	Compulsory	Compulsory	Compulsory
Health, Safety, Sustainability and Environment	N/A	N/A	N/A	Compulsory	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
Individual Research Project	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
N-AME-FML	Fluid Mechanics and Loading	Advanced Mechanical Engineering	Offshore Engineering (Engineering route) Advanced Mechanical Engineering Renewable Energy (Engineering route)
N-AME-ESA	Engineering Stress Analysis: Theory and Simulations	Advanced Mechanical Engineering	Offshore Engineering (Engineering route) Advanced Mechanical Engineering Renewable Energy (Engineering route)
N-OFF-HSSE	Health, Safety, Sustainability and Environment	Offshore Engineering (Management route)	Renewable Energy (Management route) Offshore Engineering (Management route)
N-OFF-ESCS	Energy Systems Case Studies	Offshore Engineering	Renewable Energy (Engineering route) Renewable Energy (Management route) Offshore Engineering (Management route) Advanced Digital Energy Systems Energy Systems and Thermal Processes (Muscat)
N-APE-RMPM	Research Methods and Project Management	Advanced Process Engineering	Advanced Process 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	Advanced Chemical Engineering	Advanced Chemical Engineering (Biorefining route) Advanced Chemical Engineering (General route) Renewable Energy (Management route)
N-RNE-EEP	Energy Economics and Policy	Renewable Energy	Offshore Engineering (Management route) Renewable Energy (Management route)
N-RNE-RES	Design of Offshore Energy Structures	Renewable Energy	Renewable Energy (Engineering route) Offshore Engineering (Engineering route)

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	ICW	ICW		
3			ICW	
4				ICW
5				ICW
6			ICW	
7	ICW	ICW		
8	ICW	ICW	ICW	
9				ICW
10	ICW	ICW	ICW	
11	ICW	ICW		ICW
12		GCW		GCW
13	ICW	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 5.
14	GCW GPRES ICW RP
15	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.
16	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: May 2018 / March 2020

1. What is the course?

Course information – RDB Cohort 1

Course Title	MSc in Retail and Digital Banking
Course code	MSRDBPTC
Academic Year	2020/21
Valid entry routes	PGDip in Retail and Digital Banking; MSc in Retail and Digital Banking
Additional exit routes	PGCert in Retail and Digital Banking
Mode of delivery	Part-time; blended
Location(s)[1] of Study	Cranfield University
School(s)	School of Management
Theme	Leadership and Management
Centre	Finance & Economics Centre
Course Director	Professor Catarina Figueira
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	N/A
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	MSc - part-time - maximum of 5 years PG Certificate – 3 years PG Diploma – 4 years
Course Start Month(s)	1 October 2018

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)

It is expected that this course will be accredited by the Chartered Banker Institute - discussions in progress to ensure that the course meets the requirements of the Institute. As a result, the students would obtain a Chartered Banker Diploma (professional qualification) as well as an MSc.

2. What are the aims of the course?

The PGDip/MSc in Retail 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 (PGDip) in Retail 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 Retail 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* (ie. 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 BlackBoard 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 Diploma (PG Dip) in Retail and Digital Banking

A PGDip will be awarded on successful completion of 130 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Modules 1-12	130
ELECTIVE MODULES:	
N/A	0
TOTAL:	130

The number of credits stated above is also required so the student can obtain the professional qualification ***Chartered Banker Diploma*** (130 credits) .

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.

To be eligible for the PG Certificate students must successfully complete Module 7 Retail Banking and Product Management.

B. MSc in Retail and Digital Banking

An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits

COMPULSORY MODULES:	
Modules 1-12 (one is a double module) Thesis (in-company project)	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***.

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).

NOTE – students aiming for the professional qualification must achieve a minimum mark of 50% in all modules.

6. How is the course structured?

[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%).

Part-time students register for the course in September and are expected to complete the course within 2-3 years.

7. Course Level Assessment Strategy[4]

[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 – Metro Bank – Cohort 1

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
1		MXR/ EFS Occ F	Economics of Financial Services	Prof Catarina Figueira	16		10	N		29/10/18	14/01/19	40	GCW	100				04/02/19	
2		MXR/ ACC Occ F	Accounting	Dr Matthias Nnadi	16		10	N		29/10/18	14/01/19	40	EX	100				28/01/19	
3		M-F/FMRE Occ F	Financial Markets, Regulation and Ethics	Dr Walter Gontarek	16	20	10	Y		04/02/19	29/04/19	40 40	IPRAC	70	MULTI 30	GPRS GPRS	15 15	04/03/19 29/04/19	

[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
4		MXR/ DIB Occ F	Digital Banking	Prof Catarina Figueira	16	20	10	N		04/02/19	29/04/19	40	ICW	100				13/05/19	
5		M-M/FIN Occ F	Financial Management	Dr Andrea Moro	16		10	Y		20/05/19	22/07/19	40	Ex	100				29/07/19	
6		MXR/ OBM Occ F	Organisational Behaviour for Managers	Professor Emma Parry	16		10	Y		20/05/19	22/07/19	40	ICW	100				26/08/19	
7		MXR/ RBM Occ F	Retail Banking and Product Management	Prof Catarina Figueira	32	40	20	N		09/09/19	30/03/20	40 40	EX ICW	60 40				27/04/20 18/11/19	
8		MXS/ GP1 Occ F	Group Project Challenge and Action Learning	Prof Catarina Figueira	16		10	Y		09/09/19	04/11/19	40			100 MULTI	GCW GPRES ICS	60 20 20	25/11/19 25/11/19 25/11/19	
9		MXM/ P2M Occ F	Programme and Project Management	Dr Steve Carver	20		10	Y		02/12/19	09/12/19	40			100 MULTI	GCW GPRAC	50 50	13/01/20 09/12/19	
10		MXR/ NPSD Occ F	New Product and Service Development	Dr Kader Aoufi	16		10	N		27/04/20	18/05/20	40	GCW	100				17/08/20	
11		M-T/MM T Occ F	Marketing Management	Professor Emma Macdonald	16		10	Y		22/06/20	20/07/20	40	ICW	100				19/06/20	

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
12		MXR/ MAM Occ F	Modelling & Analysis for Management	Dr Andy Angus/ Dr Costas Alexiou	16		10	N		06/01/20	30/03/20	40	GCW	100				11/05/20	
13		MXR/ THESIS Occ F	Thesis (workplace project)	Professor Catarina Figueira			70	N		06/01/20	21/09/20	50	THS	100				31/10/20	

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-F/ACC	Accounting	MSc Finance & Management	MSc Investment Management; MSc Retail & Digital Banking
M-F/ORG	Organisational Behaviour: Application	MSc Management	MSc Investment Management; MSc Retail & Digital Banking
M-F/FMRE	Financial Markets, Regulation and Ethics	MSc Finance & Management	MSc Investment Management; MSc Retail & Digital Banking
M-M/FIN	Financial Management	Full-time MBA	MSc Retail & Digital Banking
MXM/P2M	Programme & Project Management	Exec MBA	MSc Retail & Digital Banking
M-T/MMT	Marketing Management	MSc Management	MSc Management and Corporate Sustainability; MSc Management and Entrepreneurship; MSc Retail & Digital Banking
MXS/GP1	Group Project Challenge and Action Learning	MSc Business and Strategic Leadership	MSc Retail & 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 Financial Services	GCW	GCW			GCW					
Accounting						EX				
Financial Markets, Regulation and Ethics			ICW							
Digital Banking				ICW						
Financial Management						EX				

Award ILOs / Module No.	ILO 1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9.	ILO10
Organisational Management						ICW		ICW		
Retail Banking and Product Management	EX, ICW	EX, ICW		EX, ICW	EX, ICW			EX, ICW	EX, ICW	
Group Project Challenge and Action Learning							Multi	Multi		
Project and Programme Management							Multi	Multi		
New Product & Service Development				GCW			GCW			
Marketing Management				GCW	GCW					
Modelling & Analysis for Management									GCW	

A. Postgraduate Certificate in Retail & Digital Banking – Any 6 of the modules set out, including Retail Banking & Product Management

B. Postgraduate Diploma in Retail & Digital Banking – completion of the 12 modules set out

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

C. MSc in Retail & Digital Banking – completion of the 12 modules set out and a thesis.

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.	ILO9.	ILO10.
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: May 2020

1. What is the course?

Course information

Course Title	MSc in Robotics
Course code	MSRBTFTC, MSRBTPTC, PCRBTFTC (Registry to create PgDip code)
Academic Year	2020/21
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time, Part-time
Location(s)[1] of Study	Cranfield University
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Aerospace
Centre	Centre for Structures, Assembly and Intelligent Automation
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
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
Benchmark Statement(s)	N/A
Registration Period(s) available	Full-time MSc - one year, Part-time MSc – three years
Course Start Month(s)	October

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 course will apply for accreditation by IET and IMechE. This course is designed and developed in accordance to the Accreditation of Higher Education Programme Handbook.

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) Modules 2 & 3	0 20
ELECTIVE MODULES:	
4 modules from module 4-9	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:	
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]

[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

- **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.

Part-time students register for the course in October 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. For students with inadequate programming experience, it is recommended that they complete module 5 prior to module 7. 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. 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

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

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 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	N-RBT-IND	Induction week for Robotics MSc	Dr Gilbert Tang	12		0		05/10/20	05/10/20	09/10/20		AO						
2	N-RBT-FR	Fundamentals of Robotics	Dr Gilbert Tang	30		10		12/10/20	12/10/20	16/10/20	40	GCW	100				FT 13/11/20 PT 27/11/20	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 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	N-RBT-RC	Robotics Control	Seemal Asif	30		10		19/10/20	19/10/20	23/10/20	40	ICW	100				FT 04/12/20 PT 18/12/20	At the next available opportunity within the same academic year
4	N-RBT-AIML	Artificial Intelligence and Machine Learning for Robotics	Dr Karl Jenkins	30		10		09/11/20	09/11/20	13/11/20	40	ICW	100				FT 08/01/21 PT 22/01/21	At the next available opportunity within the same academic year
5	N-RBT-PMR	Programming Methods for Robotics	Dr Irene Moulitsas	20		10		23/11/20	23/11/20	27/11/20	40	ICW	100				FT 22/01/21 PT 05/02/21	At the next available opportunity within the same academic year
6	N-RBT-HRI	Human-Robot Interaction	Dr Gilbert Tang	24		10		14/12/20	14/12/20	18/12/20	40	GCW	100				FT 05/02/21 PT 19/02/21	At the next available opportunity within the same academic 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 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	N-RBT-MVR	Machine Vision for Robotics	Dr Zeeshan Rana	35		10		25/01/21	25/01/21	29/01/21	40	ICW	100				FT 26/02/21 PT 12/03/21	At the next available opportunity within the same academic year
8	N-RBT-ARS	Autonomy in Robotic Systems	Dr Luca Zanotti Fragonara	28		10		15/02/21	15/02/21	19/02/21	40	ICW	100				FT 19/03/21 PT 06/04/21	At the next available opportunity within the same academic year
9	N-RBT-PES	Psychology, Ethics and Standards	Dr Sarah Fletcher	30		10		11/01/21	11/01/21	15/01/21	40	EX	100				WEEK 4	At the next available opportunity within the same academic year
10a	N-RBT-GP	Group Project in Digital Robotics	Dr Gilbert Tang	30		40		01/03/21	01/03/21	14/05/21	50			100	GPROJ/ GPRES	80/ 20	14/05/21 14/05/21	N/A
10b	N-RBT-DISS	Dissertation in Digital	Dr Gilbert Tang	20		40		01/03/21	01/03/21	14/05/21	50	IPROJ	100				14/05/21	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
		Robotics																
11	N-RBT-THESIS	Individual Research Project	Dr Gilbert Tang	20		80		19/04/21	19/04/21	14/08/21	50			100	THESIS/ IPRES	80/ 20	20/08/21 14/08/21	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

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		

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
4	ICW			ICW			ICW		

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9
5	ICW								
6	GCW	GCW			GCW		GCW		GCW
7	ICW			ICW			ICW		
8	ICW	ICW					ICW		
9					EX				
10a	GPROJ/ GPRES	GPROJ/ GPRES	GPROJ/ GPRES	GPROJ/ GPRES	GPROJ/ GPRES	GPROJ/ GPRES	GPROJ/ GPRES	GPROJ/ 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.

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>

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: August 2020

1. What is the course?

Course information

Course Title	MSc in Safety and Human Factors in Aviation
Course code	MSSHAFTC, MSSHAPTC, PCSHAPTC
Academic Year	2020/21
Valid entry routes	MSc, PgCert
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time (MSc), Part-time (MSc, PgCert,)
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
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)	Not Applicable
Registration Period(s) available	Full-time all routes - one year, Part-time MSc & PGDip - up to three years, Part-time PgCert - two years
Course Start Month(s)	October (for full time students only in Academic Year 2020/21)

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:	
Module 1: Course Introduction Modules: 3, 4, 7 and 9	0 40
ELECTIVE MODULES:	
Any three 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: 15	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:

- 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

[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%).

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.

The MSc course consists of studying 7 compulsory modules, 2 optional modules, 2 group project modules 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 Certificate consists of studying three compulsory modules and then three other modules selected by the student from the remaining modules excluding the Capstone project.

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 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.

[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

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.

