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COURSE SPECIFICATION

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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.

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COURSE TITLE:	MSc Offshore Engineering

Date of first publication/latest revision:	15/01/2019

1. What is the course?

Course information

Course Title	Offshore Engineering
Course code	MSOFFFTC, MSOFFPTC, PDOFFFTC, PDOFFPTC, PCOFFFTC, PCOFFPTC
Academic Year	2019/20
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
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)	Full-time MSc - one year, Part-time MSc - up to three years

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[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

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available	
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).

This course team will seek formal accreditation from the Energy Institute (EI),

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.

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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 5 core and 3 applied modules. Each core module is generally delivered over one week, whereas each applied module is delivered over two weeks at Cranfield.

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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 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
ENGINEERING ROUTE -**COMPULSORY MODULES:**	
Induction	0
Materials & Corrosion Core	10
Risk and Reliability Engineering	10
Engineering Stress Analysis: Theory and Simulations	10
Applied Materials and Corrosion	10
Management for Technology	10
ELECTIVE MODULES:	
SELECT 1 MODULE FROM: Computational Fluid Dynamics for Renewable Energy	10
Structural Integrity	10
TOTAL:	60

Description	Credits

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MANAGEMENT ROUTE -COMPULSORY MODULES:	
Induction Materials & Corrosion Core Risk and Reliability Engineering Advanced Maintenance Engineering and Asset Health, Safety, Security and Environment Management for Technology	0 10 10 10 10 10
ELECTIVE MODULES:	
SELECT 1 MODULE FROM: Energy Economics and Policy Applied Materials & Corrosion	 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 Materials & Corrosion Core Risk and Reliability Engineering Engineering Stress Analysis: Theory and Simulations Applied Materials & Corrosion Computational Fluid Dynamics for Renewable Energy 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

Description	Credits
MANAGEMENT ROUTE - **COMPULSORY MODULES:**	
Induction Materials & Corrosion Core Risk and Reliability Engineering Energy Economics and Policy Applied Materials & Corrosion Health, Safety, Security and Environment Advanced Maintenance Engineering and Asset Management 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	 40

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Group project	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 Materials & Corrosion Core Risk and Reliability Engineering Engineering Stress Analysis: Theory and Simulations Applied Materials & Corrosion Computational Fluid Dynamics for Renewable Energy Structural Integrity Energy Systems Case Studies Management for Technology Group Project Individual Research Project	0 10 10 10 10 10 10 10 10 40 80
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 Materials & Corrosion Core Risk and Reliability Engineering Energy Economics and Policy Applied Materials & Corrosion Health, Safety, Security and Environment Advanced Maintenance Engineering and Asset Management Energy Systems Case Studies Management for Technology Group Project Individual Research Project	0 10 10 10 10 10 10 10 10 40 80
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.

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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 <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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 re-sit award capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);
  - o 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

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

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[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%).

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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.

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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	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
									Calendar				Independent Assessment		Multi-part Assessment			Submission dates	
1	I-ENE-INWK Occ A	Induction	P Clough	24		0	Y		7/10/19	11/10/19	N/A	AO	N/A					
2	N-AME-RR	Risk and Reliability Engineering	M Shafiee	30		10	N		14/10/19	18/10/19	40	EX	100				Exam week 1	Sept 20
3	I-OOT-A1078	Materials & Corrosion Core	J Sumner	32		10	Y		28/10/19	01/11/19	40	EX	100				Exam week 1	Sept 20

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' 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-RNE-EEP	Energy Economics and Policy	N Ozkan	27		10	Y		04/11/19	08/11/19	40	ICW	100				F/T 23/11/19 P/T 30/11/19	July 20
5	N-AME-SI	Structural Integrity	A Mehmanparast	38.5		10	Y		4/11/19	8/11/19	40	EX	100				Exam Week 2	Sept 20
6	N-AME-ESA	Engineering Stress Analysis: Theory and Simulations	A Mehmanparast	32		10	Y		18/11/19	22/11/19	40	ICW	100				FT 04/01/20 PT 18/01/20	July 20
7	I-OOT-A1087	Advanced Maintenance Engineering and Asset Management	M Shafiee	32		10	Y		25/11/19	29/11/19	40	ICW	100				FT 21/12/19 PT 04/01/20	July 20
8	N-OFF-HSSE	Health, Safety, Security and Environment	G Drew	25		10	Y		6/1/20	17/1/20	40	ICW	100				FT 18/1/20 PT 1/2/20	July 20
9	N-REE-CFDR	Computational Fluid Dynamics for Renewable Energy	P Verdin	30		10	Y		6/1/20	17/1/20	40	ICW	100				FT 18/1/20 PT 1/2/20	July 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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment (Independent)	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9] (100%)	Type of Assessment (Multi-part)	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
10	I-OOT-A1076	Applied Materials and Corrosion	J Sumner	32		10	N		20/1/20	31/1/20	40	ICW	100				F/T 1/2/20 P/T 15/2/20	July 20
11	N-OFF-ESCS Occ A	Energy System Case Studies	X Zhang	32		10	Y		3/2/20	14/2/20	40			100 Multi	GPRES ICW	25 75	GPRES 14/2/20 ICW FT 15/2/20 ICW PT 1/3/20	July 20
12	G-MTI Occ A	Management for Technology	R Adams	27		10	Y		17/2/20	21/2/20	40	EX	100				Exam week 4	Sept 20
13	I-ENE-GRPP Occ A	Group Project	G Drew	16		40	Y		24/2/20	8/5/20	50 50	GPROJ ICW	80 20	80 20	GPRES GRPOJ ICW Observed Behaviour	20 80 50 50	04/05/20 01/05/20 09/05/20 NA	
14	I-ENE-DISS Occ A	Dissertation (part-time option)	G Drew	10		40	Y		28/9/19	25/9/20	50	IPROJ IPRES	80 20				25/9/20 21/9/20	

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

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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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
15	I-ENE-THESIS Occ A	Individual Research Project	G Drew	20		80	Y		11/5/20	11/9/20	50 50	THESIS OR	90 10				OR 31/08/20-07/09/20 THESIS 07/09/20	

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

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		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
N-AME-RR	Risk and Reliability Engineering	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
G-MTI	Management for Technology	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
I-OOT-A1087	Advanced Maintenance Engineering and Asset Management	N/A	N/A	N/A	Compulsory	Compulsory	Compulsory
N-AME-ESA	Engineering Stress Analysis: Theory and Simulations	Compulsory	Compulsory	Compulsory	N/A	N/A	N/A
New Code	Energy Economics & Policy	N/A	N/A	N/A	Elective	Compulsory	Compulsory
N-AME-SI	Structural Integrity	Elective	Compulsory	Compulsory	N/A	N/A	N/A
N-REE-CFDR	Computational Fluid Dynamics for Renewable Energy	Elective	Compulsory	Compulsory	N/A	N/A	N/A
N-OFF-HSSE	Health, Safety, Security and Environment	N/A	N/A	N/A	Compulsory	Compulsory	Compulsory
I-OOT-A1076	Applied Materials & Corrosion	Compulsory	Compulsory	Compulsory	Elective	Compulsory	Compulsory
N-OFF-ESCS	Energy System Case Studies	N/A	Compulsory	Compulsory	N/A	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
I-ENE-DISS	Dissertation (part-time option)	N/A	Elective PT	Elective PT	N/A	Elective PT	Elective PT
I-ENE-THESIS	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

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

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
N-AME-ESA	Engineering Stress Analysis: Theory and Simulations	Advanced Mechanical Engineering	Offshore Engineering (Engineering route) Renewable Energy (Engineering route)
N-AME-SI	Structural Integrity	Advanced Mechanical Engineering	Offshore Engineering (Engineering route) REMS EngD Design of Rotating Machines
N-OFF-HSSE	Health, Safety, Security and Environment	Offshore Engineering	Renewable Energy (Management route)
I-OOT-A1087	Advanced Maintenance Engineering and Asset Management	Offshore Engineering	Renewable Energy (Management route) REMS EngD
G-MTI	Management for Technology	School of Management	Advanced Mechanical Engineering REMS EngD Energy Systems and Thermal Processes Energy Systems and Thermal Processes (Muscat) Process Systems Engineering Process Systems Engineering (Muscat) Advanced Chemical Engineering (General route) Advanced Chemical Engineering (Management route) Offshore Engineering (Engineering route) Offshore Engineering (Management route) Thermal Power Computational and Software Techniques in Engineering
N-OFF-ESCS	Energy Systems Case Studies	Renewable Energy	Offshore Engineering (Engineering route) Offshore Engineering (Management route) Energy Systems and Thermal Processes (Muscat)
N-REE-CFDR	Computational Fluid Dynamics for Renewable Energy	Advanced Mechanical Engineering	Offshore Engineering (Engineering route)

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NEW CODE	Energy Economics and Policy	Renewable Engineering	Energy Informatics Intake deferred for 19/20 Offshore Engineering (Management route)

7. 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

A. Postgraduate Certificate

Award ILOs Module No.	1	2	3 (Engineering route)	4 (Management route)

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Award ILOs Module No.	1	2	3 (Engineering route)	4 (Management route)
2	EX	EX		
3	EX	EX		
4				ICW
5			EX	
6			ICW	
7				ICW
8				ICW
9			ICW	
10			ICW	ICW
12	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.	1	2	3 (Engineering route)	4 (Management Route)	5	
11	ICW GPRES	ICW GPRES	ICW GPRES	ICW GPRES	ICW GPRES	
113					GPROJ ICW	
114					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.	6	7		
13	THESIS OR	THESIS OR		

<u>CROSS-MODULAR ASSESSMENT</u> (including any assessment which rests outside an individual module)

Title	Modules Covered	Assessment	
		Type	Weight (%)

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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

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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.

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

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.

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COURSE SPECIFICATION

Cranfield University: Course Specifications

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

COURSE TITLE: MSc in Operations Excellence

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	2019/20
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
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	Part-time MSc - up to three years

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[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

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

Teaching and assessment is also provided by Cranfield School of Management and University of Cambridge (Institute of Manufacturing).

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 course 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 Blackboard VLE as a source of information on learning and assessment materials plus routes to additional information and sources of help if required.

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- 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. As a result of Covid-19 restrictions, all modules will be taught online during the academic year 2020/21.
- 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 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:	
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	

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Description	Credits
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 <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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

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[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%).

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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);

- o it is <u>not</u> 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. <u>How is the course structured?</u>

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

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

The (80 credit) 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 supervisor to ensure adequate formative assessment and on-time project completion.

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							
								Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates		
												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
1	I-OPX-INWK	Induction	Dr Patrick McLaughlin	15		0	N	08/10/19	08/10/19	9/10/19	N/A	AO	N/A				N/A	
2	I-OPX-EF	Effective Factories	Mr John Patsavellas	35		10	N	04/11/19	04/11/2019	08/11/19	40	ICW	100				03/01/20	At the next available opportunity which may not be until the course runs the following year

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Calendar 'Residential' Start Date	Calendar 'Residential' 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	I-OPX-BMS	Business and Manufacturing Strategy	Dr Abdelkader Aoufi	16	0	10	N	06/01/20	06/01/20	10/01/20	40	GCW	100				21/02/20	At the next available opportunity which may not be until the course runs the following year
4	I-OPX-TMT	Team Management	Dr Patrick McLaughlin	35	15	10	N	10/02/20	10/02/20	14/02/20	40	ICW	100				27/03/20	At the next available opportunity which may not be until the course runs the following year
5	I-OPX-IM	Innovation Management	Dr Patrick McLaughlin	35	15	10	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
7	I-OPX-TM	Technology Management (delivered at Cambridge)	Dr Patrick McLaughlin	35	10	10	N	12/10/20	12/10/20	16/10/20	40	ICW	100				04/12/20	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	07/09/20	07/09/20	11/09/20	40	ICW	100				30/10/20	At the next available opportunity which may not be until the

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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
																		course runs the following year
9	I-OPX-MAI	Operations Assessment and Improvement	Mr John Patsavellas	35	10	10	N	23/11/20	23/11/20	27/11/20	40	ICW	100				22/01/21	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	08/02/21	08/02/21	19/02/21	40	ICW	100				26/03/21	At the next available opportunity which may not be until the course runs the following year
11	I-OPX-GP	Group Project	Dr Patrick McLaughlin	40		40	N	06/04/20	06/04/20	28/08/20	50			100	GCW GPRES ICW	64 16 20	28/08/20 07/09/20 07/09/20	
12	I-OPX-THES	Thesis Project	Dr Patrick McLaughlin	40		80	N	30/11/20	30/11/20	06/09/21	50	THESIS OR	90 10				31/08/21 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

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Operations Excellence COURSE SPECIFICATION
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Please list all modules that are used by another existing course.

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

7. 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 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.)

The Award intended learning outcomes are assessed by the following module assessments:

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			ICW	ICW	ICW			

Award ILOs Module No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6		
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 (%)
N/A			

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality

Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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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.

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9. 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.	

COURSE TITLE:	PgCert in Supply Chain Practice

Date of first publication/latest revision:	May 2019

1. What is the course?

Course information

Course Title	PG Certificate in Supply Chain Practice
Course code	PCSCPPTC
Academic Year	2019-2020
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
Teaching Institution	Cranfield University
Admissions body	Cranfield University
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)	September 2019

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[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

Version 1.0 April 2019

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 until 2021 and the Chartered Institute of Purchasing and Supply until August 2019.

Currently the proposed programme is not accredited by these professional bodies but as it is closely aligned to the MSc. in Logistics and Supply chain Management we would seek accreditation. Chartered Institute of Logistics and Transport and Chartered Institute of Purchasing and Supply

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. <u>What should students expect to achieve in completing the course?</u>

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

A. **PgCert**

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 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 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:	
Elements 1 to 4 Element 5	40 20
ELECTIVE MODULES:	
N/A	
TOTAL:	60

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

Pass Criteria
The University operates 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 <u>not</u> 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 <u>on the first attempt</u> 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 <u>not</u> 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 with the client and are expected to complete the course within one year.

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[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%).

Version 1.0 April 2019

Course modules

The following modules outline all parts of the programme leading to PgCert.
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.

| | | | | | | | | Calendar | | | | Assessment | | | | | | |
| | | | | | | | | | | | | Independent Assessment | | Multi-part Assessment | | | Submission dates | |
Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment	Weighting within module8 (%) 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	M-S/INWK	Induction	Mike Bernon	4		0		25 Sept 2019											
1	M-S /SCP	Supply Chain Practice	Mike Bernon	25	0	10	N	10 Mar 2020	10 Mar 2020	12 Mar 2020	50	ICW	100				7 April 2020	
2	M-S /IOM	Inventory and Operations Management Practice	Emel Aktas	25		10	N	25 – 27 Sept. 2019	25th Sept. 2019	27th Sept. 2019	40	ICW	100				25th October 2019	
3	M-S /WDC	Logistics Management -	Hendrik Reefke	25		10	N	25 – 27 Nov. 2019	25th Nov. 2019	27th Nov. 2019	40	ICW	100				23rd December 2019	

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[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%.

[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.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting[6]	Credits	Is the module shared? Y/N	Calendar			Minimum Mark[7] - 40% or 50%	Assessment					Submission dates	
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment				
												Type of Assessment	Weighting within module8 (%) 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
		Warehousing and DC Design																
4	M-S /FT	Logistics Management – Freight Transport	Melvyn Peters	25		10	N	13 – 15 Jan 2020	13th Jan 2020	15th Jan 2020	40	ICW	100				15th Feb 2020	
5	M-S /IP	Independent Project- Supply Chain Practice	Mike Bernon			20	N	16 Jan 2020	Non residential	Non residential	50	IPROJ IPRES	80% 20%				9th March 2020	

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

7. 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. PgCert

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		IPROJ	IPROJ	IPROJ	IPROJ	IPROJ IPRES

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10

(Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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.

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

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.

COURSE TITLE:	Pre-Masters Course in Engineering

Date of first publication/latest revision:	March 2019

1. What is the course?

Course information

Course Title	Pre-Masters Course in Engineering
Course code	QPSOEFQC
Academic Year	2019/20
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
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Ordinary degree or HND (with 3 years' experience) in engineering and physical science disciplines. Previous experience, aptitude and level of academic achievement will be assessed.
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

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[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

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.

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?

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 technical English language skills and 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.

The course 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.
- EU & overseas students wishing to enhance their technical English language skills and 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?

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

A. **Pre-Masters Course in Engineering**

In completing this course successfully, 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

2

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. Use with confidence communication technical English language skills as applied to engineering projects;

ILO 8. Undertake a structured approach to research for individual projects at master level.

4. How is the course taught?

The course consists of two major groups of elements:

- Lecture Courses; All the lecture courses are mandatory. The only exception is the Academic English language module where it is required for EU/Overseas students needing to improve their academic English prior to attending MSc courses. Students who do not require the Academic English module will carry out further investigations and study on their Individual Project II. This activity will be included in the final project report and will be assessed by the student's supervisor.

- Individual Projects I and II; The Individual Projects I and II aim 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 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 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

3

COMPULSORY MODULES:	
Modules 1-11 and 13	140
If initial assessment of English Language level is assessed as 'must attend': • Module 12 (Academic English Language) and • Module 14 (Individual Project I)	10 50
ELECTIVE MODULES:	
If initial assessment of English Language level is assessed as either 'should attend' or 'do not need to attend' either: • Module 12 (Academic English Language) and • Module 14 (Individual Project I) or • Module 15 (Individual Project II)	10 50 60
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
In order to proceed to an MSc course students 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:
  o 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);
  o 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);
  o it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.

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[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%).

- **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 at the end of 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.

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: Module Start Date (eg Pre-course task)	Calendar: 'Residential' Start Date	Calendar: 'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment: Type of Assessment	Independent Assessment: Weighting within module8 (%) of Independent assessments	Multi-part Assessment: Weighting within module of multi-part assessments [9] (100%)	Multi-part Assessment: Type of Assessment	Multi-part Assessment: Weighting of individual elements of multi-part assessment[10]	Submission dates: Assessment Submission and/or exam date[11]	Submission dates: Assessment / Exam Retake date
1	N-PY-MD	Mechanical Design	Jack Stockford	20		10	N	20/01/20	20/01/20	31/01/20	40	ICW	100				17/04/20	19/06/20
2	N-PY-ESA	Engineering Stress Analysis	Dr Hao Cui	20		10	N	11/11/19	11/11/19	22/11/19	40	ICW	100				03/12/20	17/04/20
3	N-PY-AE	Aeronautical Engineering	Jack Stockford	20		10	N	28/10/19	28/10/19	08/11/19	40	EX	100				12/19	04/20

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

Pre-Masters Course in Engineering COURSE SPECIFICATION
Version 2.0 January 2019

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 Module Start Date (eg Pre-course task)	Calendar 'Residential' Start Date	Calendar 'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment Type of Assessment	Independent Assessment Weighting within module8 (%) of Independent assessments	Multi-part Assessment Weighting within module of multi-part assessments[9] (100%)	Multi-part Assessment Type of Assessment	Multi-part Assessment Weighting of individual elements of multi-part assessment[10]	Submission dates Assessment Submission and/or exam date[11]	Submission dates Assessment / Exam Retake date
4	N-PY-BAEM	Basic Aerodynamics	Dr Amir Zare Shahneh	20		10	N	07/10/19	07/10/19	18/10/19	40	EX	100				01/20	04/20
5	N-PY-PP	Propulsion and Power	Prof Pericles Pilidis	20		10	N	24/01/20	24/01/20	06/03/20	40	EX	100				03/20	06/20
6	N-PY-M1	Mathematics I	Dr Zeeshan Rana	40		20	N	07/10/19	07/10/19	03/12/19	40	EX	100				01/20	04/20
7	N-PY-M2	Mathematics II	Peter Sherar	40		20	N	20/01/20	20/01/20	04/03/20	40	EX	100				03/20	06/20
8	N-PY-EMF	An Introduction to Engineering Materials and Failure Analysis	Dr David Ayre	26		10	N	05/02/20	05/02/20	05/03/20	40	EX	100				03/20	06/20
9	N-PY-T	Thermofluids	Dr Ioannis Goulos	20		10	N	11/11/19	11/11/19	06/12/19	40	EX	100				01/20	04/20
10	N-PY-CAD	Computer Aided Design (CATIA)	Dr Adrian Clarke	15		10	N	13/01/20	13/01/20	17/01/20	40	ICW	100				14/02/20	14/02/20
11	N-PY-CF90	Computing Course	Dr Jafar Jamshidi	30		10	N	21/10/19	21/10/19	29/11/19	40	ICW	100				17/01/20	01/06/20
12	N-PY-AEL	Academic English Language	Joanne Holden	30		10	N	10/10/19	10/10/19	28/11/19	40	ICW	100				03/03/20	01/06/20

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

Pre-Masters Course in Engineering COURSE SPECIFICATION
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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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
13	N-PY-RM	Research Methods	Dr Amir Zare Shahneh	20		10	N	14/01/20	14/01/20	13/02/20	40	ICW	100				27/03/20	01/06/20
14	N-PY-IP1	Individual Project I	Dr Amir Zare Shahneh	30		50	N	14/01/20	04/11/19	10/07/20	50	THESIS OR	90 10				10/07/20 03/07/20	
15	N-PY-IP2	Individual Project II	Dr Amir Zare Shahneh	30		60	N	14/01/20	04/11/19	10/07/20	50	THESIS OR	90 10				10/07/20 03/07/20	

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

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Pre-Masters Course in Engineering COURSE SPECIFICATION
Version 2.0 January 2019

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			

7. 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, 1 element of assessment by oral presentation. In addition the Individual Project I & II 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 Course ILOs.

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

A. Pre-Masters Course in Engineering

Course ILOs / Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8
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	
13			ICW		ICW	ICW		
14	THESIS	THESIS	THESIS		THESIS	OR	THESIS	THESIS OR
15	THESIS	THESIS	THESIS		THESIS	OR	THESIS	THESIS OR

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

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

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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.

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

The Pre-Master 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

<table>
<tr><td colspan="2">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.</td></tr>
</table>

COURSE TITLE:	MSc in Process Systems Engineering

Date of first publication/latest revision: 15/01/2019

1. What is the course?

Course information

Course Title	Process Systems Engineering
Course code	MSPSEFTC, MSPSEPTC, PDPSEFTC, PDPSEPTC, PCPSEFTC, PCPSEPTC (UK) MSPSOFTC, MSPSOPTC (Muscat)
Academic Year	2019/20
Valid entry routes	Cranfield - PgCert, PgDip, MSc Muscat - MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Full-Time, Part-Time
Location(s)[1] of Study	Cranfield and Muscat
School(s)	School of Water, Energy and Environment
Theme	Energy & Power
Centre	Climate and Environmental Protection
Course Director	Dr Dawid P Hanak
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	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)	Not Applicable

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[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

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Registration Period(s) available	1 year Full-Time, 3 years Part-time
Course Start Month(s)	October for Cranfield September for Muscat

Institutions delivering the course

This course is delivered by the School of Water, Energy and Environment, Energy Theme, Climate and Environmental Protection where the research interests include:

- Design, Operation, Simulation and Optimisation of Clean Energy and Industrial Systems
- Sustainable Process Engineering
- Process and Flow Measurements and Control
- Technical and Economic Feasibility Assessments of Process and Energy Systems

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

Teaching and/or assessment is also provided by the School of Management of Cranfield University.

This course is also delivered by Cranfield academics at the University of Muscat, Oman.

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

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

The MSc at Cranfield is currently accredited by the Institution of Mechanical Engineers (IMechE) until 2019.

2. What are the aims of the course?

Cranfield University offers this course in order to provide engineering and applied science graduates with current theory and practice of the technical and managerial aspects of process systems engineering. Material presented in the course modules is applicable to the design, operation and control of a wide range of process plants, including those employed by the oil and gas, petrochemical, chemical, pharmaceutical, water, food and drink and power industries. The course has evolved over the past 10 years as a result of discussions with Industrial Advisory Panels, employers, sponsors and previous students. The content of the programme of study is up-dated regularly to reflect changes arising from technical advances, economic factors and changes in legislation, regulations and standards.

This programme is intended for the following range of students:

- Engineering and applied science graduates and practicing engineers wishing to pursue a technical management career in the strongly growing process industry sector.
- Applicants are required to have at least a UK 2nd class honours degree or its equivalent. Applications from candidates with lesser qualifications but with considerable relevant working experience will be considered.

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

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

A. **Postgraduate Certificate in Process Systems Engineering**

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

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ILO 1.　Evaluate the technical, environmental and economic issues involved in the design and operation of process plants and the current practice in process industries.

ILO 2.　Apply effectively the knowledge gained to the design, operation, optimisation and control of process systems via proper methodologies and relevant software.

ILO 3.　Apply independent learning, especially via the effective use of information retrieval systems and a competent and professional approach to solving problems of industrial process systems.

ILO 4.　Apply and critically evaluate key technical management principles, including project management, people management, technology marketing, product development and finance.

ILO 5.　Apply advanced approaches and use effectively related tools in more specialised subjects related to process industries (for example risk management, process modelling and simulation or CFD tools).

B. Postgraduate Diploma in Process Systems Engineering

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

ILO 6.　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 Process Systems Engineering

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

ILO 7.　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 8.　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
- One-day workshop in MATLAB training
- Arrangement of attendance of relevant modules offered by other MSc programmes

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The taught programme is generally delivered from October to February and is divided into core and applied modules. Each core module is generally delivered over one week, whereas each applied module is delivered over two weeks at Cranfield. At Muscat, all modules are delivered over one week.

The Group Project is delivered between March and May. Each group will typically include 4-6 students and an academic supervisor will be assigned to each group. Formal project review meetings will be held on a bi-weekly basis at which each student will be required to provide a brief presentation on the work performed to date. The academic supervisor will participate in these project review meetings to record attendance, assess the individual oral presentations and level of contribution to the project and to provide guidance as appropriate. Students taking the group project are required to participate in at least 80% of these review meetings. Additionally, it is expected that students will meet and work on the project outside of the formal meetings. A (student) project co-ordinator will be nominated to ensure that these meetings are used to good effect and appropriate minutes are taken and findings reported to the academic supervisor. Students will be required to attend in person the initial and final project review meetings.

Part-time students have the option to carry out a dissertation project in place of the Group project.

The Individual Research Project is typically delivered between May and September. Each student is allocated a supervisor, who will guide and assess the student work. During the Individual research project period, the supervisor and the student should meet at least every two weeks to review progress made and agree future actions.

5. <u>What do students need to achieve in order to graduate?</u>

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
Management for Technology	10
Process Plant Operations	10
Process Design and Simulation	10
Advanced Control Systems	10
Computational Fluid Dynamics for Industrial Processes	10
Risk & Reliability Engineering	10
ELECTIVE MODULES:	
N/A	
TOTAL:	**60**

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B.   Postgraduate Diploma

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

Description	Credits
COMPULSORY MODULES:	
Induction	0
Management for Technology	10
Process Plant Operations	10
Process Design and Simulation	10
Advanced Control Systems	10
Thermal Systems Operation and Design	10
Risk & Reliability Engineering	10
Process Measurement Systems	10
Computational Fluid Dynamics for Industrial Processes	10
Group Project (Compulsory for Full-Time Students)*	40
ELECTIVE MODULES:	
*Part Time Students: Group Project OR Dissertation	40 40
TOTAL:	**120**

C.   MSc (at Cranfield)

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

Description	Credits
COMPULSORY MODULES:	
Induction	0
Management for Technology	10
Process Plant Operations	10
Process Design and Simulation	10
Advanced Control Systems	10
Thermal Systems Operation and Design	10
Risk & Reliability Engineering	10
Process Measurement Systems	10
Computational Fluid Dynamics for Industrial Processes	10
Group Project (Compulsory for Full-Time Students)*	40
Individual Research Project	80
ELECTIVE MODULES:	
2 modules from:	
Part Time Students: Group Project	40

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Description	Credits
OR Dissertation	40
TOTAL:	**200**

D. MSc (in Muscat)

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:	
Process Plant Operations	10
Process Design and Simulation	10
Advanced Control Systems	10
Computational Fluid Dynamics for Industrial Processes	10
Risk and Reliability Engineering	10
Thermal Systems Operation and Design	10
Process Measurement Systems	10
Management for Technology	10
Group Project (Compulsory for full time students)	40
Individual Research Project	80
ELECTIVE MODULES:	
Part Time Students: Group Project	40
OR	
Dissertation	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] [4]

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[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%.

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- **For Taught Assessments,** the minimum mark for each individual taught assessment <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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).

5. <u>How is the course structured?</u>

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

This course is also offered on a part-time basis. Students would instead attend the required modules of the taught component according to the schedule agreed with the course director. MSc research projects are commonly undertaken in collaboration with the candidate's place of work.

Each module is taught over one week, with the second week largely free of structured teaching to allow time for more independent learning and reflection.

Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) exit routes are provided as fall back routes for MSc candidates.

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%).