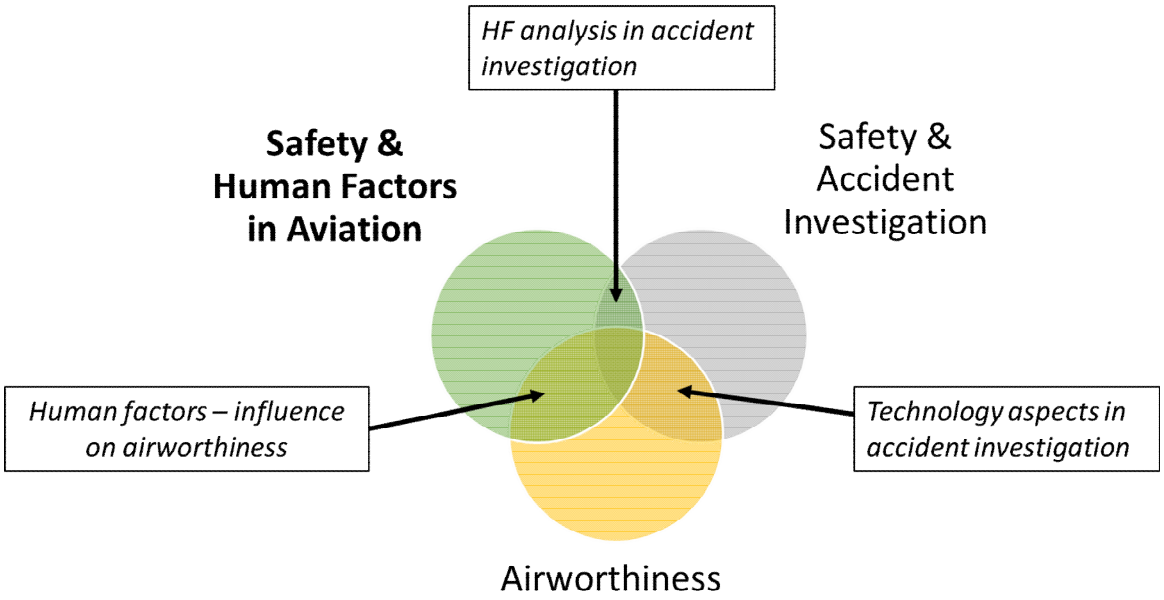

Figure 1 – Linkage between other courses in Centre

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 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	28/09/20	28/09/20	02/10/20	N/A	AO	N/A				N/A	N/A
2		N-HFS-IHF	Cognitive Ergonomics	Dr Jim Nixon	30	0	10	N	05/10/20	05/10/20	09/10/20	40	ICW	100				FT 09/11/20 PT 07/12/20	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 Submission and/or exam date[11]	Assessment / Exam Retake date
3		N-HFS-SAAS	Safety Assessment of Aircraft Systems	Dr Leigh Dunn	35	15	10	Y	11/01/21	11/01/21	15/01/21	50			100 MULTI	Integrated Assessment with N-HFS-ASA GPRES ICW	 30 70	 FT &PT 29/01/21 FT 01/03/21 PT 29/03/21	At the next available opportunity which may not be until the course runs the following year
4		N-HFS-HPE	Human Performance and Error	Dr Simon Place	30	10	10	N	19/10/20	19/10/20	23/10/20	50	ICW	100				FT 23/11/20 PT 04/01/21	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	02/11/20	02/11/20	06/11/20	40	ICW	100				07/12/20	At the next available opportunity which may not be until the course runs the following year
6		N-HFS-RMS	Research Methods	Dr Jim Nixon	30	0	10	Y	07/12/20	07/12/20	11/12/20	50	ICW	100				FT 11/01/21 PT 08/02/21	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 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 Submission and/or exam date[11]	Assessment / Exam Retake date
7		N-SAI-ISMS Occ C	Aviation Safety Management	Dr David Barry	30	10	10	Y	08/02/21	08/02/21	12/02/21	50	ICW	100				FT15/03/21 PT 12/04/21	At the next available opportunity which may not be until the course runs the following year
8		N-HFS-AAI	Aircraft Accident Investigation and Response	Dr Leigh Dunn	30	10	10	Y	12/04/21	12/04/21	16/04/21	40	ICW	100				FT17/05/21 PT 14/06/21	At the next available opportunity which may not be until the course runs the following year
9		N-HFS-ASA	Applied Safety Assessment	Dr Leigh Dunn	15	15	10	N	25/01/21	25/01/21	29/01/21	50			100 MULTI	Integrated Assessment with N-HFS-SAAS GPRES ICW	 30 70	 FT & PT 29/01/21 FT 01/03/21 PT 29/03/21	At the next available opportunity which may not be until the course runs the following year
10 A		N-HFS-SHCP20	Safety and Human Factors 'Capstone' Project	Prof G Braithwaite	10	0	20	N	26/04/21	26/04/21	07/05/21	40 40	GCW GPRES	70 30				FT & PT 07/05/21 FT & PT 07/05//21	At the next available opportunity which may not be until the course runs

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 Submission and/or exam date[11]	Assessment / Exam Retake date
																			the following year
10 B		N-HFS-SHFCP	Safety and Human Factors 'Capstone' Project (only for part-time students who registered before October 2020)	Prof G Braithwaite	10	0	10	N	26/04/21	26/04/21	07/05/21	40 40	GCW GPRES	70 30				FT & PT 07/05/21 FT & PT 07/05/21	10
11		N-HFS-TS	Training and Simulation*	Dr Wen-Chin Li	30	2	10	N	22/02//21	22/02/21	26/02/21	40	ICW	100				FT 29/03/21 PT 26/04/21	At the next available opportunity which may not be until the course runs the following year
12		N-HFS-HFAM	Human Factors in Aviation Maintenance*	Cengiz Turkoglu	30	10	10	Y	22/03/21	22/03/21	26/03/21	40	ICW	100				FT 26/04/21 PT24/05/21	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 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 Submission and/or exam date[11]	Assessment / Exam Retake date
13		N-HFS-FDM Occ A	Flight Data Monitoring	Dr David Barry	25	22	10	Y	08/03/21	08/03/21	11/03/21	40	ICW	100				FT 12/04/21 PT 10/05/21	At the next available opportunity which may not be until the course runs the following year
14		N-HFS-WJD	Work and Job Design*		30		10	N	NOT CURRENTLY AVAILABLE			40	ICW	100				N/A	N/A
15		N-HFS-THESIS	Individual Research Project (MSc)	Dr Jim Nixon	20	0	80	N	05/10/2020	05/10/2020	03/09/21	50	THESIS	100				06/09/21	

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
N-HFS-HFAM	Human Factors in Aviation Maintenance	Safety and Human Factors in Aviation	Airworthiness Military Aerospace and Airworthiness Safety and Accident Investigation
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.

The course uses a range of assessment types. Students can expect to have two written examinations, ten pieces of assessment by submitted work and three elements of assessment by presentation or viva.

Students are subject to two forms of assessment with regard to 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 their presentation is organised, the quality of their individual presentations and visual aids and how well they are able to answer questions from the audience. Both forms of assessment have an equal weighting with regard to the module mark.

The thesis is assessed using a combination of their written work and an oral poster presentation. The oral poster presentation provides an opportunity for each student to present their thesis to members of staff,

visiting aviation professionals and the external examiner. These oral presentations are judged on the basis of the quality of the presentation in terms of content and visual aids, how well the key findings and other important elements of the research been communicated and how well the student has responded to questions from the audience

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	GPRES		
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	GPRES		
10				GCW	GPRES		
11	ICW	ICW	ICW			ICW	
12	ICW	ICW	ICW			ICW	
13	ICW	ICW				ICW	
14	ICW	ICW				ICW	ICW
15							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.

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: August 2020

1. What is the course?

Course information

Course Title	MSc in Strategic Marketing
Course code	MSSTMFTC, PDSTMFTC, PCSTMFTC
Academic Year	2020/21
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 Ahmed Shaalan
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. MSc

An MSc will be awarded on successful completion of 200 credits as outlined below:

Description	Credits
COMPULSORY MODULES:	
Modules 1-11 Thesis (12)	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.
- **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

---

[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

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.

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 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		M-K-SMP	Strategic Marketing and Planning	Dr Ahmed Shaalan	20		10	N	05.10.20	05.10.20	14.10.20	40 40	Integrated assessment ICW 50% GPRE 50%						
2		M-K/MCP	Marketing Consulting Project	Prof Stan Maklan	20		10	N	03.05.21	07.05.21	07.05.21							16.11.20 07.05.21	
3		M-K-AFS	Accounting and Finance for Strategic Marketing	Dr Simon Templar	20		10	N	20.04.21	26.04.21	26.04.21								

[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	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
4		M-K/MBS	Managing Brands	Dr Dennis Esch	20		10	N	14.10.20	14.10.20	30.10.20	40 40	Integrated assessment						
5		M-K/IMC	Integrated Marketing Communications	Dr Tamira King	20		10	N	20.10.20	20.10.20	19.11.20		ICW 70% GPRES 30%					11.01.21 16.12.20 17.12.20	
6		M-K/DIR	Digital and Social Media Marketing	Dr Annmarie Hanlon	20		10	N	09.11.20	09.11.20	18.11.20								
7		M-K/ROM	Retailing and Omnichannel Management	Dr Tamira King	20		10	N	26.01.21	26.01.21	16.02.21	40	Integrated Assessment					16.03.21	
8		M-K/CRM	Customer Relationship Marketing and Customer Experience	Dr Tamira King	20		10	N	12.01.21	12.01.21	02.02.21		ICW 100%						
9		M-K/CKM	B2B Customer and Key Account Management	Dr Beth Rogers	20		10	N	12.01.21	12.01.21	22.01.21	40	Integrated Assessment					22.03.21	
10		M-K/SKM	Sales Management	Dr Beth Rogers	20		10	N	12.01.21	22.01.21	22.01.21		ICW100%						

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
11		M-K-BIA	Big Data, Insights and Analytics	Prof Stan Maklan	60		30	N	23.11.20	23.11.20	19.04.21	40	EX ICW	60 40				EWeek 6 08.06.21	
12		M-K/THS	Thesis – review and submission process	Dr Ian Crawford	10		70	N	N/A	10.05.21	10.09.21	50	THESIS	100				10.09.21	

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 MCP	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
3 AFS	✓	✓	✓		✓	✓		✓	✓		✓	✓
4 MBS	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
5 MKC	✓	✓	✓		✓	✓		✓	✓		✓	✓
6 DIR	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
7 ROM	✓	✓	✓	✓	✓	✓		✓			✓	✓
8 CRM	✓	✓	✓	✓	✓	✓		✓			✓	✓
9 CKM	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
10 SKM	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
11 BIA	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12 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; Marketing Consulting Project;	ICW GPRES	50 50
		ICW	70

	Accounting and Finance for Strategic Marketing Managing Brands; Integrated Marketing Communications; Digital and Social Media Marketing;	GPRES	30
Integrated Assessment	Retailing and Omnichannel Management; Customer Relationship Marketing and Customer Experience;	ICW	100
Integrated Assessment	B2B Customer and Key Account Management; Sales Management	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:	16/10/19

1. What is the course?

Course information

Course Title	Systems Engineering
Course code	MSSEEPTC, PDSEEPTC, PCSEEPTC, MSSEEPAC
Academic Year	2020-21
Valid entry routes	MSc and PgDip
Additional exit routes	PgCert, PgDip
Mode of delivery	Part-time Blended Learning
Location(s)[1] 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?[2]	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
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	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 (or more) through the assessment of taught modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Induction Introduction to Systems and Systems Engineering Enterprise Management Problem Analysis and System Definition System Design and Realisation	0 10 10 10 10
ELECTIVE MODULES:	
20 credits from the advanced modules 5, 6 or 8 -12	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:	
Induction Introduction to Systems and Systems Engineering Enterprise Management Problem Analysis and System Definition System Design and Realisation System Design and Realisation Workshop Problem Analysis and System Definition Workshop Research Methods	0 10 10 10 10 10 10 10
ELECTIVE MODULES:	
50 credits from the advanced modules 8 - 12	50
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 Introduction to Systems and Systems Engineering Enterprise Management Problem Analysis and System Definition System Design and Realisation System Design and Realisation Workshop Problem Analysis and System Definition Workshop Research Methods	0 10 10 10 10 10 10 10
ELECTIVE MODULES:	
50 credits from the advanced modules 8 - 12	50
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); [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);

[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 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.

The Problem Analysis and System Definition Workshop and System Design and Realisation Workshop modules include extended residential workshops. These modules are delivered over a 12 week period including assessment. Workshops at the beginning and end of the modules allow for more extensive group working. These are combined with remote group working via the VLE to complete the group activities. The assessment of these modules combines group and individual elements. Details of workshops and assessment for each module are in the module descriptions.

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[4]

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

[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 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[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	Residential Start Date	Residential 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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
0	R-SEE-IND	Induction[12]	Mr Sean Price	3.5		0	N	07/09/20 (Sept 20 intake)	07/09/20	11/09/20 11/09/20 (Module End Date)	N/A	AO	n/a	N/A	N/A	N/A	N/A	N/A
1	R-SEE-ISSE	Introduction to Systems &	Mr Sean Price	30	0	10	Y	07/09/20 (Sept 20 intake)	07/10/20	08/10/20	50	ICW	100	N/A	N/A	N/A	04/01/21	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%.
[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.
[12] 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[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	Residential Start Date	Residential 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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
		Systems Engineering								01/01/21 (Module end date)								
2	R-SEE-PASD	Problem Analysis and System Definition	Mr Richard Adcock	25		10	Y	19/10/20 (Sept 20 intake)	25/11/20	26/11/20 01/01/21 (Module End Date)	50	ICW	100	N/A	N/A	N/A	04/01/21	TBC
3	R-SEE-PASDW	Problem Analysis and System Definition Workshop	Dr Steve Barker	40		10	N	15/02/21 Sept 20 intake)	22/02/21 24/03/21	26/02/21 25/03/21 23/04/21 (Module End Date)	50	ICW	100	N/A	N/A	N/A	26/04/21	TBC
4	R-SEE-EM	Enterprise Management	Mr Matthew Summers	25		10	Y	04/01/21 (Sept 20 intake)	04/02/21	06/02/21 23/04/21 (Module End Date)	50	ICW	100	N/A	N/A	N/A	26/04/21	TBC
5	R-SEE-SDR	System Design and Realisation	Dr Tim Ferris	25		10	Y	A:07/09/20 (Jan 20 intake)	A:09/10/20	10/10/20 01/01/21 (Module End Date)	50	ICW	100	N/A	N/A	N/A	A:04/01/21	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	Credits	Is the module shared? Y/N	Calendar			Assessment								
												Independent Assessment		Multi-part Assessment			Submission dates		
								Module Start Date	Residential Start Date	Residential 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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
								B:26/04/21 (Sept 20 intake)	B: 28/05/21	B:29/05/21 13/08/21 (Module End Date)							B:16/08/21	TBC
6	R-SEE-SSEL	Simulation in the Systems Engineering Lifecycle	Mr Sean Price	25		10	N	A:19/10/20 (Jan 20 intake)	A: 18/11/20	A:19/11/20 01/01/21 (Module End Date	50	ICW	100	N/A	N/A	N/A	A:04/01/21	TBC
								B:07/06/21 (Sept 20 intake)	B: 07/07/21	B:08/07/21 13/08/21 (Module End Date)	50	ICW	100	N/A	N/A	N/A	B:16/08/21	TBC
7	R-SEE-MS	Megaproject Systems	Mr Matthew Summers	30		10	N	This module will not run until academic year 21/22			50	MULTI		100%	GPRES GCW	60% 40%		TBC
8	R-SEE-SCSE	Software and Cyber Systems Engineering	Dr Raju Pathmeswaran	25		10	N	This module will not run until academic year 21/22			50	ICW	100	N/A	N/A	N/A		TBC
9	R-SEE-DR	Dependability and Resilience	Dr Tim Ferris	25	0	10	N	04/01/21	15/01/21 12/02/21	16/01/21 13/02/21	50	ICW	100	N/A	N/A	N/A	26/04/21	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	Credits	Is the module shared? Y/N	Calendar			Assessment							
												Independent Assessment		Multi-part Assessment			Submission dates	
								Module Start Date	Residential Start Date	Residential 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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
								(Jan 20 intake)		23/04/21 (Module End Date)								
10	R-SEE-HSE	Human Systems Engineering	Dr Fanny Camelia	25	0	10	N	15/02/21 (Jan 20 intake)	24/03/21	25/03/21 23/04/21 (Module End Date)	50	ICW	100	N/A	N/A	N/A	26/04/21	TBC
11	R-SEE-RM	Research Methods	Dr Steve Barker	10		10	N	26/04/21 (Jan 20 intake)	N/A	N/A 13/08/21 (Module End Date)	50	ICW	100	N/A	N/A	N/A	16/08/21	TBC
12	R-SEE-SDRW	System Design and Realisation Workshop	Dr Raju Pathmeswaran	40	0	10	N	07/06/21 (Jan 20 intake)	14/06/21 14/07/21	18/06/21 15/07/21 13/08/21 (Module End Date)	50	ICW	100	N/A	N/A	N/A	16/08/21	TBC
13	R-SEE-THESIS	Thesis	Mr Sean Price	50	0	80	N	This module will not run until Academic Year 21/22			50	THESIS	100	N/A	N/A	N/A	N/A	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-ISSE	Introduction to Systems and Systems Engineering	Systems Engineering MSc	Defence and Security Programme
R-SEE-EM	Enterprise Management	Systems Engineering MSc	Defence and Security Programme
R-SEE-PASD	Problem Analysis and System Definition	Systems Engineering MSc	Defence and Security Programme
R-SEE-SDR	System Design and Realisation	Systems Engineering MSc	Defence and Security Programme

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		
4		ICW		ICW
5		ICW		
6		ICW		
7				
8		ICW		ICW
9		ICW		ICW
10	ICW			
11		ICW		ICW
12			MULTI	
13				

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				ICW
3	ICW	ICW		ICW	
4		ICW	ICW		
5		ICW		ICW	ICW
6		ICW	ICW		ICW
7					ICW
8		ICW	ICW		
9		ICW		ICW	
10		ICW	ICW	ICW	
11		ICW	ICW		
12	MULTI	MULTI	MULTI		MULTI
13					

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	ICW	ICW			ICW
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 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: 17/03/2020

1. What is the course?

Course information

Course Title	Systems Engineering for Defence Engineering
Course code	MSSECFTR – PDSECFTR – PCSECFTR – MSSECPTR – PDSECPTR – PCSECPTR – MSSECPAR – PDSECPAR – PCSECPAR – SPSECPTR
Academic Year	2020-21
Valid entry routes	MSc, PgDip, PgCert, Short course for credit
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-time & Part-time
Location(s)[1] of Study	Shrivenham
School(s)	Cranfield Defence and Security
Theme	Defence and Security
Centre	Centre for Systems Engineering
Course Director	Dr Stephen Barker
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 Engineering Degree Apprenticeship
Is the Degree apprenticeship integrated or non-integrated?	Non-integrated
Is the Mastership offered as an open and/or closed course?	Open

[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; additionally an IELTS score of 7.0 is required by students for whom English is not a first language.
UK Qualifications Framework Level	QAA FHEQ level 7 (Masters)
Benchmark Statement(s)	N/A
Registration Period(s) available	A Part time student who registers for the PgCert will have a registration period of 3 years. For the PgDip this will be 4 years, and for the MSc 5 years. A Full time student who registers for the MSc will have a registration period of 1 year.
Course Start Month(s)	Course Withdrawn – no new students

Institutions delivering the course

This course is delivered by Centre for Systems Engineering where the research interests include:

systems analysis and development, systems thinking, architecture and test and evaluation.

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

- As the course is delivered at the Defence Academy, students have access to the facilities onsite and to current serving MOD military and civilian staff.
- Students can arrange to make visits to a number of military venues.
- 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 accredited formally by IMechE and IET until 2018.

2. What are the aims of the course?

Cranfield University offers this course in order to teach graduates the principles, procedures and practices of Systems Engineering in the defence context. It offers some choice and specialisation to students having different backgrounds, interests or specific requirements. The Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) entry and 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:

- recent graduates wishing to extend their knowledge and skills in the above areas
- experienced and or qualified engineers and scientists wishing to apply their skills in new areas
- the courses are targeted at people who will be able to add real value to the delivery of through-life defence capability in general and to their subsequent appointments in defence ministries, procurement and logistics agencies, defence science and technology organisations or defence industry in particular.

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. distinguish between systems and complex systems
- ILO 2. recognise complex systems and their associated problems
- ILO 3. design cost-effective, timely and effective complex systems
- ILO 4. defend adopting a systems approach over other methods of solving complex systems problems
- ILO 5. analyse the principal influences and constraints on the modern defence environment
- ILO 6. use Systems Engineering methods to explore defence lifecycle issues
- ILO 7. apply systems knowledge and systems thinking to the decision making process in relation to systems' problems in a constantly changing defence environment comprising people, doctrine, technology, time and budget
- ILO 8. formulate a Systems Engineering approach to Through Life Management Planning, Requirements Engineering, System Design, Trade- offs, Verification, Validation and Integrated Test and Evaluation
- ILO 9. assemble stakeholder needs and constraint, making appropriate use of requirements management techniques

B. Postgraduate Diploma

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

- ILO 10. analyse realistic problems which occur in a constantly changing defence environment (comprising people, doctrine, technology, time and budget) and may be solved using complex decision-making processes
- ILO 11. organise a tailored, whole system, through-life approach to explore a complex problem, using appropriate methods and tools
- ILO 12. judge the quality of Systems Engineering practices applied by industry and government in the defence environment
- ILO 13. propose a practical systems approach to accommodate both industrial and governmental ideology
- ILO 14. assess risk and uncertainty in complex systems
- ILO 15. propose suitable resources to mitigate risk and uncertainty in complex systems
- ILO 16. construct simple models, using modern techniques, tools and processes such as Synthetic Environments, to facilitate Defence Acquisition
- ILO 17. appraise Systems Engineering published work to justify and support their line of reasoning
- ILO 18. express effectively, through oral and written communication, their justified line of reasoning.
- ILO 19. critically analyse practical situations requiring complex decision-making to solve dynamic systems problems involving people, doctrine, technology, time and cost
- ILO 20. organise a balanced, whole system, through life approach and exploit appropriate methods and tools
- ILO 21. critically compare and contrast industrial best practices in Systems Engineering with Defence Acquisition and propose how to achieve a practical systems approach

C. MSc

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

- ILO 22. Recognise a complex Systems Engineering problem which can be solved using knowledge acquired during the taught phase of the course
- ILO 23. assess evidence gathered through self-directed research

ILO 24 defend the validity of their conclusions in relation to their chosen complex Systems Engineering problem

ILO 25. assemble evidence to support their line of reasoning and conclusions for their chosen complex Systems Engineering problem in conjunction with dependent and independent learning abilities

ILO 26. write a thesis to convey their problem, assessment, defence and conclusions associated with their identified complex Systems Engineering problem

4. How is the course taught?

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

- use of the 'Virtual Learning Environment' (VLE) to deliver additional resources such as online questionnaires, forums and quizzes will be added to supplement and augment those used in classroom based learning
- use of group exercises where students investigate topics while undertaking certain modules and then presenting their findings back to their peers and academics. Such group research would typically utilise on-site library facilities and the digital library access to the Defence Technology School, where military equipment is available and used for some modules
- discussion sessions regarding Systems Engineering theory and practice used in defence environments
- participation in the course by a range of students from serving Military Officers, civilian MOD employees and students from defence companies, both UK and Foreign, so providing a forum to raise current issues and comment on the latest developments from different perspectives
- the Systems Engineering for Defence Capability suite of courses benefit from having the provision of a Flexible Education Coordinator who provides guidance and support to students undertaking the different routes.

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:	
Systems Approach to Engineering Lifecycle Processes Introduction Lifecycle processes Advanced Applied Systems Thinking	10 10 10 10
ELECTIVE MODULES:	
Modules to the value of 20 credits, with no more than 10 credits selected from the DAM Electives selected from: Availability, Reliability, Maintainability and Support Strategy Capability Context	 10 10

Decision Analysis, Modelling and Support	10
Human Centric Systems Engineering	10
Model Based Systems Engineering	10
Networked and Distributed Simulation	10
Systems of Systems Engineering	10
Simulation and Synthetic Environments	10
Systems Engineering and Software	10
Systems Engineering Workshop	10
DAM ELECTIVES	
The International Dimensions of Defence Acquisition	10
Knowledge in Defence	10
Programme and Project Management	10
Supply Network Management in Defence and Commercial Environment	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:	
Systems Approach to Engineering	10
Lifecycle Processes Introduction	10
Lifecycle processes Advanced	10
Capability Context	10
Applied Systems Thinking	10
Advanced Systems Engineering Workshop	20
ELECTIVE MODULES:	
Modules to the value of 50 credits, with no more than 20 credits selected from the DAM Electives selected from:	
Availability, Reliability, Maintainability and Support Strategy	10
Decision Analysis, Modelling and Support	10
Human Centric Systems Engineering	10
Model Based Systems Engineering	10
Networked and Distributed Simulation	10
Systems of Systems Engineering	10
Simulation and Synthetic Environments	10
Systems Engineering and Software	10
Systems Engineering Workshop	10
DAM ELECTIVES	
The International Dimensions of Defence Acquisition	10
Knowledge in Defence	10
Programme and Project Management	10
Supply Network Management in Defence and Commercial Environment	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:	
Systems Approach to Engineering	10
Lifecycle Processes Introduction	10
Lifecycle processes Advanced	10
Capability Context	10
Applied Systems Thinking	10
Advanced Systems Engineering Workshop	20
Thesis	80
ELECTIVE MODULES:	
Modules to the value of 50 credits, with no more than 20 credits selected from the DAM Electives selected from:	
Availability, Reliability, Maintainability and Support Strategy	10
Decision Analysis, Modelling and Support	10
Human Centric Systems Engineering	10
Model Based Systems Engineering	10
Networked and Distributed Simulation	10
Systems of Systems Engineering	10
Simulation and Synthetic Environments	10
Systems Engineering and Software	10
Systems Engineering Workshop	10
DAM ELECTIVES	
The International Dimensions of Defence Acquisition	10
Knowledge in Defence	10
Programme and Project Management	10
Supply Network Management in Defence and Commercial Environment	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]

[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

- **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 as follows:

- MSc course within 48 weeks
- PgDip within a minimum of 24 weeks and a maximum of 40 weeks
- PgCert within a minimum of 12 weeks and a maximum of 20 weeks depending on the optional module chosen.

The course is also offered on a part-time basis. The MSc part-time variant is completed over a period of 3 to 5 years. Whilst students are registered for 5 years, the normal time to complete the taught phase of the course part-time is 3 years, with a minimum time of 2 years. For the PgDip the part-time variant is completed in 2 to 4 years; the maximum period of registration allowed is 4 years. For the PgCert the part-time variant is normally completed in 2 years; the maximum period of registration allowed is 3 years.

A 10 credit module is taught over a period of one week with 5 credit and 20 credit modules pro rata.

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%).