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Course modules

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

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar				Assessment							
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates		
												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
1	I-ENE-INWK Occ A	Induction	P Clough	24		0	Y	[	7/10/2019	11/10/2019	N/A	AO	N/A				N/A	[
2	N-AME-RR Occ A	Risk and Reliability Engineering	M Shafiee	30		10	Y		14/10/2019	18/10/2019	40	EX	100				Exam week 1	Sept 2020

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												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	N-PSE-PPO Occ A	Process Plant Operations	V Kumar	30		10	Y		21/10/19	25/10/19	40	ICW	100				F/T 1611/19 P/T 16/11/19	July 20
4	N-PSE-CETIP Occ A	Computational Fluid Dynamics for Industrial Processes	P Verdin	30		10	Y		4/11/19	8/11/19	40	ICW	100				FT 30/11/19 PT 30/11/19	July 20
5	N-PSE-ACS Occ A	Advanced Control Systems	L Lao	30		10	Y		18/11/19	22/11/19	40	ICW	100				FT 7/12/19 PT 14/12/19	July 20
6	N-PSE-PMS Occ A	Process Measurement Systems	L Lao	30		10	Y		6/1/20	17/1/20	40	ICW	100				FT 18/1/20 PT 1/2/20	JULY 20
7	N-PSE-PSD Occ A	Process Design and Simulation	D Hanak	30		10	Y		20/1/20	31/1/20	40	ICW	100				FT 1/2/20 PT 15/2/20	July 20
8	N-PSE-TSOD Occ A	Thermal Systems Operation and Design	A Nabavi	30		10	Y		3/2/20	14/2/20	40	ICW	100				F/T 15/2/20 P/T 29/2/20	July 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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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 Submission and/or exam date[11]	Assessment / Exam Retake date
9	G-MTI Occ A	Management for Technology	R Adams	27		10	Y		17/2/20	21/2/20	40	EX	100				Exam week 4	Sept 20
10	I-ENE-GRPP Occ A	Group Project	G Drew	16		40	Y		24/2/20	8/5/20	50 50	GPROJ ICW	80 20				GPROJ 1/5/20 ICW 9/5/20	
11	I-ENE-DISS Occ A	Dissertation for part time students	G Drew	10		40	Y		28/09/19	25/9/20	50 50	IPROJ IPRES	80 20				25/9/20 21/9/20	
12	I-ENE-THESIS Occ A	Energy Individual Research Project	G Drew	20		80	Y		11/5/20	11/9/20	50 50	OR THESIS	10 90				OR 31/08/20-07/09/20 THESIS 07/09/20	

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

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

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[14] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[15] (%) of Independent assessments	Weighting within module of multi-part assessments [16]	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
1	I-ENE-INWK Occ B	Induction	P Clough	24		0	Y	[	15/9/19	19/9/19	N/A	AO	N/A				N/A	[
4	N-PSE-PPO Occ B	Process Plant Operations	D Hanak	30		10	Y		22/9/19	26/9/19	40	ICW	100				FT 4/10/19 PT 18/10/19	
3	N-PSE-PMS Occ B	Process Measurement Systems	L Lao	30		10	Y		6/10/19	10/10/19	40	ICW	100				FT 18/10/19 PT 1/11/19	

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[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

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Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' End Date	Minimum Mark[14] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module15 (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
2	N- PSE-CETIP Occ B	Computational Fluid Dynamics for Industrial Processes	P Verdin	30		10	Y		27/10/19	31/10/19	40	ICW	100				FT 15/11/19 PT 29/11/19	
5	N- PSE-ACS Occ B	Advanced Control Systems	L Lao	30		10	Y		3/11/19	7/11/19	40	ICW	100				FT 22/11/19 PT 06/12/19	
9	N-PSE-PSD Occ B	Process Design and Simulation	D Hanak	30		10	Y		24/11/19	28/11/19	40	ICW	100				FT 5/12/19 PT 20/12/19	
7	N-AME-RR Occ B	Risk and Reliability Engineering	M Shafiee	30		10	Y		8/12/19	12/12/19	40	EX	100				Muscat Exam week 1	
6	N-PSE-TSOD Occ B	Thermal Systems Operation and Design	A Nabavi	30		10	Y		19/1/20	23/1/20	40	ICW	100				F/T 31/1/20 P/T 14/2/20	
8	G-MTI Occ C	Management for Technology	R Adams	27		10	Y		2/2/20	6/2/20	40	EX	100				Muscat Exam	

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

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Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers[13]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[14] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[15] (%) of Independent assessments	Weighting within module of multi-part assessments	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
																	week 2	
10	I-ENE-GRPP Occ B	Group Project	G Drew	16		40	Y		23/2/19	7/5/19	50 50	GPROJ ICW	80 20				GPROJ 4/5/20 ICW 8/5/20	
11	I-ENE-DISS Occ B	Dissertation for part time students	G Drew	10		40	Y		27/9/19	24/9/20	50 50	IPROJ IPRES	80 20				24/9/20	
12	I-ENE-THESIS Occ B	Energy Individual Research Project	G Drew	20		80	Y		10/5/20	10/9/20	50 50	OR THESIS	10 90				6/9/20	

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

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

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
G-MTI	Management for Technology	School of Management	• Advanced Mechanical Engineering • REMS EngD • Offshore Engineering • Energy Systems and Thermal Processes • Process Systems Engineering • Advanced Chemical Engineering • Energy Informatics Intake deferred for 19/20
N-AME-RR	Risk and Reliability Engineering	Advanced Mechanical Engineering	• Energy Informatics Intake deferred for 19/20 • Renewable Energy • Process Systems Engineering • REMS EngD
N-PSE-ACS	Advanced Control Systems	Process Systems Engineering	• Advanced Chemical Engineering – General route • Energy Systems and Thermal Processes • Energy Informatics Intake deferred for 19/20 • WiRe CDT
N-PSE-CETIP	Computational Fluid Dynamics for Industrial Processes	Process Systems Engineering	• Advanced Chemical Engineering • Energy Systems and Thermal Processes • Energy Informatics Intake deferred for 19/20 • REMS EngD
N-PSE-PSD	Process Design and Simulation	Process Systems Engineering	• Advanced Chemical Engineering • Energy Systems and Thermal Processes • Energy Informatics Intake deferred for 19/20
N-PSE-PMS	Process Measurement Systems	Process Systems Engineering	• Energy Informatics Intake deferred for 19/20
N-PSE-PPO	Process Plant Operations	Process Systems Engineering	• Advanced Chemical Engineering – General Route
N-PSE-	Thermal Systems Operation	Process Systems	• Energy Systems and

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TSOD	and Design	Engineering	• Thermal Processes • Advanced Chemical Engineering – General Route

7. **How are the ILOs assessed?**

The following assessment types are utilised:

The course uses a range of assessment types. Students can expect to have 6–8 written examinations, 7 pieces of assessment by submitted work and 4–5 elements of assessment by presentation or viva.

This approach has been adopted in order to:

- Assess the knowledge of the students using methods appropriate to the nature of the subject area
- Help the students to improve their technical writing and oral 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. **PgCert at Cranfield**

Award ILOs / Module No.	ILO 1	ILO2	ILO3	ILO4	ILO5
2	EX			EX	EX
3	ICW		ICW		
5		ICW			
7	ICW	ICW	ICW		
8	ICW		ICW		
9				EX	

B. **PgDip at Cranfield**

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	ILO3	ILO4	ILO5	ILO6
4		ICW	ICW			
6	ICW		ICW	ICW		

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Module No. \ Award ILOs	ILO 1	ILO 2	ILO3	ILO4	ILO5	ILO6
10						GPROJ ICW
11						IPROJ IPRES

C. MSc at Cranfield

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

Module No. \ Award ILOs	ILO7	ILO8
12	THESIS OR	THESIS OR

D. MSc in Muscat

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

Module No. \ Award ILOs	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8
2		ICW	ICW		ICW			
3	ICW		ICW		ICW			
4	ICW		ICW					
5		ICW						
6	ICW		ICW					
7	EX			EX	EX			
8				EX				
9	ICW	ICW	ICW					
10						GPROJ ICW		
11						IPROJ IPRES		
12							THESIS OR	THESIS OR

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

Title	Modules Covered	Assessment

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		Type	Weight (%)

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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.

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

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the 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.

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

Graduates of the course have been successful in gaining employment in:

- Engineering consultancies and design practices
- Industries:
  · Oil and gas
  · Petrochemical
  · Chemical
  · Pharmaceutical
  · Water
  · Power
  · Food and drink
- Research organisations
- Academic institutions

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COURSE SPECIFICATION

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

COURSE TITLE:	MSc in Procurement and Supply Chain Management

Date of first publication/latest revision:	July 2019

1. What is the course?

Course information

Course Title	MSc in Procurement and Supply Chain Management
Course code	MSPSCFTC, PDPSCFTC, PCPSCFTC
Academic Year	2019/20
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 Demand Chain Management
Course Director	Dr Denyse Julien
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	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	Full-time MSc - one year
Course Start Month(s)	September

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[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

Institutions delivering the course

This course is delivered by the School of Management/Centre for Demand 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 until August 2017.

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.

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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

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- 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

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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)	100
Module 26	0
Thesis Module 27	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 <u>not</u> have discretion to overrule this limit, but can refer a case to Senate's Education Committee);[3] [4]

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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

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- **For Taught Assessments,** the minimum mark for each individual taught assessment <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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.

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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 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	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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	M-L/PSP	Principles of Strategic Procurement	Dr Farooq Habib	20		10	Y	12/11/19	12/11/19	10/12/19	40	ICW	100				13/01/20	
2	M-L/SCSS	Supply Chain Strategy and Sustainability	Dr Heather Skipworth	20		10	Y	07/10/19	07/10/19	07/11/19	40	ICW	100				18/11/19	
3	M-L/ACF	Accounting and Finance	Dr Simon Templar	20		10	Y	30/01/19	30/01/19	10/12/19	40	EX	100				W/C 16/12/19	
4	M-L/ATS	Analytical Techniques for Supply Chain Management	Prof Emel Aktas	30		10	Y	08/01/19	08/01/19	05/12/19	40	ICW	100				06/12/19	
5	M-L/FRT	Freight Transport	Prof Melvyn Peters	20		10	Y	04/01/19	04/01/19	12/01/19	40	ICW	100				20/01/20	
6	M-L/IOM	Inventory and Operations Management	Dr Anurag Tewari	20		10	Y	10/01/19	10/01/19	12/11/19	40	GCW	100				28/11/19	

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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.

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
												Independent Assessment		Multi-part Assessment			Submission dates	
7	M-L/ISB	Information Systems and e-Business	Dr Syed Imran Ali	20		10	Y	13/02/20	13/02/20	25/03/20	40 40	GCW	100				02/05/20	
8	M-L/PMI	Project Management Introduction	Dr Denyse Julien	20		10	Y	Occ-A 03/02/20 Occ-C 10/02/20 Occ-D 17/02/20	03/02/20 12/02/20 19/02/20	05/02/20 12/02/20 19/02/20	40			MULTI 100% MULTI 100% MULTI 100%	GCW GPRAC GCW GPRAC GCW GPRAC	75 25 75 25 75 25	05/02/20, 05/02/20 12/02/20, 12/02/20 19/02/20 19/02/20	
9	M-P/SSE	Supplier Selection and Evaluation	Dr Soroosh Saghiri	20		10	N	14/01/20	14/01/20	31/91/20	40	ICW	100				28/02/20	
10	M-P/NCM	Negotiation and Contract Management	Dr Farooq Habib	20		10	N	13/01/20	13/01/20	27/01/20	40 40	GPRAC ICW	30 70				24/02/20 24/02/20	
11	M-P/BPO	Business Process Outsourcing	Dr Soroosh Saghiri	12		5	Y	16/02/20	16/02/20	20/03/20	40			MULTI 100%	GCW ICW	75 25	19/04/20 19/04/20	
12	M-P/RSC	Designing and Managing Resilient Supply Chains	Dr Uta Jüttner	12		5	Y	16/03/20	16/03/20	19/03/20	40	GCW	100				16/04/20	
13	M-L/OUT	Logistics Outsourcing	Prof Melvyn Peters	12		5	Y	20/01/20	20/01/20	22/01/20	40	ICW	100				16/02/20	
14	M-L/PRR	Planning and Resourcing Road Freight Transport	Prof Melvyn Peters	12		5	Y	02/03/20	02/03/20	04/03/20	40			MULTI 100%	GPRES GCW ICW	10 40 50	03/04/20 03/04/20 03/04/20	
15	M-L/HLR	Humanitarian Logistics	Dr Hendrik Reefke	12		5	Y	17/02/20	17/02/20	19/02/20	40	ICW	100				01/04/20	

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
									Calendar			Assessment						
												Independent Assessment		Multi-part Assessment			Submission dates	
16	M-L/SIM	Simulation	Dr Nicky Yates	12		5	Y	23/03/20	23/03/20	25/03/20	40	ICW	100				09/05/20	
17	M-L/SXS	Six Sigma	Dr Farooq Habib	12		5	Y	13/02/20	13/02/20	14/02/20	40	GCW	100				09/03/20	
18	M-L/PFM	Performance Measurement in the Supply Chain	Dr Andrey Pavlov	12		5	Y	27/01/20	27/01/20	29/01/20	40	GCW	100				23/02/20	
19	M-L/SOP	Sales and Operations Planning	Dr Heather Skipworth	12		5	Y	26/03/20	26/03/20	27/03/20	40	ICW	100				28/04/20	
20	M-L/RLO	Retail Logistics	Prof Michael Bourlakis	12		5	Y	20/02/20	20/02/20	21/02/20	40	ICW	100				20/03/20	
21	M-L/SNCC	Social Network Analysis in a Supply Chain Context	Dr Leila Alinaghian	12		5	Y	03/02/20	03/02/20	05/02/20	40	ICW	100				26/02/20	
22	M-L/BMG	Business Model Generation	Dr Denyse Julien	12		5	Y	24/02/20	24/02/20	26/02/20	40	GCW	100				29/03/20	
23	M-P/FDP	Future of Digital Procurement	Dr Farooq Habib	12		5	Y	09/03/20	09/03/20	10/03/20	40	GCW	100				06/04/20	
24	M-L/BDA	Big Data Analytics for Supply Chain Management	Prof Emel Aktas	12		5	Y	24/02/20	24/02/20	26/02/20		ICW	100				29/03/20	
25	M-L/CSC	Circular Supply Chains	Dr Denyse Julien	12		5	Y	13/01/20	13/01/20	17/01/20				MULTI	GCW GPRC	60 40	09/02/20 09/02/20	
26	M-L/RSM	Research Methods	Dr Denyse Julien	12		0	Y	N/A	N/A	N/A	N/A	AO	N/A				N/A	
27	M-L/THS	Thesis	Supervisors	0		80	Y	08/04/20	08/04/20	02/06/20	50	THESIS	100				05/09/20	

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

Procurement and Supply Chain Management COURSE SPECIFICATION
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7. 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

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review. For collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focussed Review which looks at each course in depth. In addition occasional site inspection visits are made.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guidance provided by the QAA particularly in Chapter B7 (External Examining) which emphasises that external examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

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

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

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

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

and acted on where appropriate by the Education Committee, Senate, School and University Executives.

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

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.

Procurement and Supply Chain Management COURSE SPECIFICATION
Version 1.0 July 2019   :

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 Retail and Digital Banking

Date of first publication/latest revision:	July 2019

1. What is the course?

Course information

Course Title	MSc in Retail and Digital Banking
Course code	MSRDBPTC
Academic Year	2019/20
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
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	MSc - part-time - maximum of 5 years PG Certificate – 3 years PG Diploma – 4 years
Course Start Month(s)	October

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[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
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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.