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[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 assessment[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
1	R-SEDC-SAE	Systems Approach to Engineering	Dr Tim Ferris	65		10	N	Module not running this academic year			50	ICW	100					
2	R-SEDC-LPI	Lifecycle Processes Introduction	Mr Rick Adcock	35		10	N	Module not running this academic year			50	ICW	100					

[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 assessment[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
3	R-SEDC-LPA	Lifecycle Processes Advanced	Dr Tim Ferris	35		10	N	Module not running this academic year			50 50	ICW ICW	100 100					
4	R-SEDC-CC	Capability Context	Mr Matt Summers	35		10	N	Module not running this academic year			50	ICW	100					
5	R-SEDC-AST	Applied Systems Thinking	Dr Steve Barker	60		10	N	Module not running this academic year			50 50	ICW GPRES	70 30					
6	R-SEDC-SEWN	Systems Engineering Workshop	Dr Raju Pathmeswaran	37		10	Y	14/12/20	11/01/21	15/01/21	40 ICW	 ICW	 70	30	GPRES GCW	10 20	15/01/21 15/01/21 22/02/21	TBC
7	R-SEDC-ASEW	Advanced Systems Engineering Workshop	Mr Jeremy Smith	100		20	N	A:05/10/20 B:12/04/21	02/11/20 10/05/21	13/11/20 21/05/21	50 50 50 50 50 50	GCW GPRES ICW GCW GPRES ICW	25 25 50 25 25 50				13/11/20 13/11/20 21/12/20 21/05/21 21/05/21 05/07/21	21/05/21 21/05/21 28/06/21 TBC 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[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 assessment[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
8	R-SEDC-ARMSS	Availability, Reliability, Maintainability & Support Strategy	Miss Laura Lacey	35		10	Y[11]	A:31/08/20 B:11/01/21	28/09/20 08/02/21	02/10/20 12/02/21	40 40	ICW ICW	100 100				09/11/20 15/03/21	15/03/21 TBC
9	R-SEDC-DAMS	Decision Analysis, Modelling and Support	Dr Ken McNaught	30		10	Y[12]	A14/09/20	12/10/20	16/10/20	40	ICW	100				23/11/20	TBC
10	R-SEDC-HCSE	Human Centric Systems Engineering	Ms Fanny Camelia	35		10	Y	A:26/10/20 B:08/02/21	23/11/20 15/03/21	27/11/20 19/03/21	40 40	ICW ICW	100 100				04/01/21 26/04/21	26/04/21 TBC
11	R-SEDC-MBSE	Model Based Systems Engineering	Dr Raju Pathmeswaran	40		10	N	15/03/21	12/04/21	16/04/21	40	ICW	100				24/05/21	TBC
12	R-AMOR-NDS	Networked and	Mr Jonathan Searle	32		10	Y	22/02/21	22/02/21	26/02/21	40	ICW	100				05/04/21	TBC

[11] This module shares a large proportion of its teaching with R-ESD-RSE but the assessment and ILOs are different.

[12] This module shares a large proportion of its teaching with R-AMOR-DA but the assessment and ILOs are different.

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 assessment[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
	Occ A	Distributed Simulation																
13	R-SEDC-SOSE	System of Systems Engineering	Dr Steve Barker	35		10	N	21/06/21	19/07/21	23/07/21	40	ICW	100				30/08/21	TBC
14	R-SEDC-SSE	Simulation and Synthetic Environments	Mr John Hoggard	30		10	Y[13]	A:17/08/20 B:21/12/20	14/09/20 18/01/21	18/09/20 22/01/21	40 40	ICW ICW	100 100				26/10/20 01/03/21	01/03/21 TBC
15	R-SEDC-SEAS	Systems Engineering and Software	Dr Raju Pathmeswaran	37		10	N	25/01/21	22/02/21	26/02/21	40	ICW	100				05/04/21	TBC
16	R-DAM-IDDA	The International Dimensions of Defence Acquisition	Dr Pete Ito	30	0	10	Y	28/12/20	25/01/21	29/01/21	40	ICW	100				08/03/21	21/22

[13] This module shares a large proportion of its teaching with R-AMOR-FMS but assessment and ILOs are different.

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 assessment[9]	Assessment Submission and/or exam date[10]	Assessment / Exam Retake date
17	R-DAM-MKIDA	Knowledge in Defence	Dr Roger Darby	30	0	10	Y	22/02/21	22/03/21	26/03/21	40	ICW	100				04/05/21	21/22
18	R-DAM-PPM	Programme and Project Management	Mr John McCormack	30	0	10	Y	31/05/21	28/06/21	02/07/21	40			100	ICW GCW	80 20	09/08/21 09/08/21	21/22
19	R-DAM-SNMCE	Supply Network Management in Defence and Commercial Environment	Mr Stuart Young	30	0	10	Y	17/08/20	07/09/20	10/09/20	40	ICW	100				19/10/20	21/22
20	R-SEDC-PSW	Thesis Selection Workshop	Dr Steve Barker	20	0	0	N	A:09/11/20 B:17/05/21	07/12/20 14/06/21	11/12/20 18/06/21		AO AO					N/A N/A	
21	R-SEC-THESIS	Thesis	Prof Emma Sparks	20	0	80	N	A:18/01/21 B:26/07/21	N/A N/A	18/02/22 26/08/22	50	THESIS	100				18/02/22 26/08/22	

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-AMOR-NDS	Networked and Distributed Simulation	Defence Simulation and Modelling (AMOR Programme)	Defence Simulation and Modelling
R-SEDC-HCSE	Human Centric Systems Engineering	Systems Engineering for Defence Capability	Defence Acquisition Management
R-SEDC-DAMS	Decision Analysis Modelling and Support	Systems Engineering for Defence Capability	Defence Acquisition Management
R-DAM-IDDA	The International Dimensions of Defence Acquisition	Defence Acquisition Management	Systems Engineering for Defence Capability Defence and Security Programme
R-DAM-MKIDA	Knowledge in Defence	Defence Acquisition Management	Systems Engineering for Defence Capability
R-DAM-PPM	Programme and Project Management	Defence Acquisition Management	Systems Engineering for Defence Capability
R-DAM-SNMCE	Supply Network Management in Defence and the Commercial Environment	Defence Acquisition Management	Systems Engineering for Defence Capability
R-SEDC-SEWN	Systems Engineering Workshop	Systems Engineering for Defence Capability	Defence and Security Programme

8. How are the ILOs assessed?

The course uses a range of assessment methods. Students can expect to have:

- assessed coursework
- three elements of assessment by Group presentation and Group Portfolio (during Applied Systems Thinking, Systems Engineering Workshop and Advanced Systems Engineering Workshop).

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. The thesis assessment can include a viva voce requested at the discretion of the Examination Board.

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	ILO 9
1		ICW		ICW	ICW	ICW	ICW		ICW
2			ICW					ICW	ICW
3	ICW	ICW		ICW	ICW	ICW	ICW	ICW	
4		ICW	ICW		ICW		ICW		
5	ICW GPRES	ICW GPRES		ICW GPRES	ICW GPRES	ICW GPRES	ICW GPRES		
6		ICW MULTI		ICW MULTI		ICW MULTI		ICW	ICW
7	ICW	ICW GPRES	ICW	ICW GPRES	ICW GPRES	ICW GPRES	ICW GPRES	ICW	ICW GPRES
8			ICW		ICW		ICW	ICW	
9			ICW			ICW	ICW	ICW	
10		ICW		ICW	ICW		ICW	ICW	ICW
11				ICW	ICW	ICW			
12		ICW	ICW		ICW		ICW		ICW
13	ICW	ICW		ICW	ICW	ICW			ICW
14	ICW	ICW	ICW		ICW	ICW	ICW	ICW	
15		ICW		ICW	ICW		ICW		
16					ICW				ICW
17					ICW				ICW
18		ICW		ICW	ICW		ICW		
19			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 10	ILO 11	ILO 12	ILO 13	ILO 14	ILO 15	ILO 16	ILO 17	ILO 18	ILO 19	ILO 20	ILO 21
1	ICW						ICW	ICW		ICW		
2		ICW						ICW	ICW	ICW	ICW	
3	ICW	ICW			ICW	ICW						
4	ICW							ICW	ICW			ICW
5	ICW GPRES				ICW GPRES	ICW GPRES	ICW GPRES			ICW GPRES		ICW GPRES
6			ICW		ICW		ICW		ICW	ICW	ICW	

Award ILOs / Module No.	ILO 10	ILO 11	ILO 12	ILO 13	ILO 14	ILO 15	ILO 16	ILO 17	ILO 18	ILO 19	ILO 20	ILO 21
					MULTI				MULTI			
7	ICW GPRES	ICW GPRES			ICW	ICW	ICW		ICW GPRES	ICW GPRES	ICW	
8	ICW						ICW		ICW	ICW	ICW	
9	ICW	ICW			ICW	ICW	ICW		ICW	ICW		
10	ICW		ICW	ICW				ICW	ICW	ICW		ICW
11	ICW	ICW					ICW			ICW		
12	ICW	ICW			ICW	ICW	ICW				ICW	
13	ICW	ICW			ICW	ICW				ICW		
14			ICW				ICW		ICW			
15	ICW		ICW							ICW		
16					ICW				ICW			
17					ICW				ICW			
18		ICW		ICW	ICW		ICW					
19			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 22	ILO 23	ILO 24	ILO 25	ILO 26
7	ICW GPRES		ICW	ICW	
9	ICW	ICW			
15	ICW				
21	THESIS	THESIS	THESIS	THESIS	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.

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: 03 Feb 2020

1. What is the course?

Course information

Course Title	Systems Thinking Practice
Course code	MSSTPPTC, MSSTPPAC, PDSTPPTC, PDSTPPAR, PCSTPPTC, SPSTPPTC
Academic Year	2020-2021
Valid entry routes	MSc, PgDip, PgCert and individual modules for credit
Additional exit routes	PgCert, PgDip
Mode of delivery	Part-time
Location(s)[1] of Study	Cranfield
School(s)	Cranfield Defence and Security
Theme	Defence and Security
Centre	Centre for Electronic Warfare, Information and Cyber
Course Director	Jeremy Hilton
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
Is the Degree apprenticeship integrated or non-integrated?	Non-integrated

[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
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, 2 years PgDip, 2 year PgCert
Course Start Month(s)	September 2020

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, Systems Engineering.

All our industrial 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 Mastership (set of modules for credit) has been specifically designed to address the needs of the Systems Thinking Apprenticeship Standard so that the capabilities of individuals and organisations will be enhanced. The exit route of PgDip is available for those who purely wish to meet the End Point Assessment requirements.

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. Two modules begin with a short residential period, and then continue to completion in the workplace. Four of the core modules are taught through our learning portal providing flexibility to the student. Two modules begin on-site, but are then completed through practice in the workplace, with remote mentoring by Cranfield Academic staff.

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 we are going to bring in commercial practitioners to enhance our teaching during the Introduction to Systems Methods and Dialogue and Collaboration modules. They will be supporting the academic teaching the module through the demonstration and discussion of their real-world experience and have no assessment role. In addition, due to the creative and diagrammatic aspect of being a practitioner, we will be involving an art teacher to enhance aspects of the Fundamentals of Systems Thinking module, especially with regard to both introducing ‘new ways of seeing’ and in improving students’ comfort in drawing rich pictures in a collaborative environment.

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 pre-prepared answers, peer review and direct staff

feedback. 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 students' backgrounds can range for those who are deeply technical to those with a creative and artistic preference. We have had some 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.

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 (or more) 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 Practice	10
Systems Leadership and Organisational Behaviour	10
ELECTIVE MODULES:	
Select one from:	
Formal Representation of Systems	10
Complex Systems	10
Systems Thinking for Social Change	10
TOTAL:	**60**

B. Postgraduate Diploma in Systems Thinking Practice

The accumulation of 120 credits (or more) 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 Practice	10
Systems Leadership and Organisational Behaviour	10
Systems Research Methods	10
Systems Thinking Development and Exploitation	40
ELECTIVE MODULES:	
Select one from:	
Formal Representation of Systems	10
Complex Systems	10
Systems Thinking for Social Change	10
Select one from:	
Philosophy and Theory of Systems Thinking	10
Architecting Enterprises	10
Requisite Variety for Organisations	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 Practice	10

Systems Leadership and Organisational Behaviour Systems Research Methods Systems Thinking Development and Exploitation Thesis	10 10 40 80
ELECTIVE MODULES:	
Select one from: Formal Representation of Systems Complex Systems Systems Thinking for Social Change Select one from: Philosophy and Theory of Systems Thinking Architecting Enterprises Requisite Variety for Organisations	 10 10 10 10 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.

[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 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?

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 2 years 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 Thinking Development and Exploitation which is worth 40 credits and has an indicative requirement for 400 hours of study in total, and the Thesis 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 the Introduction to Systems Methods, Systems Leadership and Organisational Behaviour and Systems Research Methods. The Introduction to Systems Methods module is a pre-requisite for Systems Practice and Systems Thinking Development and Exploitation. The following modules require 60 credits from prior modules: Philosophy and Theory of Systems Thinking, Architecting Enterprises, and Requisite Variety for Organisations.

Residential modules have a 2-week period of directed study, followed by a 1-week residential, then a 4-week coursework period. The exceptions are: the Fundamentals of Systems Thinking which has no prior directed study; the Systems Practice module has a 1-week period of directed study followed by a 2-day residential, then an 8-week coursework period; Systems Research Methods which has a 1-week directed study followed by 3-day residential, then an 8-week distance learning period, followed by a 4-week coursework period; and the Systems Thinking Development and Exploitation module has a 1-week directed study period prior to the course, followed by a 3-day residential and then a 28-week coursework and distance learning period. Distance learning modules comprise 12 weeks directed study followed by a 4-week coursework period.

Distance learning 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 3: Formal Representation of Systems; Complex Systems; and Systems Thinking for Social Change. In year 2, there are 2 core modules (one is 40-credit) and one elective from a choice of 5: Philosophy and Theory of Systems Thinking; Architecting Enterprises; Requisite Variety for Organisations; and whichever electives they did not choose in the first year. However, this option might result in the student studying two modules at once. All elective modules are distance learning modules

7. Course Level Assessment Strategy[4]

This course aim to develop Systems Thinking Practitioner skills and behaviours in addition to the academic focus of a Master's level qualification. These skills require proficiency in written communication and in the practical application of systems methods trough facilitated workshops.

[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 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 tutor 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 attributes. 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 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. 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 Research Methods and Systems Thinking Development and Exploitation) are supported by a number of formative tasks including group discussion, case studies, 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. On on-line modules, students will engage with interactive learning activities which incorporate 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 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.

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 module8 (%) 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	NEW MODULE R-STP-I	Induction	J Hilton	4	0	0	N	07/09/20	07/09/20	End of studies	N/A	AO						
1	NEW MODULE R-STP-FST	Fundamentals of Systems Thinking	J Hilton	30	0	10	N	07/09/20	07/09/20	11/09/20	50	ICW	100				12/10/20	TBA
2	NEW MODULE R-STP-ISM	Introduction to Systems Methods	Dr N Clewley	30	0	10	N	19/10/20	02/11/20	06/11/20	50	ICW	100				07/12/20	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%. 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.
[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 module8 (%) 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	NEW MODULE R-STP-DC	Dialogue and Collaboration	Dr A Witheridge	30	0	10	N	01/03/21	15/03/21	19/03/21	50	ICW	100				16/04/21	TBA	
4	NEW MODULE R-STP-SP	Systems Practice	J Hilton	15	0	10	N	21/06/21	05/07/21	09/07/21	50	ICW	100				20/08/21	TBA	
5	NEW MODULE R-STP-SLO	System Leadership and Organisational Behaviour	L Dodd	20	0	10	N	12/04/21	12/04/21	30/07/21	50	ICW	100				30/07/21	TBA	
6	NEW MODULE R-STP-FRS	Formal Representation of Systems	Dr N Clewley	30	0	10	N	23/11/20	23/11/20	22/03/21	50	ICW	100				22/03/21	TBA	
7	NEW MODULE R-STP-CS	Complex Systems	L Dodd	30	0	10	N	23/11/20	23/11/20	22/03/21	50	ICW	100				22/03/21	TBA	
8	NEW MODULE R-STP-STSC	Systems Thinking for Social Change	J Hilton	20	0	10	N	23/11/20	23/11/20	22/03/21	50	ICW	100				22/03/21	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 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 module8 (%) 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
9	NEW MODULE R-STP-SRM	Systems Research Methods	Dr A Witheridge	20	0	10	N	29/11/21	06/12/21	06/12/21	50	ICW	100				11/03/22	TBA
10	NEW MODULE R-STP-STDE	Systems Thinking Development and Exploitation	J Hilton	50	0	40	N	14/02/22	21/02/22	23/02/22	50 50	ICW1 ICW2	40 60				11/04/22 19/08/22	TBA TBA
11	NEW MODULE R-STP-PTST	Philosophy and Theory of Systems Thinking	S Price	20	0	10	N	13/09/21	13/09/21	24/12/21	50	ICW	100				24/12/21	TBA
12	NEW MODULE R-STP-AE	Architecting Enterprises	R Harris	20	0	10	N	13/09/21	13/09/21	24/12/21	50	ICW	100				24/12/21	TBA
13	NEW MODULE R-STP-RVO	Requisite Variety for Organisations	J Hilton	20	0	10	N	13/09/21	13/09/21	24/12/21	50	ICW	100				24/12/21	TBA
14	NEW MODULE R-STP-THESIS	Thesis	Dr A Witheridge	48	0	80	N	12/09/22	12/09/22	11/09/23	50 50	THESIS IPRES	70 30				11/09/23 Sep 2023	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

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 and written communication skills, so formative feedback is provided on verbal 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	ICW		
2	ICW		ICW
3		ICW	
4		ICW	ICW
5			ICW
6			ICW
7			ICW
8			ICW
Options	Choice of 6, 7 or 8 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
9	ICW	ICW				
10	ICW1	ICW1	ICW1	ICW2	ICW2	ICW2
11		ICW			ICW	ICW
12		ICW			ICW	ICW
13		ICW			ICW	ICW
Options	Choice of 11, 12 or 13 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
14	THESIS	THESIS	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 apprenticeship 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 Mastership 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: August 2020

1. What is the course?

Course information

Course Title	MSc and PgDip Thermal Power with options in: Aerospace Propulsion Gas Turbine Technology Power, Propulsion and the Environment Rotating Machinery Engineering and Management
Course code	MSTHPFTC, MSTPAFTC, PDTHPFTC, PDTPAFTC, PCTHPFTC, PCTPAFTC
Academic Year	2020/2021
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 Engineering
Course Director	Dr Theoklis Nikolaidis (October) / Dr Devaiah Nalianda (March) Programme Director (March and October) - Professor Pericles Pilidis
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No 56
Apprenticeship Standard the course is mapped to	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 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)	October and March

Institutions delivering the course

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

- Gas Turbine Engineering
- Turbomachinery and Icing
- Computational Aerodynamics
- Combustor Design and Low Emissions
- Technical Economic Environmental Risk Assessment

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 Royal Aeronautical Society (RAeS) and the Institution of Mechanical Engineers (IMechE) until October 2021.

2. What are the aims of the course?

Cranfield University offers this course in order 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. Examine 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. Adapt and deploy 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. Plan and deliver a substantial technical thesis demonstrating application of problem-solving, technical and/or communication skills to solve relevant problems, using appropriate methods and taking account of costs, ethics, management, environment impact and/or social effects of engineering.

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.
- Class room/online teaching.
- Supervisor support.

The Thermal Power 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, Fatigue and Fracture, 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)

In addition candidates have to complete a thesis worth 50% of the Thermal Power 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 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:	
3	20
ELECTIVE MODULES:	
Any modules from 1, 2, and 4 – 11 to the total value of 40 credits	40
TOTAL:	60

B. Postgraduate Diploma Gas Turbine Technology Option

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

Description	Credits
COMPULSORY MODULES:	
Modules 3	20
ELECTIVE MODULES:	
Modules chosen from modules 1,2,4,5,6,7,8,10,11 to the total value of 100 credits	100
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, 5, 6 Individual Research Project (12)	90 100
ELECTIVE MODULES:	
Modules chosen from modules 7, 8, 9, 10, 11 to the total value of 10 credits	10
TOTAL:	200

D. Postgraduate Diploma Aerospace Propulsion Option

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

Description	**Credits**
COMPULSORY MODULES:	
Module, 3	20
ELECTIVE MODULES:	
Modules chosen from modules 1,2,4,5,6,7,8,10,11 to the total value of 100 credits	100
TOTAL:	120

E. 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, 5, 6, 8 Individual Research Project (12)	100 100
ELECTIVE MODULES:	
N/A	
TOTAL:	200

F. Postgraduate Diploma Power, Propulsion and the Environment Option

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

Description	**Credits**
COMPULSORY MODULES:	
Module 3	20

ELECTIVE MODULES:	
Modules chosen from modules 1,2,4,5,6,7,8,10,11 to the total value of 100 credits	100
TOTAL:	120

G. 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, 10 Individual Research Project (12)	90 100
ELECTIVE MODULES:	
Modules chosen from modules 5, 7, 8, 9, 11 to the total value of 10 credits	10
TOTAL:	200

H. Postgraduate Diploma Rotating Machinery, Engineering and Management Option

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

Description	Credits
COMPULSORY MODULES:	
Module 3	20
ELECTIVE MODULES:	
Modules chosen from modules 1,2,4,5,6,7,8,10,11 to the total value of 100 credits	100
TOTAL:	120

I. 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, 5, 6, 10 Individual Research Project (12)	100 100

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; - 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.

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 Master's course in October or March and are expected to complete the course within 12 calendar months. All Thermal Power options are available for both entries. The PgDip courses are 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 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 permitting the student is able to 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 a number of 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 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. Blackboard) 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 of it and hence it is explained to students at the start of the Course, at induction. The course includes a diverse range of (Formative and Summative) assessments across the course depending on the particular subject being assessed, its particular delivery objectives and ILOs. These may therefore include written examinations, individual coursework, group coursework, individual presentations, group presentations, individual projects and thesis and group projects. These assessments are planned in advance to the start of the program and the students informed adequately on the requirements and schedules during the academic year.

The course begins with the first term, wherein the modules delivered 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

[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

assessments (for each module). The knowledge thus gained significantly aids in 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, if it is not within the compulsory modules in the option of his choice. 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 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 course management 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 are 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, Blackboard,). To ensure ethical integrity, promote self-awareness and personal proficiency, the student is required to normally submit assignment/report based work through a software to ensure no plagiarised information is included as part of the report. The work is then 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 criteria (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.

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 his 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.

October 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%	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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1	N-THP-C Occ A20	Combustors	Dr Vishal Sethi	30	13	10	N	15/03/21	15/03/21	02/06/21	40	EX	100				Exam Week 7	Exam Week 2
2	N-THP-ES Occ A20	Engine Systems	Dr Ioannis Roumeliotis	30	0	20	N	09/10/20	09/10/20	05/03/21	40			100	ICW IPRES	70 30	05/03/21	At the next available opportunity which will be approximately six months later
3	N-THP-GPSD	Gas Turbine Performance	Prof Pericles Pilidis	65	0	20	N	05/10/20	05/10/20	17/12/20	50	EX	100				Exam Week 2	Exam Week 7

[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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
	A20	Simulation and Diagnostics																	
4	N-THP-TBC Occ A20	Turbomachinery and Blade Cooling	Dr Pavlos Zachos	50	0	20	N	06/10/20	06/10/20	10/12/20	40	EX	100				Exam Week 2	Exam Week 7	
5	N-THP-MDT Occ A20	Mechanical Design of Turbomachinery	Dr Panos Laskaridis	30	0	10	N	06/03/21	06/03/21	01/06/21	40	EX	100				Exam Week 7	Exam Week 2	
6	G-MTI Occ B20	Management for Technology	Dr Richard Adams	27	0	10	Y	11/01/21	11/01/21	15/01/21	40	EX	100				18/01/21	At the next available opportunity which will be approximately six months later	
7	N-THP-CFDGT Occ A20	Computational Fluid Dynamics for Gas Turbines	Dr Joao Amaral Teixeira	30	N	10	N	02/11/20	02/11/20	20/11/20	40	ICW	100				29/01/21	At the next available opportunity which will be approximately six months later	
8	N-THP-PSPI Occ A20	Propulsion Systems Performance and Integration	Dr Devaiah Nalianda	30	4	10	N	01/02/21	01/02/21	12/02/21	40	EX	100				Exam Week 7	Exam Week 8/9	

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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
9	N-THP-FF Occ A20	Fatigue and Fracture	Dr Panos Laskaridis	25	7	10	N	NOT CURRENTLY AVAILABLE			40	EX	100				N/A	N/A
10	N-THP-GTORM Occ A20	Gas Turbine Operations and Rotating Machines	Dr Uyioghosa Igie	30	22	10	N	07/06/21	07/06/21	11/06/21	40	ICW	100				13/08/21	At the next available opportunity which will be approximately 1 months later
11	N-THP-JEC Occ A20	Jet Engine Control	Dr Theoklis Nikolaidis	30	13	10	Y	08/03/21	08/03/21	12/03/21	40	ICW	100				23/04/21	20/08/21
12	N-THP-THES/F Occ A20	Individual Research Project	Prof Pericles Pilidis	6		100	N	05/10/20	05/10/20	02/09/21	50	THESIS		100	THESIS ORAL	90 10	12/08/21 03/09/21	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

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	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 B20	Combustors	Dr Vishal Sethi	30	0	10	N	15/03/21	15/03/21	02/06/21	40	EX	100				Exam Week 7	Exam Week 2
2	N-THP-ES Occ B20	Engine Systems	Dr Yiguang Li	30	0	20	N	19/03/21	19/03/21	08/10/21	40			100	ICW IPRES	70 30	14/09/20 23/09/20	At the next available opportunity which will be approximately 6 months later
3	N-THP-GPSD Occ B20	Gas Turbine Performance, Simulation and Diagnostics	Prof Pericles Pilidis	65	0	20	N	15/03/21	15/03/21	21/05/21	50	EX	100				Exam Week 7	Exam Week 2

[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	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
4	N-THP-TBC Occ B20	Turbomachinery and Blade Cooling	Dr Pavlos Zachos	50	10	20	N	16/03/21	16/03/21	18/05/21	40	EX	100				Exam Week 7	Exam Week 2	
5	N-THP-MDT Occ B20	Mechanical Design of Turbomachinery	Dr Panos Laskaridis	30		10	N	06/03/21	06/03/21	01/06/21	40	EX	100				Exam Week 7	Exam Week 2	
6	G-MTI Occ B21	Management for Technology	Dr Richard Adams	27		10	Y	10/01/22	10/01/22	14/01/22	40	EX	100				17/01/21	At the next available opportunity which will be approximately 6 months later	
7	N-THP-CFDGT Occ B20	Computational Fluid Dynamics for Gas Turbines	Dr Joao Amaral Teixeira	30	14	10	N	21/06/21	21/06/21	02/07/2021	40	ICW	100				13/08/21	At the next available opportunity which will be approximately 6 months later	
8	N-THP-PSPI Occ B20	Propulsion System Performance and Integration	Dr Devaiah Nalianda	30	4	10	N	05/07/21	05/07/21	30/08/21	40	EX	100				Exam Week 8/9	Exam Week 7	
9	N-THP-FF Occ B20	Fatigue and Fracture	Dr Panos Laskaridis	25	7	10	N	NOT CURRENTLY AVAILABLE			40	EX	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[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	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
10	N-THP-GTORM Occ B20	Gas Turbine Operations and Rotating Machines	Dr Uyioghosa Igie	30	22	10	N	07/06/21	07/06/21	11/06/21	40	ICW	100				13/08/21	At the next available opportunity which will be approximately 6 months later
11	N-THP-JEC Occ B20	Jet Engine Control	Dr Theoklis Nikolaidis	30	13	10	N	21/06/21	21/06/21	02/07/21	40	ICW	100				20/08/21	At the next available opportunity which will be approximately 6 months later
12	N-THP-THES/F Occ B20	Individual Research Project	Prof Pericles Pilidis	6		100	N	15/03/21	15/03/21	03/02/22	50	THESIS		100	THESIS ORAL	90 10	06/01/22 03/02/22	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 Type for Thermal Power Award Options