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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. 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

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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 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. **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) provided that a minimum mark of 50% is achieved in all modules.

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

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

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COMPULSORY MODULES:	
Modules 1-12 Thesis	130 70
ELECTIVE MODULES:	
N/A	0
TOTAL:	200

If the MSc is completed successfully, the student will also obtain the professional qualification ***Chartered Banker Diploma*** provided that a minimum mark of 50% is achieved in all modules.

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

Pass Criteria

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

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

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does <u>not</u> 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 <u>on the first attempt</u> 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 <u>not</u> 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.

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

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6. <u>How is the course structured?</u>

Students register for the course in September and are expected to complete the course within two-three years.

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Course modules – Cohort 2 – October 2019

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

Module Number	Module code	Title	Module Leader	Contact hours	Total hours delivered by Visiting Lecturers	Credits	Is the module shared? Y/N	Calendar			Minimum Mark[4] - 40% or 50%	Assessment							
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates		
												Type of Assessment	Weighting within module (%) of Independent assessments	Weighting within module of multi-part assessment (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment	Assessment Submission and/or exam date[5]	Assessment / Exam Retake date	
1	MXR/EFS Occ R19	Economics of Financial Services	Prof Catarina Figueira	16		10	N	11/11/19	11/11/19	10/02/20	50	GCW	100				02/03/20		
2	MXR/ACB Occ R19	Accounting for Business	Dr Matthias Nnadi	16		10	N	11/11/19	11/11/19	10/02/20	50	EX	100				24/02/20		
3	M-F/FMRE Occ R19	Financial Markets, Regulation and Ethics	Dr Walter Gontarek	16	20	10	Y	09/03/20	09/03/20	01/06/20	50 50	IPRAC GPRES	70 30				04/05/20 01/06/20		
4	MXR/DIB Occ R19	Digital Banking	Prof Catarina Figueira	16	20	10	N	09/03/20	09/03/20	01/06/20	50	ICW	100				22/06/20		
5	M-M/FIN Occ R19	Financial Management	Dr Nemanja Radic	16		10	Y	06/07/20	06/07/20	21/09/20	50	Ex	100				19/10/20		
6	MXR/OBM Occ R19	Organisational Behaviour for Managers	Dr Deirdre Anderson	16		10	Y	06/07/20	06/07/20	21/09/20	50	ICW	100				05/10/20		

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[4] 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.

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

Module Number	Module code	Title	Module Leader	Contact hours	Total hours delivered by Visiting Lecturers	Credits	Is the module shared? Y/N	Calendar Module Start Date (eg Pre-course task)	Calendar 'Residential' Start Date	Calendar 'Residential' End Date	Minimum Mark[4] - 40% or 50%	Independent Assessment Type of Assessment	Independent Assessment Weighting within module (%) of Independent assessments	Multi-part Assessment Weighting within module of multi-part assessment (100%)	Multi-part Assessment Type of Assessment	Multi-part Assessment Weighting of individual elements of multi-part assessment	Submission dates Assessment Submission and/or exam date[5]	Assessment / Exam Retake date
7	MXR/RBM Occ R20	Retail Banking and Product Management	Prof Catarina Figueira	32	40	20	N	26/10/20	26/10/20	07/06/21	50 50	EX ICW	60 40				25/01/21 21/06/21	
8	MXS/GP1 Occ R20	Group Project Challenge and Action Learning	Prof Catarina Figueira	16		10	Y	26/10/20	26/10/20	11/01/21	50			100 MULTI	GCW GPRES ICS	60 20 20	05/02/21 15/02/21 26/02/21	
9	MXM/P2M Occ R20	Programme and Project Management	Dr Steve Carver	20		10	Y	08/02/21	08/02/21	08/03/21	50			100 MULTI	GCW GPRAC	50 50	01/03/21 10/03/21	
10	MXR/NPSD Occ R20	New Product and Service Development	Dr Kader Aoufi	16		10	N	05/07/21	05/07/21	26/07/21	50	GCW	100				30/08/21	
11	M-T/MMT Occ R21	Marketing Management	Dr Ahmed Shaalan	16		10	Y	13/09/21	13/09/21	27/09/21	50	ICW	100				18/10/21	
12	MXR/MAM Occ R20	Modelling & Analysis for Management	Dr Andy Angus/ Dr Costas Alexiou	16		10	N	22/03/21	22/03/21	07/06/21	50	GCW	100				02/07/21	
13	MXR/THS Occ R19	Thesis (workplace project)	Professor Catarina Figueira			70	N	06/01/20	06/01/20	21/09/20	50	THS	100				13/12/21	

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/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

7. 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				
Organisational Management						ICW		ICW		
Retail Banking	EX, ICW	EX, ICW		EX, ICW	EX, ICW			EX, ICW	EX, ICW	

Award ILOs / Module No.	ILO 1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9	ILO10
and Product Management										
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 (%)

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for

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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.

9. **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.

COURSE TITLE: MSc in Robotics

Date of first publication/latest revision: May 2019

1. What is the course?

Course information

Course Title	MSc in Robotics
Course code	MSRBTFTC MSRBTPTC PCRBTFTC (Registry to create PgDip code)
Academic Year	2019/20
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
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University Entry Requirements
UK Qualifications Framework Level	QAA FHEQ level 7
Benchmark	N/A

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[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

Statement(s)	
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

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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:	
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

4

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 <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

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

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

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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%).

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.

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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	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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 assessment10	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
												Independent Assessment		Multi-part Assessment			Submission dates	
1	N-RBT-IND	Induction week for Robotics MSc	Dr Gilbert Tang	12		0		7/10/19	7/10/19	11/10/19		AO						
2	N-RBT-FR	Fundamentals of Robotics	Dr Gilbert Tang	30		10		14/10/19	14/10/19	18/10/19	40	GCW	100				FT 15/11/2019 PT	At the next available

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
																	29/11/2019	opportunity within the same academic year
3	N-RBT-RC	Robotics Control	Seemal Asif	30		10		28/10/19	28/10/19	01/11/19	40	ICW	100				FT 29/11/2019 PT 13/12/2019	At the next available opportunity within the same academic year
4	N-RBT-AIML	Artificial Intelligence and Machine Learning for Robotics	Dr Antonios Antoniadis	30		10		11/11/19	11/11/19	15/11/19	40	ICW	100				FT 03/01/2020 PT 17/01/2020	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

8

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
										Calendar			Independent Assessment	Multi-part Assessment			Submission dates	
5	N-RBT-PMR	Programming Methods for Robotics	Dr Irene Moulitsas	20		10		02/12/19	02/12/19	06/12/19	40	ICW	100				FT 17/01/2020 PT 31/01/2020	At the next available opportunity within the same academic year
6	N-RBT-HRI	Human-Robot Interaction	Dr Gilbert Tang	24		10		16/12/19	16/12/19	20/12/19	40	GCW	100				FT 24/01/2020 PT 07/02/2020	At the next available opportunity within the same academic year
7	N-RBT-MVR	Machine Vision for Robotics	Dr Zeeshan Rana	35		10		27/01/20	27/01/20	31/01/20	40	ICW	100				FT 28/02/2020 PT 13/03/2020	At the next available opportunity within the same academic

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

9

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												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
																		year
8	N-RBT-ARS	Autonomy in Robotic Systems	Dr Luca Zanotti Fragonara	28		10		10/02/20	10/02/20	14/02/20	40	ICW	100				FT 13/03/2020 PT 27/03/2020	At the next available opportunity within the same academic year
9	N-RBT-PES	Psychology, Ethics and Standards	Dr Sarah Fletcher	30		10		13/01/20	13/01/20	17/01/20	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/ Dr Antonios Antoniadis	30		40		02/03/20	02/03/20	15/05/20	50			100	GPROJ/ GPRES	80/ 20	15/05/2020 15/05/2020	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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment Type of Assessment	Weighting within module[8] (%) of Independent assessments	Multi-part Assessment Weighting within module of multi-part assessments [9](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Submission dates Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
10b	N-RBT-DISS	Dissertation in Digital Robotics	Dr Gilbert Tang/ Dr Antonios Antoniadis	20		40		02/03/20	02/03/20	15/05/20	50	IPROJ	100				15/05/2020	N/A
11	N-RBT-THESIS	Individual Research Project	Dr Gilbert Tang	20		80		27/04/20	27/04/20	23/08/20	50			100	THESIS/ IPRES	80/20	28/08/2020 28/08/2020	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

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

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

7. 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. 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
1									
2	GCW	GCW	GCW					GCW	
3	ICW	ICW	ICW			ICW			
4	ICW			ICW		ICW			
5	ICW								
6	GCW	GCW			GCW	GCW		GCW	
7	ICW			ICW		ICW			
8	ICW	ICW				ICW			
9					EX				

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Award ILOs Module No.	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9
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		
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	N/A	N/A

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review. For collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focussed Review which looks at each course in depth. In addition occasional site inspection visits are made.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guidance provided by the QAA particularly in Chapter B7 (External Examining) which emphasises that external examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

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

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

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

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

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

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.

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Version 2.0 May 2019

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 Safety and Accident Investigation (Air Transport) Teach Out

Date of first publication/latest revision: September 2019

1.   What is the course?

Course information

Course Title	MSc in Safety and Accident Investigation (Air Transport)
Course code	MSSAIPTC, PDSAIPTC, PCSAIPTC – Safety and Accident Investigation (Air Transport)
Academic Year	2019/20
Valid entry routes	MSc in Safety and Accident Investigation (Air Transport) PgDip in Safety and Accident Investigation (Air Transport) PgCert in Safety and Accident Investigation (Air Transport)
Additional exit routes	Not Applicable
Mode of delivery	Part-time
Location of Study	Cranfield University
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Transport Systems
Centre	Centre for Safety and Accident Investigation
Course Director	Saryani Asmayawati
Awarding Body	Cranfield University
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	Not Applicable
Registration Period(s) available	Part-time MSc - up to three years, Part-time PgDip - two years, Part-time PgCert - one year
Course Start Month(s)	N/A - teach out only

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Safety and Accident Investigation (Air Transport) COURSE SPECIFICATION

Version 2.1 September 2019

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 management
- Accident investigation
- Risk management
- Human factors

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

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

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

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

The course is not currently accredited.

2. What are the aims of the course?

The aim of the course is to provide students with the knowledge and skills to conduct an air/rail/marine accident investigation in accordance with the standards and recommended practices as inferred by the appropriate guidelines and legislations, including:

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

Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) entry routes are provided for students who wish to access only parts of the course provided. It is also suggested that the latter two qualifications may be more appropriate for students who have no need for a separate Individual Research Project.

This programme is intended for the following range of students:

- Those with a technical or operational background in air, rail, or marine transport
- Those employed as accident investigators
- Those employed in operational safety management
- Other employment sources including military, regulators and manufacturers

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

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

A. **Postgraduate Certificate in Safety and Accident Investigation (Air Transport)**

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

ILO 1.a Demonstrate a fundamental understanding of, and the application thereof to current problems, the process of transport accident investigation including preparation, emergency response, evidence collection, analysis, report writing and making recommendations;

ILO 2.a Understand the statutory obligations of an accident investigator and the competing interests of agencies including the police, Coroner, regulator, operator and manufacturer and incorporate these in investigation processes;

ILO 3.a Identify the evidence sources that may be available to an investigation and personally demonstrate how to collect, preserve and interpret them;

ILO 4.a Examine major accident investigation case studies and critically evaluate their relevance to investigation techniques and aviation safety;

ILO 5.a Critically analyse evidence collected during an investigation, draw conclusions and make recommendations that do not lay blame, are replicable, logical and of sufficient scientific rigour;

ILO 6.a Plan, organise and conduct an accident investigation, on site with due regard to personal safety, evidence preservation, ethics and rigour;

ILO 7.a Appraise and use appropriate techniques for the analysis of evidence;

ILO 8.a Work as part of an accident investigation team with an understanding of the various roles of other team members;

ILO 9.a Compose an accident report in accordance with the structure laid out in national or regional standards;

ILO 10.a Plan and conduct effective presentations of their findings.

B. Postgraduate Diploma in Safety and Accident Investigation (Air Transport)

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

ILO 1. Demonstrate an advanced level of understanding, and application thereof to current problems, within a personal choice of technical areas to be chosen from, for example, but not restricted to, human factors, risk management, forensic science, crashworthiness and wreckage recovery;

ILO 2. Develop personal expertise in the capability of being able to critically evaluate evidence collected within the personal choice of specialist technical areas so as to be able to conduct the investigation of an accident independently without supervision, or as part of a team;

ILO 3. Develop personal management skills so as to be able to lead specialist teams in an area of the investigation in which they have achieved technical competence developed as a result of their academic studies.

C. MSc in Safety and Accident Investigation (Air Transport)

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

ILO 4. Formulate a research task, develop aims and objectives for completing the research task, and setting research hypotheses where appropriate;

ILO 5. Critically assess different methodologies and select an appropriate one to test a particular hypothesis;

ILO 6. Collect primary and secondary data and know how to choose appropriate analysis techniques;

ILO 7. Understand the potential biases that may influence researchers and methods to limit such occurrences;

ILO 8. Conduct a literature review and present it in an appropriate style;

ILO 9. Prepare a scientific thesis and present results based upon the techniques listed above;

ILO 10. Give a presentation to peers about the research project.

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Safety and Accident Investigation (Air Transport) COURSE SPECIFICATION

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4. How is the course taught?

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

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

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:

PgCert in Safety and Accident Investigation (Air Transport)

Description	Credits
COMPULSORY MODULES:	
Modules: 1 and 2	60
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:

PgDip in Safety and Accident Investigation

Description	Credits
COMPULSORY MODULES:	
Modules: 1 and 2 PgDip Project: 14	60 20
ELECTIVE MODULES:	
Four modules selected from: 4- 13	40
TOTAL:	120

C. MSc

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Safety and Accident Investigation (Air Transport) COURSE SPECIFICATION

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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:

MSc in Safety and Accident Investigation

Description	Credits
COMPULSORY MODULES:	
Modules: 1, 2 and 3 Individual Research Project: 15	60 100
ELECTIVE MODULES:	
Four modules selected from: 4- 13	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);[1] [2]
- **For Taught Assessments,** the minimum mark for each individual taught assessment <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is not permissible for you to fail an elective module and then proceed to take a different elective module in its place.

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

[2] 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%).

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Safety and Accident Investigation (Air Transport) COURSE SPECIFICATION

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- **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 MSc students register for the course in January or May and are expected to complete the course within three years.

The basic structure of the programme is summarised below:

A. Postgraduate Certificate (PgCert)

PgCert in Safety and Accident Investigation (Air Transport)
Two compulsory/core modules to be taken in sequential order as follows:

- Fundamentals of Accident Investigation
- Applied Aircraft Accident Investigation

B. Postgraduate Diploma (PgDip)

PgDip in Safety and Accident Investigation (Air Transport)
As for the PgCert route, in addition, students select four modules from differing specialist areas including:

- Core Skills
- Management
- Engineering
- Operations
- Specialist Techniques

In addition to the four modules, PgDip students are required to complete a supervised research report on a subject of their choice within the field of aircraft accident investigation or an allied subject area.