Module Number	Module Code	Aerospace Propulsion	Gas Turbine Technology	Power Propulsion and the Environment	Rotating Machine, Engineering and Management		Joint with another MSc
1	N-THP-C	C	C	C	C		No
2	N-THP-ES	C (E for PgDip)	C (E for PgDip)	C (E for PgDip)	C		No
3	N-THP-GPSD	C	C	C	C		No
4	N-THP-TBC	C	C	C	C		No
5	N-THP-MDT	C (E for PgDip)	C (E for PgDip)	E	C		No
6	G-MTI	C	C	C	C		See below
7	N-THP-CFDGT	E - for PgDip only	E	E	C - for PgDip only		No
8	N-THP-PSPI	C (E for PgDip)	E	E	Not available		No
9	N-THP-FF	E - for PgDip only	E	E	C – for PgDip only		No
10	N-THP-GTORM	Not available	E	C (E for PgDip)	C		No
11	N-THP-JEC	E - for PgDip only	E	E	Not available		No
12	N-THP-THES/F	C – MSc only	C – MSc only	C – MSc only	C – MSc only		No

C - Compulsory; E – Elective;

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	Thermal Power	Computational and Software Techniques in Engineering Advanced Mechanical Engineering Advanced Chemical Engineering (General option and Biorefining option) Energy Informatics Energy Systems and Thermal Processes (Cranfield and Muscat) Offshore Engineering (Engineering option and Management option) Process Systems Engineering (Cranfield and Muscat) Renewable Energy Marine Structures (EngD)
N-THP-JEC Occ A	Jet Engine Control	Thermal Power	Shared teaching with Airworthiness (N-AW-FAEC)

8. How are the ILOs assessed?

The course uses a range of assessment strategies. Students can expect to have up to eight written examinations, four assessments by submitted assignment work and at least two elements of assessment by presentation or viva.

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

A. Postgraduate Certificate

Award ILOs / **Module No.**	ILO1	ILO2	ILO3
1		EX	EX

Award ILOs / Module No.	ILO1	ILO2	ILO3
2		ICW/IPRES	ICW/IPRES
3	EX	EX	
4		EX	EX
5		EX	EX
6		EX	
7			ICW
8	EX	EX	EX
9		EX	EX
10	ICW	ICW	ICW
11		EX	EX

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.	ILO4
1	EX
2	
3	EX
4	EX
5	EX
6	
7	ICW
8	EX
9	EX
10	ICW
11	EX

C. MSc

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

Award ILOs / Module No.	ILO5
12	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.

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: August 2020

1. What is the course?

Course information

Course Title	MSc in Through-life System Sustainment
Course code	MSTLSPTC, PDTLSPTC, PCTLSPTC, MSTLSPAC, PDTLSPAC, PCTLSPAC
Academic Year	2020/2021
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
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	Through-life Engineering Services Institute
Course Director	Dr John Erkoyuncu
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	N/A
Is this course offered as a Cranfield Mastership?	Yes
Apprenticeship Standard the course is mapped to	Through-life Engineering Services
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

[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, Through-life Engineering Services Institute where the research interests include:

Product-service systems and through-life engineering, and teaching interests include “through-life capability thinking”.

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

Teaching will also be provided by external speakers, mostly leading industry practitioners, but may also include invited lectures 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 course is accredited formally by the Institution of Mechanical Engineers (IMechE) and Royal Aeronautical Society until 2019/20.

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.

PgDip and PgCert exit routes are also intended for students who wish to access only parts of the course provided.

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 (Group project for MSc and PgDip only).

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). Modules in the academic year 2020/21 will take place online using WebEx.
- Industry experience days (with sponsoring companies).
- A multi-sector Group Project – supervised by Cranfield Academics.
- An Individual Project – supervised by Cranfield Academics for students pursuing an MSc only; OR
- An Individual Project- 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 Module 2 Any 5 Taught Modules from Modules 3-9	0 10 50
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 Modules 2-9 Group Project	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 Modules 2-9 Group Project Either: • Individual Research Project – for non-apprenticeship students • End Point Assessment – for apprenticeship students	0 80 40 80 80
ELECTIVE MODULES:	
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?

The course is offered only on a part-time basis and will normally run over 2 years. Students may be permitted to undertake the course over up to 5 years if necessary due to employer commitments.

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. The students have around six weeks to complete the assessment after module completion.

---

[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

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.

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 developing an 8000 word thesis.

The master level 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 (as in assessment method 1).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.

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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
1		I-TLS-INWK	Induction	Dr John Erkoyuncu	15		0	N	06/10/20	06/10/20	07/10/20	N/A	AO	N/A				N/A	
2		I-TLS-A1524	Managing Assets and Value	Prof Andrew Starr	32		10	N	19/10/20	19/10/20	30/10/20	40	ICW	100				07/12/20	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	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-TLS-ETLS	Through-Life Business Models and Servitisation	Matthew Caffrey	32		10	N	09/12/20	09/12/20	15/12/20	40	ICW	100				25/01/21	At the next available opportunity which may not be until the course runs the following year
4		I-TLS-A1525	Through-life System Effectiveness	Dr Maryam Farsi	10		10	N	01/02/21	01/02/21	05/02/21	40	ICW	100				15/03/21	At the next available opportunity which may not be until the course runs the following year
5		I-IVH-A1514	Diagnostics and Prognostics	Dr Muhammad Khan	24.75		10	N	22/03/21	22/03/21	01/04/21	40	ICW	100				04/05/21	At the next available opportunity which may not be until the course runs the following year
6		I-TLS-SNAM	Operational Availability and Risk	Dr Isidro Durazo Cardenas	30		10	N	10/05/21	10/05/21	21/05/21	40	ICW	100				21/06/21	At the next available opportunity which may not

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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
																			be until the course runs the following year
7		I-TLS-CENG-C20	Optimising Whole Life Cost and Performance Management	Dr Leigh Kirkwood	32		10	Y	05/07/21	05/07/21	16/07/21	40	ICW	100				16/08/21	At the next available opportunity which may not be until the course runs the following year
8		I-CE-A2012	Information Management	Dr Christos Emmanouilidis	32		10	N	13/09/21	13/09/21	24/09/21	40	ICW	100				25/10/21	At the next available opportunity which may not be until the course runs the following year
9		I-TLS-LSS	Leadership and Change Management	Dr Colin Pilbeam	32		10	N	01/11/21	01/11/21	12/11/21	40	ICW	100				13/12/21	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 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[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
10		I-TLS-GP	Group Project	Dr John Erkoyuncu	20		40	N	01/03/21	01/03/21	06/09/21	50			100	GCW GPRES ICW IPRAC	64 16 10 10	06/09/21 13/09/21 06/09/21 06/09/21	At the next available opportunity which may not be until the course runs the following year
11		I-TLS-THESIS	Individual Research Project	Dr John Erkoyuncu	20		80	N	07/03/22	07/03/22	05/09/22	50	THESIS OR	90 10				29/08/21 05/09/22	
12		I-TLS-EPA	End Point Assessment	Dr John Erkoyuncu	20		80	N	07/03/22	07/03/22	05/09/22	50	IPROJ OR	60 20	20	ICW IPRES OR	40 30 30	29/07/22 27/08/22 05/09/22 05/09/22 05/09/22	I-TLS-EPA

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

Open Cohort- April 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)	' Residential' Start Date	' Residential' End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
1	I-TLS-INWK	Induction	Dr John Erkoyuncu	15		0	N	06/04/21	06/04/21	07/04/21	N/A	AO	N/A				N/A	
2	I-TLS-A1524	Managing Assets and Value	Prof Andrew Starr	32		10	N	19/04/21	19/04/21	23/04/21	40	ICW	100				07/06/21	At the next available opportunity which may not be until the course runs the following year
3	I-TLS-ETLS	Through-Life Business Models and Servitisation	Matthew Caffrey	32		10	N	07/06/21	07/06/21	11/06/21	40	ICW	100				19/07/21	At the next available opportunity which may not be until the course

[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.
[16] For **multi-part assessments** please record the overall weighting of module which should be 100%.
[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)	' Residential' Start Date	' Residential' End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
																		runs the following year
4	I-TLS-A1525	Through-life System Effectiveness	Dr Maryam Farsi	32		10	N	19/07/21	19/07/21	23/07/21	40	ICW	100				06/09/21	At the next available opportunity which may not be until the course runs the following year
5	I-IVH-A1514	Diagnostics and Prognostics	Dr Muhammad Khan	32		10	N	01/11/21	01/11/21	05/11/21	40	ICW	100				20/12/21	At the next available opportunity which may not be until the course runs the following year
6	I-TLS-SNAM	Operational Availability and Risk	Dr Isidro Durazo Cardenas	32		10	N	10/01/22	10/01/22	14/01/22	40	ICW	100				28/02/22	At the next available opportunity which may not be until the course runs the following year
7	I-TLS-CENG	Optimising Whole Life	Dr Leigh Kirkwood	32		10	Y	28/02/22	28/02/22	04/03/22	40	ICW	100				19/04/22	At the next available opportunity

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)	' Residential' Start Date	' Residential' End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
		Cost and Performance Management																which may not be until the course runs the following year
8	I-CE-A2012	Information Management	Dr Christos Emmanouilidis	32		10	N	25/04/22	25/04/22	29/04/22	40	ICW	100				06/06/22	At the next available opportunity which may not be until the course runs the following year
9	I-TLS-LSS	Leadership and Change Management	Dr Colin Pilbeam	32		10	N	06/06/22	06/06/22	10/06/22	40	ICW	100				25/07/22	At the next available opportunity which may not be until the course runs the following year
10	I-TLS-GP	Group Project	Dr John Erkoyuncu	20		40	N	06/09/21	06/09/21	28/02/21	50			100	GCW GPRES ICW IPRAC	64 16 10 10	21/02/22 28/02/22 21/02/22	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[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)	' Residential' Start Date	' Residential' End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module15 (%) of	Weighting within module of multi-part	Type of Assessment	Weighting of individual elements of multi-part	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
11	I-TLS-THESIS	Individual Research Project	Dr John Erkoyuncu	20		80	N		06/10/22	03/04/23	50	THESIS OR	90 10				27/03/23 03/04/23	
12	I-TLS-EPA	End Point Assessment	Dr John Erkoyuncu	20		80	N		06/10/22	04/04/23	50	IPROJ OR	60 20	20	ICW IPRES OR	40 30 30	27/02/23 27/03/23 03/04/23 03/04/23 03/04/23	

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-TLS-CENG	Optimising Whole-life Cost and Performance Management	Through-life System Sustainment	Engineering Competence
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

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						
3	ICW	ICW						
4	ICW	ICW	ICW					
5	ICW	ICW		ICW				
6	ICW	ICW	ICW			ICW		
7		ICW			ICW		ICW	
8		ICW			ICW			

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8
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 IPRAC	GCW GPRES ICW IPRAC	GCW GPRES ICW IPRAC

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 OR	THESIS OR
12	IPROJ MULTI OR	IPROJ MULTI 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: May 2020

1. What is the course?

Course information

Course Title	Water and Sanitation for Development
Course code	MSWVDFTC, MSWVDPTC, PDWVDFTC, PDWVDPTC, PCWVDFTC, PCWVDPTC
Academic Year	2020/21
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 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	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	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: October. Part-time: throughout the year (October 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 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 2021.

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

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	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

B. Postgraduate Diploma

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

Description	Credits
COMPULSORY MODULES:	
Induction Water resource engineering Water, society and development Public health, hygiene and sanitation Resilience, shocks and emergencies Group Project (Full Time Students)	0 20 20 20 20 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 Water resource engineering Water, society and development Public health, hygiene and sanitation Resilience, shocks and emergencies Group Project (Full Time Students) Thesis project	0 20 20 20 20 40 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:

- 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?

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[4]

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 modules, independent coursework will be used to assess three modules, whilst one will have an examination. The assessments have been mapped against the course level ILOs to ensure they cover the core learning across the course. Summative assessment will be complimented by on-going formative assessment and feedback within modules.