C. MSc

MSc in Safety and Accident Investigation (Air Transport)
Similar to the PgDip route except that, instead of the research report, MSc students are required to complete a supervised Individual Research Project on a subject of their choice within the field of aircraft accident investigation or an allied subject area. The research is expected to go into much greater depth than that required for the PgDip.

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.

MSc in Safety and Accident Investigation (Air Transport)

Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers [4]	Credits	Is the module shared? Y/N	Calendar			Minimum Mark[5] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module6 (%) of Independent assessments	Weighting within module of multi-part assessments [7](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
1	N-SAI-FOI	Fundamentals of Accident Investigation	Leigh Dunn	100		30	Y	09/09/19 (Occ A19)	09/09/19 (Occ A19)	27/09/19 (Occ A19)	50 50 50	ICW (1) ICW (2) ICW (3)	20 30 50				25/11/19 25/11/19 25/11/19	At the next available opportunity which may not be until

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

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

[5] 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%.

[6] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[7] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[8] 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.

0[9] 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

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Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[5] – 40% or 50%	Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
																	(Occ A19)	the course runs the following year
								13/01/20 (Occ B19)	13/01/20 (Occ B19)	31/01/20 (Occ B19)	50 50 50	ICW (1) ICW (2) ICW (3)	20 30 50				30/03/20 30/03/20 30/03/20 (Occ B19)	
								11/05/20 (Occ C19)	11/05/20 (Occ C19)	29/05/20 (Occ C19)	50 50 50	ICW (1) ICW (2) ICW (3)	20 30 50				27/07/20 27/07/20 27/07/20 (Occ C19)	
2	N-SAI-AAAIT	Applied Aircraft Accident Investigation	Alan Parmenter, Saryani Asmayawati	100		30	Y	03/02/20 (Occ A19)	03/02/20 (Occ A19)	21/02/20 (Occ A19)	50 50 50	ICW (1) GPROJ ICW (2)	30 20 50				10/02/20 17/02/20 20/04/20 (Occ A19)	At the next available opportunity which may not be until the course runs the following year
								01/06/20 (Occ B19)	01/06/20 (Occ B19)	19/06/20 (Occ B19)	50 50	ICW(1) GPROJ	30 20				08/06/20 15/06/20	

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

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Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[5] – 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module6 (%) of Independent assessments	Weighting within module of multi-part assessments[7](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
											50	ICW (2)	50				17/08/20 (Occ B19)	
3	N-SAI-RM	Research Methods	Dr Jim Nixon	30		0	N	09/12/19	09/12/19	13/12/19	N/A	AO	n/a				n/a	n/a
4	N-AEN-ASC	Introduction to Aircraft Structural Crashworthiness	Dr Hessam Ghasemnejad	25		10	Y	29/06/20	29/06/20	03/07/20	40	ICW	100				01/09/20	At the next available opportunity which may not be until the course runs the following year
5	N-HFS-FDM	Flight Data Monitoring	Mr David Barry	25		10	Y	16/09/19 (Occ B19)	16/09/19 (Occ B19)	19/09/19 (Occ B19)	40	ICW	100				18/11/19 (Occ B19)	At the next available opportunity which may not be until the course runs the following year
								09/03/20 (Occ A19)	09/03/20 (Occ A19)	12/03/20 (Occ A19)	40	ICW	100				11/05/20 (Occ A19	
6	N-SAI-ISMS	Aviation Safety Management	Dr Simon Mitchell/Mr David Barry	30		10	Y	02/09/19 (Occ A19)	02/09/19 (Occ A19)	06/09/19 (Occ A19)	40	ICW	100				04/11/19 (Occ A19)	At the next available opportunity which may not be until
								30/03/20	30/03/20	03/04/20							01/06/20	

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

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Safety and Accident Investigation (Air Transport) COURSE SPECIFICATION

Version 2.1 September 2019

Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[5] - 40% or 50%	Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7] (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
								(Occ B19)	(Occ B19)	(Occ B19)	40	ICW	100				(Occ B19)	the course runs the following year
7	N-SAI-IHP	Investigating Human Performance	Saryani Asmayawati	30		10	Y	24/02/20	24/02/20	28/02/20	40	ICW	100				27/04/20	At the next available opportunity which may not be until the course runs the following year
8	N-AW-SAAS	Safety Assessment of Aircraft Systems	Dr Simon Place	35		10	Y	11/11/19 (Occ A19) 22/06/20 (Occ B19)	11/11/19 (Occ A19) 22/06/20 (Occ B19)	15/11/19 (Occ A19) 26/06/20 (Occ B19)	40 40			100 MULTI 100 MULTI	ICW GPRES ICW GPRES	70 30 70 30	13/01/20 15/11/19 (Occ A19) 24/08/20 26/06/20 (Occ B19)	At the next available opportunity which may not be until the course runs the following year
9	N-SAI-LSAI	Legal Skills for Accident Investigators	Professor Graham Braithwaite/ Dr Leigh Dunn	30		10	Y	27/04/20	27/04/20	01/05.20	40	ICW	100				29/06/20	At the next available opportunity which may not be until the course runs the following year

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

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Safety and Accident Investigation (Air Transport) COURSE SPECIFICATION

Version 2.1 September 2019

Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[5] – 40% or 50%	Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
									Calendar			Independent Assessment		Assessment	Multi-part Assessment		Submission dates	
10	N-HFS-HFAM	Human Factors in Aviation Maintenance	Cengiz Turkoglu	30		10	Y	30/03/20	30/03/20	03/04/20	40 40	ICW GPRES	90 10				01/06/20 03/04/20	At the next available opportunity which may not be until the course runs the following year
11	N-AEX-CMBC	Crisis Management and Business Continuity	David Barry	24		10	Y	04/11/19	04/11/19	08/11/19	40	ICW	100				06/01/20	At the next available opportunity which may not be until the course runs the following year
12	N-SAI-ITAI	Interviewing Techniques for Accident Investigators	Saryani Asmayawati	30		10	Y	02/03/20	02/03/20	06/03/20	40	ICW	100				05/05/20	At the next available opportunity which may not be until the course runs the following year
13	N-SAI-FMF	Fundamentals of Material Failures for Accident Investigators	Leigh Dunn	30		10	Y	16/03/20	16/03/20	20/03/20	40	ICW	100				18/05/20	At the next available opportunity which may not be until the course runs the following year

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

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Safety and Accident Investigation (Air Transport) COURSE SPECIFICATION

Version 2.1 September 2019

Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Calendar — Module Start Date (eg Pre-course task)	Calendar — 'Residential' Start Date	Calendar — 'Residential' End Date	Minimum Mark[5] - 40% or 50%	Independent Assessment — Type of Assessment	Independent Assessment — Weighting within module[6] (%) of Independent assessments	Multi-part Assessment — Weighting within module of multi-part assessments[7] (100%)	Multi-part Assessment — Type of Assessment	Multi-part Assessment — Weighting of individual elements of multi-part assessment[8]	Submission dates — Assessment Submission and/or exam date[9]	Submission dates — Assessment / Exam Retake date
14	N-SAI-DITHES	PgDip Project	Saryani Asmayawati	20		20	Y	09/12/19	09/12/19	13/12/20	50	ICW	100				13/12/20	
15	N-SAI-THES	Individual Research Project	Saryani Asmayawati	20		100	Y	09/12/19	09/12/19	13/12/20	50 50	THESIS OR	80 20				13/12/20	

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

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Safety and Accident Investigation (Air Transport) COURSE SPECIFICATION

Version 2.1 September 2019

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

MSc in Safety and Accident Investigation (Air Transport)

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
N-SAI-FOI	Fundamentals of Accident Investigation	Safety and Accident Investigation	
N-SAI-AAAIT	Applied Aircraft Accident Investigation	Safety and Accident Investigation	
N-SAI-RM (Shared Teaching)	Research Methods	Safety and Human Factors in Aviation	Safety and Accident Investigation
N-AEN-ASC	Introduction to Aircraft Structural Crashworthiness	Aircraft Engineering	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-SAI-ISMS	Aviation Safety Management	Safety and Accident Investigation	Airworthiness Military Aerospace and Airworthiness Air Transport Management (Executive) Air Transport Management (Full Time) Safety and Human Factors in Aviation Defence and Security (Engineering)
N-SAI-IHP	Investigating Human Performance	Safety and Accident Investigation	
N-AW-SAAS	Safety Assessment of Aircraft Systems	Airworthiness	Military Aerospace and Airworthiness Safety and Human Factors in Aviation

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			Safety and Accident Investigation
N-SAI-LSAI	Legal Skills for Accident Investigators	Safety and Accident Investigation	
N-HFS-HFAM	Human Factors in Aviation Maintenance	Safety and Human Factors in Aviation	Airworthiness Military Aerospace and Airworthiness Safety and Accident Investigation
N-AEX-CMBC	Crisis Management and Business Continuity	Executive Air Transport Management	Safety and Accident Investigation
N-SAI-ITAI	Interviewing Techniques for Accident Investigators	Safety and Accident Investigation	
N-SAI-FMF	Fundamentals of Material Failures for Accident Investigators	Safety and Accident Investigation	

7. **How are the ILOs assessed?**

The following assessment types are utilised:

Safety and Accident Investigation (Air Transport)
The course uses a range of assessment types. Overall, the MSc in Safety and Accident Investigation (Air Transport) has **two** distinct but interrelated elements: the taught modules, and the Individual Research Project. All modules are assessed by a variable combination of written assignments and/or examination, and, in the case of the Individual Research Project, by assessment of the written work and an oral presentation on their research findings.

The two compulsory modules, Fundamentals of Accident Investigation and Applied Aircraft Accident Investigation, include the following types of assessments:

- Group exercises
- Individual written reports (reflection notes)
- Course test
- Major field exercise
- Accident investigation report
- Essays

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

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

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- Formulate responses to specific questions against a time limit

This approach has been adopted in order to facilitate the completion of the course by part-time students, often from abroad, without the need to return for examinations. However, some modules are examined and this may influence the selection of modules by students.

For those continuing to MSc level, a formal Individual Research Project has to be presented at the end of the registration period and must demonstrate competency in hypothesis formation, literature review, methodology, analysis, conclusion forming and presentation. Students will also be asked to give a formal oral presentation on their research findings.

Assessment and ILO Mapping

A. Postgraduate Certificate in Safety and Accident Investigation (Air Transport)

Award ILOs / Module No.	ILO 1.a	ILO 2.a	ILO 3.a	ILO 4.a	ILO 5.a	ILO 6.a	ILO 7.a	ILO 8.a
1	ICW (2)	ICW (3)	ICW (1)					
2	ICW (2)		GPROJ	ICW (1)	GPROJ	GPROJ	GPROJ	GPROJ

B. Postgraduate Diploma in Safety and Accident Investigation (Air Transport)

In addition to those outlined for the Postgraduate Certificate in Safety and Accident Investigation (Air Transport), the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 11	ILO 12	ILO 13
4	ICW	ICW	ICW
5	ICW	ICW	ICW
6	ICW	ICW	ICW
7	ICW	ICW	ICW
8	ICW	ICW GPRES	ICW GPRES
9	ICW	ICW	ICW
10	ICW	GPRES	GPRES
11	ICW	ICW	ICW
12	ICW	ICW	ICW
13	ICW	ICW	ICW
14	ICW	ICW	ICW

C. MSc in Safety and Accident Investigation (Air Transport)

In addition to those outlined above for the Postgraduate Diploma in Safety and Accident Investigation (Air Transport), the Award intended learning outcomes are assessed by the following module assessments:

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Award ILOs Module No.	ILO 14	ILO 15	ILO 16	ILO 17	ILO 18
15	THESIS	THESIS	THESIS	THESIS	THESIS

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

Title	Modules Covered	Assessment	
		Type	Weight (%)

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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.

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

New Partnership arrangements are considered in two stages:

1. The University Executive is responsible for ensuring appropriate due diligence has been undertaken in respect of the University's legal, financial, reputational and ethical responsibilities.
2. A Partnership Delivery Approval Panel then considers whether the proposal meets the 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.

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

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

COURSE SPECIFICATION

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

COURSE TITLE:	MSc in Safety and Accident Investigation

Date of first publication/latest revision:	September 2019

1. What is the course?

Course information

Course Title	MSc in Safety and Accident Investigation
Course code	NEW COURSE CODE
Academic Year	2019/20
Valid entry routes	MSc in Safety and Accident Investigation PgDip in Safety and Accident Investigation PgCert in Safety and Accident Investigation
Additional exit routes	Not Applicable
Mode of delivery	Part-time
Location of Study	Cranfield University
School(s)	School of Aerospace, Transport and Manufacturing
Theme	Transport Systems
Centre	Centre for Safety and Accident Investigation
Course Director	Saryani Asmayawati
Awarding Body	Cranfield University
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	Not Applicable
Registration Period(s) available	Part-time MSc - up to three years, Part-time PgDip - two years, Part-time PgCert - one year
Course Start Month(s)	January or May

Safety and Accident Investigation COURSE SPECIFICATION

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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 management
- Accident investigation
- Risk management
- Human factors

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

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

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

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

The course is not currently accredited.

2. What are the aims of the course?

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

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

Postgraduate Diploma (PgDip) and Postgraduate Certificate (PgCert) entry routes are provided for students who wish to access only parts of the course provided. It is also suggested that the latter two qualifications may be more appropriate for students who have no need for a separate Individual Research Project.

This programme is intended for the following range of students:

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

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

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

A. **Postgraduate Certificate in Safety and Accident Investigation**

Safety and Accident Investigation COURSE SPECIFICATION

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

ILO 1. Demonstrate a fundamental understanding of, and the application thereof to current problems, the approach to safety-oriented accident investigation and accident causation theories;

ILO 2. Understand the roles and responsibilities of an accident investigator and the competing interests of various stakeholders and incorporate this in investigation processes;

ILO 3. Identify the evidence sources that may be available to an investigation and personally demonstrate how to collect, preserve and interpret them;

ILO 4. Examine accident investigation case studies and critically evaluate their relevance to investigation techniques and safety improvements;

ILO 5. Critically analyse evidence collected during an investigation using appropriate techniques, draw conclusions and make recommendations that do not lay blame, are replicable, logical and of sufficient scientific rigour;

ILO 6. Plan, organise and conduct an accident investigation with due regard to personal safety, evidence preservation, ethics and rigour;

ILO 7. Work as part of an accident investigation team with an understanding of the various roles of other team members;

ILO 8. Plan and compose written reports in accordance with applicable standards or good practice guidelines;

B. Postgraduate Diploma in Safety and Accident Investigation

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

ILO 9. Develop knowledge and personal expertise in analysing evidence collected within specialist technical areas;

C. MSc in Safety and Accident Investigation
In addition to the intended learning outcomes outlined for the Postgraduate Certificate, a diligent student would also be expected to:

ILO 10. Identify a research question and develop aims and objectives accordingly;

ILO 11. Critically assess different research methodologies and apply valid and reliable methods;

ILO 12. Collect and manage required data taking into consideration research ethics;

ILO 13. Critically evaluate literature and present it in an appropriate style;

ILO 14. Prepare a scientific thesis and communicate the research approach and results appropriately.

4. How is the course taught?

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

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

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

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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:

PgCert in Safety and Accident Investigation

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

B. Postgraduate Diploma

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

PgDip in Safety and Accident Investigation

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

C. MSc

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

MSc in Safety and Accident Investigation

Description	Credits
COMPULSORY MODULES:	
Modules: 1 and 3 Individual Research Project: 18	40 90
ELECTIVE MODULES:	

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Three or more modules selected from 2, 4-16	70
TOTAL:	200

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

Pass Criteria

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

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

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does <u>not</u> have discretion to overrule this limit, but can refer a case to Senate's Education Committee);[1] [2]
- **For Taught Assessments,** the minimum mark for each individual taught assessment <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

Part-time students register for the course in January or May and MSc students are expected to complete the course within three years. LQ applicants are encouraged to register as Associate Students and can apply for an award after successfully completing at least 30 credits.

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

[2] 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%).

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The basic structure of the programme is summarised below:

A. Postgraduate Certificate (PgCert)

PgCert in Safety and Accident Investigation
Students start with compulsory module (Fundamentals of Accident Investigation), and then choose from the following:

- Applied Aircraft Accident Investigation (30 credits)
- Applied Marine Accident Investigation (30 credits)
- Applied Rail Accident Investigation (30 credits)
- All three 10-credit modules as follows:
    - Investigating Human Performance
    - Interviewing Techniques for Accident Investigators
    - Analysis Techniques for Accident Investigators

B. Postgraduate Diploma (PgDip)

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

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

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

C. MSc

MSc in Safety and Accident Investigation
In addition to completing the taught modules that made up the PgDip, MSc students are required to complete a supervised Individual Research Project on a subject of their choice within the field of accident investigation or safety management. The research is expected to go into much greater depth than that required for the PgDip.

Safety and Accident Investigation COURSE SPECIFICATION
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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.

MSc in Safety and Accident Investigation

Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers [4]	Credits	Is the module shared? Y/N	Calendar			Minimum Mark[5] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7] (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
1	N-SAI-FOI	Fundamentals of Accident Investigation	Leigh Dunn	100		30	Y	09/09/19 (Occ A18)	09/09/19 (Occ A18)	27/09/19 (Occ A18)	50 50 50	ICW (1) ICW (2) ICW (3)	20 30 50				25/11/19 25/11/19 25/11/19 (Occ	At the next available opportunity which may not be until the course runs

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

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

[5] 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%.

[6] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[7] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[8] 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.

[0][9] 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

Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' End Date	Minimum Mark[5] - 40% or 50%	Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7] (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
	N-SAI-FOI	Fundamentals of Accident Investigation	Leigh Dunn	100		30	Y	13/01/20 (Occ B18)	13/01/20 (Occ B18)	31/01/20 (Occ B18)	50 50 50	ICW (1) ICW (2) ICW (3)	20 30 50				A18) 30/03/20 30/03/20 30/03/20 (Occ B18)	the following year
								11/05/20 (Occ C18)	11/05/20 (Occ C18)	29/05/20 (Occ C18)	50 50 50	ICW (1) ICW (2) ICW (3)	20 30 50				27/07/20 27/07/20 27/07/20 (Occ C18)	
2	N-SAI-AAAIT	Applied Aircraft Accident Investigation	Alan Parmenter, Saryani Asmayawati	100		30	Y	03/02/20 (Occ A19)	03/02/20 (Occ A19)	21/02/20 (Occ A19)	50 50 50	ICW (1) GPROJ ICW (2)	30 20 50				10/02/20 17/02/20 20/04/20 (Occ A19)	At the next available opportunity which may not be until the course runs the following year
								01/06/20 (Occ B19)	01/06/20 (Occ B19)	19/06/20 (Occ B19)	50 50 50	ICW(1) GPROJ ICW (2)	30 20 50				08/06/20 15/06/20 17/08/20 (Occ B19)	
3	N-HFS-RMS	Research Methods	Dr Jim Nixon	30		10	Y	09/12/19	09/12/19	13/12/19	40	ICW	100				10/02/20	At the next available

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

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Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' End Date	Minimum Mark[5] – 40% or 50%	Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
																		opportunity which may not be until the course runs the following year
4	N-AEN-ASC	Introduction to Aircraft Structural Crashworthiness	Dr Hessam Ghasemnejad	25		10	Y	29/06/20	29/06/20	03/07/20	40	ICW	100				01/09/20	At the next available opportunity which may not be until the course runs the following year
5	N-HFS-FDM	Flight Data Monitoring	Mr David Barry	25		10	Y	16/09/19 (Occ B19)	16/09/19 (Occ B19)	19/09/19 (Occ B19)	40	ICW	100				18/11/19 (Occ B19)	At the next available opportunity which may not be until the course runs the following year
								09/03/20 (Occ A19)	09/03/20 (Occ A19)	12/03/20 (Occ A19)	40	ICW	100				11/05/20 (Occ A19	
6	N-SAI-ISMS	Aviation Safety Management	Dr Simon Mitchell/Mr David Barry	30		10	Y	02/09/19 (Occ A19)	02/09/19 (Occ A19)	06/09/19 (Occ A19)	40	ICW	100				04/11/19 (Occ A19)	At the next available opportunity which may not be until the course runs the following year
								30/03/20 (Occ B19)	30/03/20 (Occ B19)	03/04/20 (Occ B19)							01/06/20 (Occ B19)	

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

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Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[5] - 40% or 50%	Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7] (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
7	N-SAI-IHP	Investigating Human Performance	Saryani Asmayawati	30		10	Y	24/02/20	24/02/20	28/02/20	40	ICW	100				27/04/20	At the next available opportunity which may not be until the course runs the following year
8	N-AW-SAAS	Safety Assessment of Aircraft Systems	Dr Simon Place	35		10	Y	11/11/19 (Occ A19) 22/06/20 (Occ B19)	11/11/19 (Occ A19) 22/06/20 (Occ B19)	15/11/19 (Occ A19) 26/06/20 (Occ B19)	40 40			100 MULTI 100 Multi	ICW GPRES ICW GPRES	70 30 70 30	13/01/20 15/11/19 (Occ A19) 24/08/20 26/06/20 (Occ B19)	At the next available opportunity which may not be until the course runs the following year
9	N-SAI-LSAI	Legal Skills for Accident Investigators	Professor Graham Braithwaite/ Dr Leigh Dunn	30		10	Y	27/04/20	27/04/20	01/05.20	40	ICW	100				29/06/20	At the next available opportunity which may not be until the course runs the following year
10	N-HFS-HFAM	Human Factors in Aviation	Cengiz Turkoglu	30		10	Y	30/03/20	30/03/20	03/04/20	40 40	ICW GPRES	90 10				01/06/20 03/04/20	At the next available

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

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Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' End Date	Minimum Mark[5] - 40% or 50%	Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7] (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
		Maintenance																opportunity which may not be until the course runs the following year
11	N-AEX-CMBC	Crisis Management and Business Continuity	David Barry	24		10	Y	04/11/19	04/11/19	08/11/19	40	ICW	100				06/01/20	At the next available opportunity which may not be until the course runs the following year
12	N-SAI-ITAI	Interviewing Techniques for Accident Investigators	Saryani Asmayawati	30		10	Y	02/03/20	02/03/20	06/03/20	40	ICW	100				05/05/20	At the next available opportunity which may not be until the course runs the following year
13	N-SAI-FMF	Fundamentals of Material Failures for Accident Investigators	Leigh Dunn	30		10	Y	16/03/20	16/03/20	20/03/20	40	ICW	100				18/05/20	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

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Module Number	Module code	Title	Module Leader	Contact hours[3]	Total hours delivered by Visiting Lecturers[4]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' End Date	Minimum Mark[5] - 40% or 50%	Type of Assessment	Weighting within module[6] (%) of Independent assessments	Weighting within module of multi-part assessments[7] (100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[8]	Assessment Submission and/or exam date[9]	Assessment / Exam Retake date
																		be until the course runs the following year
14	N-SAI-ATAI (new code)	Analysis Techniques for Accident Investigators	Saryani Asmayawati	30		10	N	29/06/20	29/06/20	03/07/20	40	ICW	100				01/09/20	At the next available opportunity which may not be until the course runs the following year
15	N-SAI-AMAI	Applied Marine Accident Investigation	Alan Parmenter	100		30	N	NOT CURRENTLY OFFERED			50 50 50	ICW (1) GPROJ ICW (2)	30 20 50				N/A	N/A
16	N-SAI-ARAI	Applied Rail Accident Investigation	Saryani Asmayawati	100		30	N	NOT CURRENTLY OFFERED			50 50 50	ICW (1) GPROJ ICW (2)	30 20 50				N/A	N/A
17	N-SAI-DITHES	PgDip Project	Saryani Asmayawati	20		20	Y	09/12/19	09/12/19	13/12/20	50	ICW	100				13/12/20	
18	N-SAI-THESIS (new code)	Individual Research Project	Saryani Asmayawati	20		90	Y	09/12/19	09/12/19	13/12/20	50 50	THESIS OR	90 10				13/12/20	

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

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

MSc in Safety and Accident Investigation (Air Transport)

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

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			Safety and Human Factors in Aviation Safety and Accident Investigation (Air Transport)
N-SAI-LSAI	Legal Skills for Accident Investigators	Safety and Accident Investigation	Safety Accident and Investigation (Air Transport)
N-HFS-HFAM	Human Factors in Aviation Maintenance	Safety and Human Factors in Aviation	Airworthiness Military Aerospace and Airworthiness Safety and Accident Investigation (Air Transport)
N-AEX-CMBC	Crisis Management and Business Continuity	Executive Air Transport Management	Safety and Accident Investigation (Air Transport)
N-SAI-ITAI	Interviewing Techniques for Accident Investigators	Safety and Accident Investigation	Safety and Accident Investigation (Air Transport)
N-SAI-FMF	Fundamentals of Material Failures for Accident Investigators	Safety and Accident Investigation	Safety and Accident Investigation (Air Transport)

7. How are the ILOs assessed?

The following assessment types are utilised:

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

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

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

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

Assessment and ILO Mapping

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A. Postgraduate Certificate in Safety and Accident Investigation

Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8
1	ICW (1) ICW (2) ICW (3)	ICW (1)	ICW (1) ICW (3)	ICW (1)	ICW (3)	ICW (1) ICW (2) ICW (3)	ICW (1) ICW (3)	ICW (3)
2	ICW (1) GPROJ ICW (2)	GPROJ	GPROJ	ICW (1)	GPROJ ICW (2)	GPROJ	GPROJ	GPROJ ICW (2)
7	ICW		ICW		ICW			ICW
12	ICW		ICW	ICW	ICW	ICW		ICW
14	ICW			ICW	ICW			ICW
15	ICW (1) GPROJ ICW (2)	GPROJ	GPROJ	ICW (1)	GPROJ ICW (2)	GPROJ	GPROJ	GPROJ
16	ICW (1) GPROJ ICW (2)	GPROJ	GPROJ	ICW (1)	GPROJ ICW (2)	GPROJ	GPROJ	GPROJ ICW (2)

B. Postgraduate Diploma in Safety and Accident Investigation

In addition to those outlined for the Postgraduate Certificate in Safety and Accident Investigation the Award intended learning outcomes are assessed by the following module assessments:

Award ILOs / Module No.	ILO 9
2	ICW (1) GPROJ ICW (2)
4	ICW
5	ICW
6	ICW
7	ICW
8	ICW
9	ICW
10	ICW
11	ICW
12	ICW
13	ICW
14	ICW
15	ICW (1) GPROJ ICW (2)
16	ICW (1) GPROJ

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Award ILOs Module No.	ILO 9
	ICW (2)

C. MSc in Safety and Accident Investigation

In addition to those outlined above for the Postgraduate Diploma in Safety and Accident Investigation (Air Transport), 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
18	THESIS	THESIS	THESIS	THESIS	THESIS OR

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

Title	Modules Covered	Assessment	
		Type	Weight (%)

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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.

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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.

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

All students are part-time and are usually in full-time employment. However, the MSc prepares them for a higher level of responsibility in safety and accident investigation field, and allied

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careers. Feedback from past students (the course was launched in 2005) shows that employers regard Cranfield's provision in this area as being world-leading.

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COURSE SPECIFICATION

Cranfield University: Course Specifications	

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

COURSE TITLE:	MSc in Safety and Human Factors in Aviation

Date of first publication/latest revision:	September 2019

1. What is the course?

Course information

Course Title	MSc in Safety and Human Factors in Aviation
Course code	MSSHAFTC, MSSHAPTC, PCSHAPTC
Academic Year	2019/20
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 Simon Place, Programme Director
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	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)	Not Applicable
Registration Period(s)	Full-time all routes - one year, Part-time MSc & PGDip - up to three

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[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

available	years, Part-time PgCert - two years
Course Start Month(s)	October

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 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 ;

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

B. PGDip
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 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 modules as detailed below:

Description	Credits
COMPULSORY MODULES:	
Module 1: Course Introduction Modules: 3, 4 and 7	0 30 (10 credits each)
ELECTIVE MODULES:	
Any three other credit bearing modules chosen from course modules: 2, 5, 6, 8, 9, 12, 13, 14,.	30 (10 credits each)
TOTAL:	60

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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: 2-11	0 100 (10 credits each)
ELECTIVE MODULES:	
Modules selected from: 12-14 to the value of 20 credits	20 (10 credits each)
TOTAL:	120

C.   MSc

In addition to the requirement for the Postgraduate Diploma, 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: 2-11 Individual Research Project: 16	0 100 (10 credits each) 80
ELECTIVE MODULES:	
Modules selected from: 12-14 to the value of 20 credits	20 (10 credits each)
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

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the course of your studies (Please note that the board of examiners does <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

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

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

The MSc course consists of studying 8 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 specified as part of the MSc course excluding the Capstone project.

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[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%).

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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	Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' 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
									Calendar				Independent Assessment		Multi-part Assessment			Submission dates	
1	N-HFS-IND	Safety and Human Factors in Aviation Course Induction	Dr Jim Nixon	15	0	0	N	30/09/19	30/09/19	04/10/19	N/A	AO	N/A				N/A	N/A
2	N-HFS-IHF	Cognitive Ergonomics	Dr Jim Nixon	30	0	10	N	07/10/19	07/10/19	11/10/19	40	ICW	100				FT 11/11/19 PT 09/12/19	At the next available opportunity which may not be until

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[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 taught average is ≥50%.