Module	***Assessment Details***	***Course Level ILOs***
Water Resource Engineering	Individual Course Work - A report detailing recommendations for a village's water supply, max 8 pages plus appendices.	ILO1, ILO4
Water, Society and Development	Individual Course Work - Essay with 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 constrain contexts.	ILO1, ILO3, ILO4
Public Health, Hygiene and Sanitation	Individual Course Work - A written essay analysing the policy and practice of sanitation development in a selected case study city in the Global South. The essay should link this specific case study to current thinking on public health and urban sanitation generally (3000 word limit).	ILO2, ILO3, ILO4
Resilience, Shocks and Emergencies	Individual Course Work - An integrated Urban Resilience and Emergency Response planning document for a selected urban context in the Global South. This will take the form of a written assignment (3000 words max) that critically evaluates the students' ability to apply their conceptual understanding of resilience and emergency response to a real-life case study.	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	ILO 5

[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

	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 at the concluding Exhibition Day, 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
Individual Thesis Project	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[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-WAT-INWK	Induction Week	Jitka MacAdam	24		0	Y	05/10/20	05/10/20	09/10/20	N/A	AO	N/A				N/A	
2	I-WAM-WRE	Water resource engineering (Not running in 2020-21)	Alison Parker	60	6	20	Y	12/10/20	12/10/20	30/10/20	40	ICW	100				FT - 07/11/20 PT – 21/11/20	May 2021

[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-WAM-WSD	Water, society, and development (Not running in 2020-21)	Paul Hutchings	60	6	20	Y	09/11/20	09/11/20	27/11/20	40	ICW	100				FT - 05/12/20 PT – 19/12/20	May 2021	
4	I-WAM-PHHS	Public health, hygiene and sanitation (Not running in 2020-21)	Alison Parker	60	6	20	Y	07/12/20	07/12/20	15/01/21	40	ICW	100				FT - 23/01/21 PT – 06/02/21	May 2021	
5	I-WAM-RSE	Resilience, shocks, and emergencies (Not running in 2020-21)	Heather Smith	60	6	20	Y	25/01/21	25/01/21	12/02/21	40	ICW	100				FT - 20/02/21 PT – 06/03/21	May 2021	
Module 6 – Legacy students only																			
6	I-WAM-A1168	Emergency Water Supply and Environmental Sanitation	Toby Gould	30		10	N	25/01/21	25/01/21	12/02/21	40	ICW	100				PT – 06/03/21	May 2021	

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
PROJECTS																			
7	I-WAT-GRPP	Group Project	Jitka MacAdam	16		40	Y	22/02/21	22/02/21	07/05/21	50 50	GCW GPRES ICW RP	64 16 10 10				30/04/21-16.00hrs 04/05/21 08/05/2021 08/05/2021		
8	I-WAT-DISS	Individual Project (PT MSc and PgDip only)	Jitka MacAdam	10		40	Y	22/02/21	22/02/21	24/09/21	50	IPROJ IPRES	80 20				24/09/2021 Week commencing 20/09/2021		
9	I-WAT-THESIS	Individual Thesis	Jitka MacAdam	20		80	Y	10/05/21	10/05/21	10/09/21	50	THESIS OR	90 10				06/09/21 – 16.00hrs Week commencing 24/08/21 and 31/08/21		Sept 2022

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-WAM-WRE	Water resource 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

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) or examination in January;
- 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

Award ILOs / Module No.	ILO1	ILO2	ILO3	ILO4
3	ICW		ICW	ICW
4		ICW	ICW	ICW
5	ICW	ICW		ICW
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
7	GCW GPRES ICW RP
8	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
9	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)

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: 26/01/16 – May 2020

1. What is the course?

Course information

Course Title	Water and Wastewater Engineering
Course code	MSWWEFTC, MSWWEPTC, PDWWEFTC, PDWWEPTC, PCWWEFTC, PCWWEPTC
Academic Year	2020-21
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. Yadira Bajón Fernández
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	•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.
- The course has defined feeder streams from other institutions, including significant sponsorships.

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 2021.

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 practical's to deliver optimum solutions to specified process design briefs. The practical sessions will be live streamed 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 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.

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	0
Science and engineering principles in water and wastewater treatment	30
Treatment processes for water and wastewater	30
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:	
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 Individual 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) Individual Research Project	0 30 30 20 40 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:

- 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 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. Instead they are offered individual guidance on the best sequence of study based on their prior knowledge and availability to attend. For part time students who join the course after the induction week module, a recording and presentations are made available.

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.

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 or study for an exam).

7. Course Level Assessment Strategy[4]

[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

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, whilst in addition one will be assessed by examination in addition to the individual assignment. These combinations of assessments have been selected to accommodate the diversity in the topics covered in WWE and to support students in developing a variety of master's level skills. All modules are supported by a number of formative tasks including group discussion, case studies and oral presentations; with formative feedback provided by the lecturers in the class.

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	Individual course work - Assignment comprising a series of questions (8-10) on the different topics covered in this module to be answered in an individual report (maximum 5000 words). The answers to these questions will include both descriptive parts and mathematical and engineering calculations.	ILO1, ILO3
Treatment processes for water and wastewater	Exam - The assessment will consist of an exam (15 credits) weighting individually 50% of the module marks This will be an open notes examination including a series of questions requiring a combination of descriptive and mathematical solutions. The remaining 15 credits and other 50% of the module marks are obtained through an individual assignment. This assignment will cover wastewater water treatment This will feature designing a wastewater treatment plant requiring a combination of descriptive, mathematical solutions and costing	ILO 1, ILO2, ILO3
Water and wastewater assets: lifecycles, risks and futures	Individual coursework - Report evaluating information related to a specific treatment works and recommending a strategy based around 'future - proofing' of the site (maximum 5000 words)	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 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 at the concluding Exhibition Day, 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	ILO 5

	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
Individual Thesis Project	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 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-WAT-INWK	Induction Week	Jitka McAdam	24		0	Y	05/10/20	05/10/20	09/10/20	N/A	AO	N/A				N/A	
2	I-WSC-SEP	Science and engineering principles in water and wastewater treatment	Marc Pidou	90		30	Y	12/10/20	12/10/20	17/11/20	40	ICW	100				FT 21/11/20 PT 05/12/20	May 2021

[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-WSC-TPWW	Treatment processes for water and wastewater	Francis Hassard	90		30	Y	23/11/20	23/11/20	21/01/20	40	ICW EX	50 50				FT 23/01/21 PT 06/02/21 Week commencing 22/02/21	May 2021
4	I-WSC-A1099	Water and wastewater assets: lifecycles, risks and futures	Jitka MacAdam	60		20	Y	25/01/21	25/01/21	19/02/21	40	ICW	100				FT 20/02/21 PT 06/03/21	May 2021
Modules 5 to 9 – Legacy students only																			
5	I-WSC-A1096	Water and Wastewater Treatment Principles	Irene Carra Ruiz	30		10	Y	12/10/20	12/10/20	23/10/20	40	ICW	100				PT – 14/11/20	May 2021
6	I-WSC-A1093	Process Science and Engineering	Marc Pidou	30		10	N	27/10/20	27/10/20	06/11/20	40	ICW	100				PT- 28/11/20	May 2021
7	I-WSC-A1507	Hydraulics and Pumping Systems	Imma Bortone	27		10	Y	09/11/20	09/11/20	17/11/20	40	ICW	100				PT – 05/12/20	June 2021

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
8	I-WSC-A1089	Chemical Processes	Emma Goslan	30		10	Y	24/11/20	24/11/20	19/01/21	40	EX	100				Exam week 4 - Week commencing 22/03/21	May 2021
9	I-WSC-A1092	Physical Processes	Peter Jarvis	30		10	Y	23/11/20	23/11/20	04/12/21	40	EX	100				Exam week 4 - Week commencing 22/03/21	May 2021
PROJECTS																			
10	I-WAT-GRPP	Group Project	Jitka MacAdam	16		40	Y	22/02/21	22/02/21	07/05/21	50 50	GCW GPRES ICW RP	64 16 10 10				30/04/21 - 16.00hrs 04/05/21 08/05/21 08/05/21	
11	I-WAT-DISS	Individual Project (PT MSc and PgDip only)	Jitka MacAdam	10		40	Y	22/02/21	22/02/21	24/09/21	50	IPROJ IPRES	80 20				24/09/21 Week commencing 20/09/21	
12	I-WAT-THESIS	Individual Research Project	Jitka MacAdam	20		80	Y	10/05/21	10/05/21	10/09/21	50	THESIS	90				06/09/21 – 16.00hrs	Sept 2022

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
												OR	10				Week commencing - 24/08/21 and 31/08/21	

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-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
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
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
I-WSC-A1096	Water and Wastewater Treatment Principles	Water and Wastewater Engineering	Water Infrastructure and Resilience (WIRe) CDT
I-WSC-A1507	Hydraulics and Pumping Systems	Water and Wastewater Engineering	Water Infrastructure and Resilience (WIRe) CDT
I-WSC-A1089	Chemical Processes	Water and Wastewater Engineering	Water Infrastructure and Resilience (WIRe) CDT
I-WSC-A1092	Physical Processes	Water and Wastewater Engineering	Water Infrastructure and Resilience (WIRe) CDT

8. How are the ILOs assessed?

The following assessment types are utilised:

The course uses a range of assessment types. Students can expect to have a maximum of 1 written examination, a maximum of 5 pieces of assessment by submitted work and 3 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) or examination;
- 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 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 in Water and Wastewater Engineering

Award ILOs / Module No.	ILO 1.	ILO 2.	ILO 3.
1			
2	ICW		ICW
3	ICW EX	ICW EX	ICW EX

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	ICW	ICW	ICW	
6	ICW	ICW		
7			ICW	ICW
8	EX	EX	EX	EX
9	EX	EX	EX	EX
10				GCW GPRES ICW RP
11				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
12	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 2020

1. What is the course?

Course information

Course Title	Weapons and Vehicle Systems Programme [Military Vehicle Technology (MVT) and Gun Systems Design (GSD)]
Course code	MSMVTFTR–PDMVTFTR-PCMVTFTR MSMVTPTR–PDMVTPTR-PCMVTPTR MSGSDFTR–PDGSDFTR–PCGSDFTR MSGSDPTR–PDGSDPTR-PCGSDPTR
Academic Year	2020/2021
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	MSc, PgDip, PgCert
Mode of delivery	Full-time and Part-time
Location(s)[1] of Study	Shrivenham
School(s)	Cranfield Defence and Security
Theme	N/A
Centre	Centre for Defence Engineering
Course Director	Mr Dave Simner
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

[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?	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 formally by the Institute of Mechanical Engineers (IMechE) until the 2023 intake and the Institution of Engineering and Technology (IET) until 2022.

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

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 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: FoB and WST	20
ELECTIVE MODULES	
Modules to make up 40 credits, excluding MVD or MVP modules	40
TOTAL:	**60**

B. 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, FEE, FoB, WST, ED, Surv., MVP&D, 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, FEE, FoB, WST, ED, Surv., MVP&D, VSI and AFVWSS Module GSD Project	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:	
Modules MVD or MVP Plus one of modules Surv., UMVS, VSI or RSE	20 10
ELECTIVE MODULES:	
Modules to make up 30 credits, excluding module 5	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, FEE, WST, Surv., VSI and AFVWSS Module: MVD and MVP	0 60 40
ELECTIVE MODULES	
Modules to make up 20 credits	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, FEE, WST, Surv., VSI and AFVWSS	0 60

Module: MVD and MVP Project	40 80
ELECTIVE MODULES	
Modules to make up 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:

- 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?

Please see the course structure document for details on the individual elements of the course.
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:

[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%).

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[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
Written reports related to experimental 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.

[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
SEPTEMBER 2020 – ADMISSIONS DAY FOR THE COURSE – MONDAY 7th																		
1	R-ESD-IS	Introductory Studies	Dave Simner	30		0	N	N/A	07/09/20	07/09/20	N/A	N/A					N/A	N/A
2	R-ESD-CAD	Solid Modelling and CAD	Alan Peare	30		0	N	N/A	14/09/20	18/09/20	N/A	N/A	N/A				N/A	N/A
3	R-ESD-MSC	Modelling Simulation and Control	Thiru Thirulogasingam	35		10	Y	N/A	21/09/20	25/09/20	50	ICW OR	75 25				05/10/20 FT 19/10/20 PT	By individual arrangement

[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
																	30/11/20	
4	R-ESD-WST	Weapon Systems Technology	Hugh Goyder	30	0	10	Y	N/A	28/09/20	02/10/20	40	ICW	100				09/11/20 FT 23/11/20 PT	By individual arrangement
OCTOBER 2019: – Private Study Week 19th – 23rd October (Note That Monday 19th October May Be Used As A Presentation Day For The Msc Module.)																		
5	R-ESD-FB	Fundamentals of Ballistics	Clare Knock	32	0	10	Y	N/A	05/10/20	09/10/20	50	EX	100				10/12/20	By individual arrangement (Block 2)
6	R-ESD-FE	Finite Elements in Engineering	Shaun Forth	30	0	10	Y	N/A	12/10/20	16/10/20	40	ICW	100				18/01/21FT 01/02/21 PT	By individual arrangement
7	R-ESD-MVD	Military Vehicle Dynamics	Ajay Kumar	70	0	20	N	N/A	26/10/20	30/10/20	50 50	ICW EX	50 50				25/01/21 FT 08/02/21 PT 11/12/20	By individual arrangement (Block 2)
8	R-ESD-GSD	Ordnance Design	Steve Champion	70	0	20	N	N/A	26/10/20	06/11/20	50	ICW	100				08/03/21 FT 22/03/21 PT 28/06/21 (L)	By individual arrangement
NOVEMBER 2020: – Private Study Weeks: 9th – 13th November (All); 16th – 27th November (GSD)																		

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
9	R-ESD-MVP	Military Vehicle Propulsion	Dave Simner	70	0	20	N	N/A	16/11/20	27/11/20	50	ICW	100				15/02/21 FT 01/03/21 PT	
10	R-ESD-SURV	Survivability	Gareth Appleby-Thomas	35	0	10	Y	N/A	30/11/20	04/12/20	50	ICW	100				15/02/21 FT 01/03/21 PT	By individual arrangement
December 2020: Block 1 Examinations 7th – 11th December – Official timetable will be published by Registry Christmas Break Friday 18th December 2020 – 1st January 2021 inc																		
11	R-ESD-ED	Element Design	Dave Simner	35	0	10	Y	N/A	14/12/20	18/12/20	50	ICW	100				01/03/21 FT 15/03/21 PT	By individual arrangement
JANUARY 2021																		
12	R-ESD-MVPD	Military Vehicle Propulsion and Dynamics	Dave Simner	32	0	10	Y	N/A	11/01/21	15/01/21	50	ICW	100				22/02/21	By individual arrangement
13	R-MAA-GW Occ A	Guided Weapons	Derek Bray	32	0	10	Y	N/A	11/01/21	15/01/21	50	ICW	100				15/03/21	By individual arrangement
14	R-ESD-UMVS	Uninhabited Military Vehicle Systems	John Economou	35	0	10	N	N/A	25/01/21	29/01/21	50	ICW	100				08/03/21	By individual arrangement
15	R-MAA-MA	Military Avionics	Alessio Balleri			10	Y	N/A	25/01/21	29/01/21	50	ICW	100				23/03/21	By individual arrangement

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
16	R–ESD-VSI	Vehicle Systems Integration	David Diskett	35	0	10	Y	N/A	01/02/21	05/02/21	50	ICW	100				15/03/21 FT 29/03/21 PT	By individual arrangement
FEBRUARY 2021																		
17	R-ESD-RSE	Reliability and Systems Effectiveness	Aimee Helliker	29	0	10	Y	N/A	08/02/21	12/02/21	50	ICW	100				22/03/21	By individual arrangement
18	R-EOS-RMP	Rocket Motors and Propellants	Phil Gill and Derek Bray	28	0	10	Y	N/A	08/02/21	12/02/21	50	EX	100				14/04/21	15/06/21
19	R-ESD-LWD	Light Weapon Design	Steve Champion	34	0	10	N	N/A	22/02/21	26/02/21	50 50	OR EX	20 80				26/02/21 25/03/21	By individual arrangement
MARCH 2021: Part of March, April, May and June – PROJECT – (Hand In Date Is July -See Below) **APRIL 2021: Block 2 Examinations late March/Early April - Official Timetable will be confirmed by Registry on the VLE (RM&P and LWD only)** **Easter Break: Good Friday – 2nd** April 2021 & Easter Monday – 5th April 2021																		
20	R-ESD-AFVWS	Armoured Fighting Vehicle and Weapon	David Diskett	35	0	10	N	N/A	13/07/21	23/07/21	50	ICW	100				26/07/21	By individual arrangement

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
		Systems Study																
21	R-ESD-THESIS	Thesis	Dave Simner	10	0	80	N	N/A	01/03/21	12/07/21	50	THESIS	100				12/07/21 FT 01/09/21 PT	By individual arrangement
PRESENTATION DAY – Wednesday 21st July 2021 (Planning assumption) – To include a meeting of the Industrial Advisory Panel – Date will be confirmed nearer to the time. PROJECT VIVA VOCE EXAMS – 26th-27th July INTERNAL/DEPARTMENTAL EXAMINATION BOARD – Friday 30th July 2021 – FORMAL EXAMINATION BOARD (Planning assumption only)																		

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**.
Assessment Types: ICW – Individual Coursework; OR – Viva Voce / Oral Examination; EX – Examination; THESIS - thesis
Note – For the GSD module, a second Part-Time assessment hand-in date (PT2) has been set for the student cohort from the Royal School of Artillery.

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-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 Weapon and Vehicle Systems Programme	MSc Defence and Security Programme (Part Module only – the assessment is different.)
R-ESD-FB	Fundamentals of Ballistics	MSc Weapon and Vehicle Systems Programme	MSc Defence and Security Programme (Part Module only – the assessment is different.)
R-ESD-MVPD	Military Vehicle Propulsion and Dynamics	MSc Weapon and Vehicle Systems Programme	MSc Defence and Security Programme (Part Module only – the assessment is different.)
R-ESD-MSC	Modelling Simulation and Control	MSc Weapon and Vehicle Systems Programme	MSc Defence and Security Programme (Part Module only – the assessment is different.)
R-ESD-RSE	Reliability and Systems Effectiveness	MSc Weapon and Vehicle Systems Programme	MSc Defence and Security Programme (Part Module only – the assessment is different.)
R-ESD-SURV	Survivability	MSc Weapon and Vehicle Systems Programme	MSc Defence and Security Programme (Part Module only – the assessment is different.)
R-ESD-VSI	Vehicle Systems Integration	MSc Weapon and Vehicle Systems Programme	MSc Defence and Security Programme (Part Module only – the assessment is different.)
R-ESD-WST	Weapon Systems Technology	MSc Weapon and Vehicle Systems Programme	MSc Defence and Security Programme (Part Module only – the assessment is different.)

8. 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

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 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	EX		ICW						
WST (6)	ICW	ICW	ICW	ICW							
MVD (7)	ICW	ICW	EX	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			OR		ICW	
FEE (4)			ICW		ICW			ICW			
ED (11)			ICW		ICW		ICW				
OD (8)	ICW				ICW						ICW
Surv (10)		ICW				ICW					
MVP&D (12)							ICW		ICW		
GW (13)						ICW	ICW		ICW		
UMVS (14)			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 (20)	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

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?

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 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: August 2020

1. What is the course?

Course information

Course Title	MSc in Welding Engineering
Course code	MSWEEFTC, MSWEEPTC, PDWEEFTC, PDWEEPTC, PCWEEFTC, PCWEEPTC
Academic Year	2020/21
Valid entry routes	MSc, PgDip, PgCert
Additional exit routes	PgDip, PgCert
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 Laser Processing Centre
Course Director	Dr Supriyo Ganguly
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Is this course offered as a Cranfield Mastership?	No this course is not offered as Cranfield Mastership. However, two modules, Design of Welded Structures and Welding System and Research Methods, are being offered in the Mastership program based on Manufacturing Technology and Management course
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 (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: October. 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 Laser Processing 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 course is accredited formally by the Institution of Mechanical Engineers (IMechE), Institution of Engineering and Technology (IET), Royal Aeronautical Society (RAeS) and The Welding Institute (TWI).

Students completing an accredited degree are deemed to have met part or all of the academic requirements for registration as a Chartered or Incorporated Engineer and are in a strong position to move on to achieve professional engineering status after a period of initial professional development in industry.

This qualification may also contribute to the assessment of candidates applying via the Alternative Route to study for the International Welding Engineer/Technologist/Specialist Diploma available through TWI.

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.

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

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 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, welding processes and weld design for a particular application.
- 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.
- ILO 7. 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 8. Manage the operation of welding and fabrication systems.

B. Postgraduate Diploma

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

- ILO 9. 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 10. 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 11. Develop initiatives in proposing new developments, and in solving welding technology problems, both individually and as part of a team (full-time students only).
- ILO 12. 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 13. 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 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. WebEx, Skype for business, 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:	
Taught modules 3,4 and 7	40
ELECTIVE MODULES:	
Choose one of 5 and 6, and one of 2 and 8	20
RECOMMENDED MODULE	
Introduction	0
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:	
Taught modules 2-8 Group Project (9a)	80 40
ELECTIVE MODULES:	
None	
RECOMMENDED MODULE	
Introduction	0
TOTAL:	120

PART TIME STUDENTS

Description	Credits
COMPULSORY MODULES:	
Taught modules 2-8	80
ELECTIVE MODULES:	
Group Project (9a) or Dissertation (9b)	40
RECOMMENDED MODULE	
Introduction	0
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:	
Taught Modules 2-8 Group Project (9a) Individual Research Project (10)	80 40 80
ELECTIVE MODULES:	
None	
RECOMMENDED MODULE	
Introduction	0
TOTAL:	200

PART TIME STUDENTS

Description	Credits
COMPULSORY MODULES:	
Taught Modules 2-8 Individual Research Project (10)	80 80
ELECTIVE MODULES:	
Group Project (9a) or Dissertation (9b)	40
RECOMMENDED MODULE	
Introduction	0
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 October and are expected to complete the course within 11 calendar months.

The technical modules and design 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 October and are expected to complete the course within 7 calendar months. The technical modules and design project are delivered between October and April.

Full-time PgCert students register for the course in October and are expected to complete the course within 7 calendar months. The technical modules and design project are delivered between October and April.

[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 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 taught and flexible learning modules are taught over two weeks. Week's two to four of the taught modules are largely free of structured teaching to allow time for more independent learning and reflection.

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 1-6]. In these modules the first three are distant learning which means the part time students study the course material provided to them via backboard 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 contain 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 blackboard 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 6-8], 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 fulltime students enable them 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 9-12]. The part time students participate in 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 13].

[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 assessments	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
1		I-MAT-INWK	Introduction	Dr Sue Impey	18		0	Y	28/09/20	28/09/20	02/10/20	N/A	AO	N/A				N/A	
2		I-WEE-WPE	Welding Processes and Equipment [FL]	Dr Supriyo Ganguly	27		10	Y	19/10/20	19/10/20	23/10/20	40	EX	100				16/12/20	Re-assessment date to be set by agreement of the Module Leader as/when 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 assessments	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
3		I-WEE-A1108	Welding Systems and Research Methods [Conv]	Dr Supriyo Ganguly	34		20	N	23/11/20	23/11/20	27/11/20	50	ICW	100				25/01/21 FT 22/03/21 PT	Re-assessment date to be set by agreement of the Module Leader as/when required.
4		I-WEE-A1101	Design of Welded Structures [FL]	Dr Wojciech Suder	28		10	Y	25/01/21	25/01/21	05/02/21	40	EX	100				22/02/21	Re-assessment date to be set by agreement of the Module Leader as/when required.
5		I-WEE-A1103	Welding Metallurgy [FL]	Dr Supriyo Ganguly	22		10	N	26/10/20	26/10/20	30/10/20	40	EX	100				18/12/20	Re-assessment date to be set by agreement of the Module Leader as/when required.
6		I-WEE-A1109	Introduction to Materials for Welding	Dr Supriyo Ganguly	28		10	N	05/10/20	05/10/20	09/10/20	40	EX	100				06/01/21	Re-assessment date to be set by agreement

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 Submission and/or exam date[11]	Assessment / Exam Retake date
			Engineering [Conv]																of the Module Leader as/when required.
7		I-WEE-A1102	Management of Weld Quality [FL]	Dr Supriyo Ganguly	29		10	N	11/01/21	11/01/21	20/01/21	40	ICW	100				08/02/21	Re-assessment date to be set by agreement of the Module Leader as/when required.
8		I-WEE-A1110	Advanced Welding Processes [Conv]	Dr Wojciech Suder	35		10	Y	16/11/20	16/11/20	20/11/20	40	EX	100				08/01/21	Re-assessment date to be set by agreement of the Module Leader as/when required.
9a		I-MAT-GRPP	Group Project	Dr David Ayre	20		40	Y	01/02/21	01/02/21 Occ A (FT) 01/02/21	04/05/21 FT	50 50	GCW ICW GCW	80 20 80		GPRES GPROJ ICW Observed behaviour GPRES	20 80 50 50 20	27/04/21 04/05/21 04/05/21 04/05/21 27/08/21	

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 Submission and/or exam date[11]	Assessment / Exam Retake date
				Dr Andy Pidcock						Occ B (PT)	01/09/21 PT		ICW	20		GPROJ ICW Observed behaviour	80 50 50	01/09/21 01/09/21 01/09/21	
9b		I-MAT-DISS	Dissertation for part-time students	Dr Supriyo Ganguly	20		40	Y	01/02/21	01/02/21	27/08/21	50	ICW	100				27/08/21	
10		I-MNU-THESIS	Individual Research Project	Dr Muhammad Khan	20		80	Y	01/02/21	Occ A = PT 01/02/21	PT 27/08/21	50	THESIS OR	90 10				27/08/21 01/09/21	
				Dr Muhammad Khan					01/05/21	Occ B = FT 04/05/21	FT 01/09/21	50	THESIS OR	90 10				27/08/21 01/09/21	

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	Advanced Materials Aerospace Materials Global Product Development and Management Management and Information Systems Manufacturing Technology and Management
I-WEE-A1109	Intro to materials for welding engineering	Welding Engineering	Metal Additive Manufacturing
I-WEE-A1101	Design of Welded Structures	Welding Engineering	Renewable Energy Marine Structures EngD
I-WEE-A1110	Advanced Welding Processing	Welding Engineering	Manufacturing Technology and Management, Aerospace Manufacturing, Renewable Energy Marine Structures EngD
I-MAT-GRPP	Group Project for Full Time Students	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, Cyber-Secure Manufacturing, 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, Cyber-Secure Manufacturing, Maintenance Engineering & Asset Management
I-MNU-THESIS	Individual Research Project	Advanced Materials	Cyber-Secure Manufacturing, Engineering and Management of Manufacturing Systems, Global Product Development and Management, Knowledge Management for Innovation (not currently running), Management and Information Systems, Advanced Materials, Aerospace Materials, Applied Nanotechnology, 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.	ILO 7.	ILO 8.	ILO 9.
1									
2	EX				EX	EX	EX		
3	ICW	ICW	ICW	ICW					
4	EX				EX	EX	EX		
5	EX				EX	EX			
6	EX				EX	EX			
7	ICW					ICW	ICW	ICW	ICW
8	EX				EX	EX	EX		
9c	ICW	ICW	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.	LO 1.	ILO 2.	ILO 3.	ILO 4.	ILO 5.	LO 6.	LO 7.	ILO 8.	ILO 9.	LO 10.	LO 11.	LO 12.
9a	GPROJ	GPROJ	GPROJ	GPROJ		GPROJ			GPROJ	GPROJ	GPROJ	GPROJ GPRES
9b	ICW	ICW	ICW	ICW		ICW			ICW	ICW	ICW*	ICW*

* Note that not all aspects of the learning outcome apply to part-time students who don't participate in group work

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.	ILO 11.	ILO 12.	ILO 13.
10	THESIS	THESIS	THESIS	THESIS		THESIS			THESIS	THESIS	THESIS	THESIS OR	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.