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Type of Assessment (Independent Assessment)	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments[9] (100%)	Type of Assessment (Multi-part)	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
																		the course runs the following year
3	N-AW-SAAS (Occ C)	Safety Assessment of Aircraft Systems	Dr Simon Place	35	15	10	Y	13/01/20	13/01/20	17/01/20	50			100 MULTI	GPRES ICW	30 70	FT & PT 17/01/20 FT17/02/20 PT16/03/20	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	21/10/19	21/10/19	25/10/19	50	ICW	100				FT 25/11/19 PT 02/01/20	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	04/11/19	04/11/19	08/11/19	40	EX	100				Exam Week 3	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	09/12/19	09/12/19	13/12/19	50	ICW	100				FT 13/01/20 PT 10/02/20	At the next available opportunity which

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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
																		may not be until the course runs the following year
7	N-SAI-ISMS Occ C	Aviation Safety Management	Dr Simon Mitchell David Barry	30	10	10	Y	10/02/20	10/02/20	14/02/20	50	ICW	100				FT 16/03/20 PT 14/04/20	At the next available opportunity which may not be until the course runs the following year
8	N-HFS-OH	Aviation Medicine	Dr Simon Place	30	30	10	N	18/11/19	18/11/19	22/11/19	40	EX	100				Exam Week 3	At the next available opportunity which may not be until the course runs the following year
9	N-HFS-AAI	Aircraft Accident Investigation and Response	Dr Leigh Dunn	30	10	10	Y	20/04/20	20/04/20	24/04/20	40	ICW	100				FT 26/05/20 PT 22/06/20	At the next available opportunity which may not be until the course runs the following year
10	N-HFS-ASA	Applied Safety Assessment	Dr Simon Place	15	15	10	N	27/01/20	27/01/20	31/01/20	40			100 MULTI	GCW	50	FT & PT 31/01/20	At the next available

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

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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 Module Start Date (eg Pre-course task)	Calendar 'Residential' Start Date	Calendar 'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment Type of Assessment	Weighting within module[8] (%) of Independent assessments	Weighting within module of multi-part assessments [9](100%)	Multi-part Assessment Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Submission dates Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
															ICW	50	FT 02/03/20 PT 30/03/20	opportunity which may not be until the course runs the following year
11	N-HFS-SHFCP	Safety and Human Factors 'Capstone' Project	Dr Simon Place	10	0	10	N	11/05/20	11/05/20	15/05/20	40	GCW	50				FT & PT 15/05/20	At the next available opportunity which may not be until the course runs the following year
											40	GPRES	25				FT & PT 15/05/20	
											40	ICW	25				FT 15/06/20 PT13/07/20	
12	N-HFS-TS	Training and Simulation*	Dr Wen-Chin Li	30	2	10	N	24/02/20	24/02/20	28/02/20	40	ICW	100				FT30/03/20 PT 27/04/20	At the next available opportunity which may not be until the course runs the following year
13	N-HFS-HFAM	Human Factors in Aviation Maintenance*	Cengiz Turkoglu	30	10	10	Y	30/03/20	30/03/20	03/04/20	40	GPRES	10				Ft & PT 03/04/20	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

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' 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
											40	ICW	90				FT 05/05/20 PT 01/06/20	be until the course runs the following year
14	N-HFS-FDM Occ A	Flight Data Monitoring	David Barry	25	22	10	Y	09/03/20	09/03/20	12/03/20	40	ICW	100				FT14/04/20 PT 11/05/20	At the next available opportunity which may not be until the course runs the following year
15	N-HFS-WJD	Work and Job Design*	Dr Simon Place	30		10	N	NOT CURRENTLY AVAILABLE			40	ICW	100				N/A	yearn/A
16	N-HFS-THESIS	Individual Research Project (MSc)	Dr Jim Nixon	20	0	80	N	07/10/19	07/10/19	04/09/20	50 50	THESIS OR	90 10				07/09/20 09/09/20	

Please note that this Elective module is subject to availability. Please contact your SAS Lead for further information.

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

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

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
N-AW-SAAS	Safety Assessment of Aircraft Systems	Airworthiness	Military Aerospace and Airworthiness Safety and Accident Investigation Safety and Accident Investigation (Air Transport)
N-SAI-ISMS	Aviation Safety Management	Safety and Accident Investigation	Airworthiness Air Transport Management (Executive) F-T Air Transport Management Military Aerospace and Airworthiness Safety and Accident Investigation (Air Transport)
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 Safety and Accident Investigation (Air Transport)
N-HFS-FDM	Flight Data Monitoring	Safety and Human Factors in Aviation	Safety and Accident Investigation Safety and Accident Investigation (Air Transport)
N-HFS-RMS (assessed) N-SAI-RM (non-assessed)	Research Methods	Safety and Human Factors in Aviation	Safety and Accident Investigation (Air Transport) Safety and Accident Investigation

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7. 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	ICW	ICW	ICW		
4	ICW	ICW	ICW	ICW	ICW		
5	EX	EX	ICW				
6		ICW					ICW
7	ICW	ICW	ICW	ICW	ICW		
8	EX	EX					
9	ICW	ICW					
10		ICW		GCW	GPRES		
11			ICW	GCW	GPRES		
12	ICW	ICW	ICW			ICW	
13	ICW	ICW	ICW		GPRES	ICW	
14	ICW	ICW				ICW	
15	ICW	ICW				ICW	ICW
16					OR		THESIS

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

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

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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

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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.

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

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.

COURSE TITLE:	MSc in Strategic Marketing

Date of first publication/latest revision:	June 2019

1. What is the course?

Course information

Course Title	MSc in Strategic Marketing
Course code	MSSTMFTC, PDSTMFTC, PCSTMFTC
Academic Year	2019/20
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
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
Course Start Month(s)	September

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[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

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. <u>What should students expect to achieve in completing the course?</u>

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

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.

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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 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.   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 <u>not</u> have discretion to overrule this limit, but can refer a case to Senate's Education Committee);[3] [4]

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[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%.

- **For Taught Assessments,** the minimum mark for each individual taught assessment <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o if you fail to attain the minimum mark for **<u>up to 30 learning credits</u>**, 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);
  - o if, having failed to attain the minimum mark for 30 learning credits, you fail to obtain the minimum mark for **<u>any additional learning credits</u>** 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

Full-time students register for the course in September and are expected to complete the course within around 11 calendar months.   The course is run in either two streams or in only one stream (depending on the size of the cohort).

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%).

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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module8 (%) 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	M-K-SMP	Strategic Marketing and Planning	Dr Ahmed Shaalan	20		10	N	27.04.20	27.04.20	01.05.20	40 40	Integrated assessment						
2	M-K/MCP	Marketing Consulting Project	Prof Stan Maklan	20		10	N	13.03.20	13.03.20	20.03.20		ICW 50% GPRE 50%					22.05.20 20.03.20	
3	M-K-AFS	Accounting and Finance for Strategic Marketing	Dr Simon Templar	20		10	N	20.01.20	20.01.20	11.03.20								
4	M-K/MBS	Managing Brands	Dr Dennis Esch	20		10	N	22.01.20	22.01.20	05.02.20	40 40	Integrated assessment						
5	M-K/IMC	Integrated Marketing Communications	Dr Tamira King	20		10	N	21.01.20	21.01.20	26.02.20		ICW 70% GPRES 30%					27.03.20 10.03.20 & 11.03.20	
6	M-K/DIR	Digital and Social Media Marketing	Dr Annmarie Hanlon	20		10	N	13.01.20	13.01.20	17.01.20								

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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.

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module8 (%) 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
7	M-K/ROM	Retailing and Omnichannel Management	Dr Tamira King	20		10	N	06.11.19	06.11.19	28.11.19	40	Integrated Assessment					16.12.19	
8	M-K/CRM	Customer Relationship Marketing and Customer Experience	Dr Tamira King	20		10	N	08.10.19	08.10.19	31.10.19		ICW 100%						
9	M-K/CKM	B2B Customer and Key Account Management	Dr Beth Rogers	20		10	N	07.10.19	07.10.19	31.10.19	40	Integrated Assessment					09.12.19	
10	M-K/SKM	Sales Management	Dr Beth Rogers	20		10	N	04.11.19	04.11.19	14.11.19		ICW100%						
11	M-K-BIA	Big Data, Insights and Analytics	Prof Stan Maklan	60		30	N	14.10.19	14.10.19	20.04.20	40 40	EX ICW	60 40				15.05.20 29.05.20	
12	M-K/THS	Thesis – review and submission process	Dr Ian Crawford	10		70	N	N/A	01.05.20	11.09.20	50	THESIS	100				11.09.20 @ 14:00	

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

7. 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.

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; Accounting and Finance for Strategic Marketing	ICW GPRES	50 50
Integrated Assessment	Managing Brands; Integrated Marketing Communications; Digital and Social Media Marketing;	ICW GPRES	70 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

8. **How will the University assure the quality of the provision?**

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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.

9. **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

<table>
<tr><td colspan="2">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.</td></tr>
</table>

Date of first publication/latest revision:	16/10/2019

1. What is the course?

Course information

Course Title	Systems Engineering
Course code	MSSEEPTC - PDSEEPTC - PCSEEPTC - MSSEEATC
Academic Year	2019-20
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
Admissions body	Cranfield University

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[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

1

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 and PgDip
Course Start Month(s)	January

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 IMechE or 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.

2

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 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

3

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?**

4

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
Introduction to Systems and Systems Engineering	10
Enterprise Management	10
Problem Analysis and System Definition	10
System Design and Realisation	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	0
Introduction to Systems and Systems Engineering	10
Enterprise Management	10
Problem Analysis and System Definition	10
System Design and Realisation	10
System Design and Realisation Workshop	10
Problem Analysis and System Definition Workshop	10
Research Methods	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	0
Introduction to Systems and Systems Engineering	10
Enterprise Management	10
Problem Analysis and System Definition	10
System Design and Realisation	10
System Design and Realisation Workshop	10
Problem Analysis and System Definition Workshop	10
Research Methods	10

5

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 <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

Part-time students register for the course in January 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.

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

6

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. <u>Course Level Assessment Strategy</u>[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 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".

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[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	Credits	Is the module shared? Y/N	Calendar			Assessment							
								Module Start Date (eg Pre-course task)	On-Site Start Date	On-Site End Date	Minimum Mark[7] – 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												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	13/01/20	13/01/20	17/01/20	N/A	AO	n/a	N/A	N/A	N/A	N/A	N/A
1	R-SEE-ISSE	Introduction to Systems & Systems Engineering	Mr Sean Price	30	0	10	Y	13/01/20	13/01/20 05/03/20	17/01/20 06/03/20 03/04/20 (Module end date)	50	ICW	100	N/A	N/A	N/A	06/04/20	01/06/20

[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

8

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	On-Site Start Date	On-Site 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
2	R-SEE-EM	Enterprise Management	Mr Matthew Summers	25		10	Y	04/05/20	25/06/20	27/06/20 14/08/20 (Module End Date)	50	ICW	100	N/A	N/A	N/A	17/08/20	12/10/20
3	R-SEE-PASD	Problem Analysis and System Definition	Mr Richard Adcock	25		10	Y	24/02/20	28/04/20	30/04/20 22/05/20 (Module End Date)	50	ICW	100	N/A	N/A	N/A	27/05/20	22/07/20
4	R-SEE-SDR	System Design and Realisation	Dr Tim Ferris	25		10	Y	07/09/20	25/09/20 20/11/20	26/09/20 21/11/20 18/12/20 (Module End Date)	50	ICW	100	N/A	N/A	N/A	21/12/20	15/02/21
5	R-SEE-PASDW	Problem Analysis and System Definition Workshop	Dr Steve Barker	40		10	N	25/05/20	13/07/20	14/07/20 14/08/20 (Module End Date)	50	ICW	100	N/A	N/A	N/A	17/08/20	12/10/20
6	R-SEE-SDRW	System Design and Realisation Workshop	Dr Raju Pathmeswaran	40	0	10	N	06/09/21	02/11/21	04/11/21	50	ICW	100	N/A	N/A	N/A	29/11/21	24/01/22

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

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Quality Assurance and Enhancement V1.0 October 2019

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	On-Site Start Date	On-Site 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
7	R-SEE-RM	Research Methods	Dr Steve Barker	10		10	N	04/01/21	N/A	N/A	50	ICW	100	N/A	N/A	N/A	19/04/21	14/06/21
8	R-SEE-HSE	Human Systems Engineering	Dr Fanny Camelia	25	0	10	N	04/01/21	17/03/21	18/03/21	50	ICW	100	N/A	N/A	N/A	19/04/21	14/06/21
9	R-SEE-DR	Dependability and Resilience	Dr Tim Ferris	25	0	10	N	26/04/21	14/05/21 16/07/21	15/04/21 17/07/21	50	ICW	100	N/A	N/A	N/A	09/08/21	04/10/21
10	R-SEE-SSEL	Simulation in the Systems Engineering Lifecycle	Mr Sean Price	25		10	N	07/09/20	18/11/20	19/11/20 18/12/20 (Module End Date)	50	ICW	100	N/A	N/A	N/A	21/12/20	15/02/21
11	R-SEE-SCSE	Software and Cyber Systems Engineering	Dr Raju Pathmeswaran	25		10	N	26/04/21	22/06/21	23/06/21	50	ICW	100	N/A	N/A	N/A	09/08/21	04/10/21
12	R-SEE-MS	Megaproject Systems	Mr Matthew Summers	30		10	N	06/09/21	08/10/21 19/11/21	09/10/21 20/11/21	50	MULTI		100%	GPRES GCW	60% 40%	20/11/21 20/12/21	TBA 14/02/22

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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting	Credits	Is the module shared? Y/N	Calendar			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	On-Site Start Date	On-Site End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
13	R-SEE-THESIS	Thesis	Mr Sean Price	50	0	80	N	29/11/21	N/A	N/A	50	THESIS	100	N/A	N/A	N/A	12/01/23	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

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Quality Assurance and Enhancement V1.0 October 2019

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

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						

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Award ILOs / Module No.	ILO 1	ILO 2	ILO 3	ILO 4				
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								

13

Award ILOs / Module No.	ILO 10	ILO 11	ILO 12	ILO 13	ILO 14				
4									
5									
6									
7	ICW	ICW			ICW				
8									
9									
10									
11									
12									
13	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.

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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

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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.

COURSE TITLE: Systems Engineering for Defence Capability

Date of first publication/latest revision: 18/6/19

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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	2019-20
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]	Yes
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)

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[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

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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)	September and January

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.

The 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

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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.

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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

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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:	
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
    Decision Analysis, Modelling and Support
    Human Centric Systems Engineering
    Model Based Systems Engineering
    Networked and Distributed Simulation
    Systems of Systems Engineering
    Simulation and Synthetic Environments
    Systems Engineering and Software
    Systems Engineering Workshop
 	
DAM ELECTIVES
 	
The International Dimensions of Defence Acquisition
Knowledge in Defence
Programme and Project Management
Supply Network Management in Defence and Commercial Environment
	
	10
	10
	10
	10
	10
	10
	10
	10
	10
	10
	
	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
COMPULSORY MODULES:	
Systems Approach to Engineering Lifecycle Processes Introduction Lifecycle processes Advanced Capability Context Applied Systems Thinking	10 10 10 10 10

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Systems Engineering for Defence Capability COURSE SPECIFICATION
Version 1.0 June 2019

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 Decision Analysis, Modelling and Support Human Centric Systems Engineering Model Based Systems Engineering Networked and Distributed Simulation Systems of Systems Engineering Simulation and Synthetic Environments Systems Engineering and Software Systems Engineering Workshop DAM ELECTIVES The International Dimensions of Defence Acquisition Knowledge in Defence Programme and Project Management Supply Network Management in Defence and Commercial Environment	10 10 10 10 10 10 10 10 10 10 10 10 10
TOTAL:	120

C.   MSc

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

Description	**Credits**
COMPULSORY MODULES:	
Systems Approach to Engineering Lifecycle Processes Introduction Lifecycle processes Advanced Capability Context Applied Systems Thinking Advanced Systems Engineering Workshop Thesis	10 10 10 10 10 20 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
      Decision Analysis, Modelling and Support
      Human Centric Systems Engineering
      Model Based Systems Engineering
      Networked and Distributed Simulation
      Systems of Systems Engineering
      Simulation and Synthetic Environments
      Systems Engineering and Software
Systems Engineering Workshop
	
	10
	10
	10
	10
	10
	10
	10
	10
	10

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Systems Engineering for Defence Capability COURSE SPECIFICATION
Version 1.0 June 2019

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] [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:
  - o 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);
  - o 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);
  - o 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).

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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%).

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Systems Engineering for Defence Capability COURSE SPECIFICATION
Version 1.0 June 2019

6. How is the course structured?

Full-time students register for the course commencing in September and are expected to complete their study 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.

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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 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)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												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
1	R-SEDC-SAE	Systems Approach to Engineering	Dr Tim Ferris	65		10	N	A:02/09/19	02/09/19	13/09/19	50	ICW	100				23/09/19 FT 21/10/19 PT	TBC
2	R-SEDC-LPI	Lifecycle Processes Introduction	Mr Rick Adcock	35		10	N	A:16/09/19	16/09/19	20/01//20	50	ICW	100				20/01/20 FT/PT	01/06/20

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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,

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								Calendar				Assessment						
												Independent Assessment		Multi-part Assessment			Submission dates	
	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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	R-SEDC-LPA	Lifecycle Processes Advanced	Dr Tim Ferris	35		10	N	A:11/11/19	09/12/19	13/12/19	50	ICW	100				23/12/19 FT 20/01/20 PT 13/04/20	13/04/20 TBC
								B:03/02/20	02/03/20	06/03/20	50	ICW	100					
4	R-SEDC-CC	Capability Context	Mr Rick Adcock	35		10	N	A:14/10/19	11/11/19	15/11/19	50	ICW	100				25/11/19 FT 23/12/19 PT	TBC
5	R-SEDC-AST	Applied Systems Thinking	Dr Steve Barker	60		10	N	A:16/09/19	14/10/19	18/10/19	50 50	ICW GPRES	70 30				28/10/19 FT 25/11/19 PT 18/10/19	22/06/20
								B:13/04/20	11/05/20	15//05/20	50 50	ICW GPRES	70 30				22/06/20 15/05/20	TBC
6	R-SEDC-SEWN	Systems Engineering Workshop	Mr Sean Price	37		10	N	A:09/12/19	06/01/20	10/01/20	40	ICW	70	30	GPRES GCW	10 20	10/01/20 10/01/20 20/01/20 FT 17/02/20 PT	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,

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	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' 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
7	R-SEDC-ASEW	Advanced Systems Engineering Workshop	Mr Jeremy Smith	100		20	N	A:30/09/19	28//10/19	08/11/19	50 50 50	GCW GPRES ICW	25 25 50				08/11/19 08/11/19 1612/19	01/05/20 01/05/20 08/06/20
								B:23/03/20	20/04/20	01/05/20	50 50 50	GCW GPRES ICW	25 25 50				01/05/20 01/05/20 08/06/20FT 15/06/20PT	TBC TBC TBC
8	R-SEDC-ARMSS	Availability, Reliability, Maintainability& Support Strategy	Miss Laura Lacey	35		10	Y[12]	A:26/08/19	23/09/19	27/09/19	40	ICW	100				04/11/19	16/03/20
								B:06/01/20	03/02/20	07/02/20	40	ICW	100				16/03/20	TBC
9	R-SEDC-	Decision Analysis,	Dr Ken McNaught	30		10	Y[13]	A:09/09/19	07/10/19	11/10/19	40	ICW	100				18/11/19	23/03/20

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

[13] 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,

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	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' 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
	DAMS	Modelling and Support						B:13/01/20	10/02/20	14/02/20	40	ICW	100				23/03/20	20/21
10	R-SEDC-HCSE	Human Centric Systems Engineering	Ms Fanny Camelia	35		10	Y	A:21/10/19	18/11/19	22/11/19	40	ICW	100				30/12/19	20/04/20
								B:10/02/20	09/03/20	13/03/20	40	ICW	100				20/04/20	TBC
11	R-SEDC-MBSE	Model Based Systems Engineering	Dr Raju Pathmeswaran	40		10	N	24/02/20	23/03/20	27/03/20	40	ICW	100				06/04/20 FT 04/05/20 PT	TBC
12	R-AMOR-NDS Occ A	Networked and Distributed Simulation	Mr Jonathan Searle	30		10	Y	24/02/20	24/02/20	28/02/20	40	ICW	100				09/03/20 FT 06/04/20 PT	TBC
13	R-SEDC-SOSE	System of Systems Engineering	Dr Steve Barker	35		10	N	A:16/03/20	16/03/20	20/03/20	40	ICW	100				30/03/20 FT 27/04/20 PT	24/08/20
								B:15/06/20	13/07/20	17/07/20	40	ICW	100				24/08/20	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,

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	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Calendar: Module Start Date (eg Pre-course task)	Calendar: 'Residential' Start Date	Calendar: 'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment: Type of Assessment	Independent Assessment: Weighting within module8 (%) of Independent assessments	Multi-part Assessment: Weighting within module of multi-part assessments[9] (100%)	Multi-part Assessment: Type of Assessment	Multi-part Assessment: Weighting of individual elements of multi-part assessment[10]	Submission dates: Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
14	R-SEDC-SSE	Simulation and Synthetic Environments	Mr John Hoggard	30		10	Y[14]	A:12/08/19	09/09/19	13/09/19	40	ICW	100				21/10/19 PT	02/03/20
								B:23/12/19	20/01/20	24/01/20	40	ICW	100				02/03/20 PT	TBC
15	R-SEDC-SEAS	Systems Engineering and Software	Dr Raju Pathmeswaran	37		10	N	20/01/20	17/02/20	21/02/20	40	ICW	100				02/03/20 FT 30/03/20 PT	TBC
16	R-DAM-IDDA	The International Dimensions of Defence Acquisition Environment	Dr Pete Ito	30	0	10	Y	23/12/19	20/01/20	24/01/20	40	ICW	100				02/03/20	20/21
17	R-DAM-MKIDA	Knowledge in Defence	Dr Robby Allen	30	0	10	Y	17/02/20	16/03/20	20/03/20	40	ICW	100				27/04/20	20/21
18	R-DAM-	Programme and Project	Mr John McCormack	30	0	10	Y	25/05/20	22/06/20	26/06/20	40			100	ICW GCW	80 20	03/08/20 03/08/20	20/21

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[14] 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,

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	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' 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
									Calendar				**Assessment**					
												Independent Assessment		**Multi-part Assessment**			**Submission dates**	
	PPM	Management																
19	R-DAM-SNMCE	Supply Network Management in Defence and Commercial Environment	Mr Matt Summers	30	0	10	Y	12/08/19	09/09/19	13/09/19	40	ICW	100				21/10/19	20/21
20	R-SEDC-PSW	Thesis Selection Workshop	Mrs Bronwen Holden	20	0	0	N	A:04/11/19 B:11/05/20	02/12/19 08/06/20	06/12/19 12/06/20		AO AO					N/A N/A	
21	R-SEC-THESIS	Thesis	Prof Emma Sparks	20	0	80	N	A:06/01/20 B:20/07/20	N/A N/A	06/02/21 20/08/21	50	THESIS	100				06/02/21 FT 20/08/21 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,

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

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

7. **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

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

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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 GCW		ICW GCW		ICW GCW		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:

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 GCW		ICW		ICW GCW	ICW	ICW	
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		

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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
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 (%)

8. **How will the University assure the quality of the provision?**

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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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

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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.

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

Invariably, industrial and overseas students are sponsored on the course by their employer. The main reason for the sponsor providing this support is to ensure that their employees are equipped to undertake senior positions in the companies within procurement teams or through-life capability projects.

The UK MOD has initiated a more formal career management process through which staff will be identified and developed into identified Systems Engineering roles. The PgCert, PgDip and MSc, along with other courses run by the Centre for Systems Engineering, at Shrivenham, are part of this process.

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COURSE SPECIFICATION

Cranfield University: Course Specifications

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

COURSE TITLE: MSc in Thermal Power

Date of first publication/latest revision: May 2019

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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	2019/2020
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
Teaching Institution	Cranfield University
Admissions body	Cranfield University

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[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

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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:

- Gas Turbine Engineering
- Turbomachinery and Icing
- Computational Aerodynamics
- Combustor Design

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.

An individual with an HNC/HND or equivalent with considerable industrial experience may also be considered.

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 are 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 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?

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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:	
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 1, 3, 4, 6	60
ELECTIVE MODULES:	
Modules chosen from modules 2, 5, 7, 8, 9, 10, 11 to the total value of 60 credits	60
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	90
Individual Research Project (12)	100

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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:	
Modules, 1, 3, 4, 6	60
ELECTIVE MODULES:	
Modules chosen from modules 2, 5, 7, 8, 9, 11 to the total value of 60 credits	60
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	100
Individual Research Project (12)	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:	
Modules 1, 3, 4, 6	60
ELECTIVE MODULES:	
Modules chosen from modules 2, 5, 7, 8, 9, 10, 11 to the total value of 60 credits	60

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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	90
Individual Research Project (12)	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:	
Modules 1, 2, 3, 4, 5, 6, 7, 9, 10	120
ELECTIVE MODULES:	
N/A	
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	100
Individual Research Project (12)	100
ELECTIVE MODULES:	
N/A	
TOTAL:	200

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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 <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

Full-time students register for the Masters' course in October or March and are expected to complete the course within twelve calendar months. All Thermal Power options are available for both entries.

The PgDip courses are full-time and are coincident with the MSc courses.

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[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%).

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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 week of term and work towards the project is undertaken through the academic year.

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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	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
												Independent Assessment		Multi-part Assessment			Submission dates	
1	N-THP-C	Combustors	Dr Vishal Sethi	30	0	10	N	07/10/19	07/10/19	12/12/19	40	EX	100				Exam Week 2	Exam Week 7
2	N-THP-ES	Engine Systems	Dr Yiguang Li	30	0	20	N	09/10/19	09/10/19	20/03/20	40			100	ICW IPRES	70 30	24/03/20 20/03/20	At the next available opportunity which will be approximately six

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

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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 Module Start Date (eg Pre-course task)	Calendar 'Residential' Start Date	Calendar 'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment Type of Assessment	Independent Assessment Weighting within module8 (%) of Independent assessments	Multi-part Assessment Weighting within module of multi-part assessments[9] (100%)	Multi-part Assessment Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Submission dates Assessment submission and/or exam date[11]	Assessment / Exam Retake date
																		months later
3	N-THP-GPSD	Gas Turbine Performance, Simulation and Diagnostics	Prof Pericles Pilidis	65	0	20	N	07/10/19	07/10/19	11/12/19	50	EX	100				Exam Week 2	Exam Week 7
4	N-THP-TBC	Turbomachinery and Blade Cooling	Dr Pavlos Zachos	50	0	20	N	08/10/19	08/10/19	06/03/20	40	EX	100				Exam Week 5	Exam Week 8
5	N-THP-MDT	Mechanical Design of Turbomachinery	Dr Panos Laskaridis	30		10	N	08/10/19	08/10/19	13/12/19	40	EX	100				Exam Week 2	Exam Week 7
6	G-MTI Occ B19	Management for Technology	Dr Richard Adams	27		10	Y	13/01/20	13/01/20	17/01/20	40	EX	100				20/01/20	At the next available opportunity which will be approximately six months later

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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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-THP-CFDGT	Computational Fluid Dynamics for Gas Turbines	Dr Joao Amaral Teixeira	30	N	10	N	20/01/20	20/01/20	24/01/20	40	ICW	100				09/03/20	At the next available opportunity which will be approximately six months later
8	N-THP-PSPI	Propulsion Systems Performance and Integration	Dr Devaiah Nalianda	30	4	10	N	17/02/20	17/02/20	21/02/20	40	EX	100				Exam Week 5	Exam Week 8
9	N-THP-FF	Fatigue and Fracture	Dr Panos Laskaridis	25	7	10	N		NOT CURRENTLY AVAILABLE		40	EX	100				N/A	N/A
10	N-THP-GTORM	Gas Turbine Operations and Rotating Machines	Dr Uyioghosa Igie	30	22	10	N	10/02/20	10/02/20	14/02/20	40	ICW	100				16/03/20	At the next available opportunity which will be approximately six months later
11	N-THP-JEC	Jet Engine Control	Dr Theoklis Nikolaidis	30	N	10	N	09/03/20	09/03/20	13/03/20	40	EX	100				Exam Week 5	Exam Week 8

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

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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			Minimum Mark[7] - 40% or 50%	Assessment					Submission dates	
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment				
												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
12	N-THP-THES/F	Individual Research Project	Prof Pericles Pilidis	Various		100	N	11/10/19	11/10/19	12/08/20	50			100	THESIS OR	90 10	12/08/20 04/09/20	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

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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			Minimum Mark[14] – 40% or 50%	Assessment						Submission dates	
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment					
												Type of Assessment	Weighting within module[15] (%) of Independent assessments	Weighting within module of multi-part assessments [16](100%)	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 B19	Combustors	Dr Vishal Sethi	30	0	10	N	09/03/20	09/03/20	27/05/20	40	EX	100					Exam Week 7	At the next available opportunity which will be approximately six months later
2	N-THP-ES Occ B19	Engine Systems	Dr Yiguang Li	30	0	20	N	01/04/20	01/04/20	23/09/20	40			100	ICW IPRES	70 30		14/09/20 23/09/20	At the next available opportunity which will be approximately six months later

[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

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Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers [13]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[14] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												Type of Assessment	Weighting within module[15] (%) of Independent assessments	Weighting within module of multi-part assessments [16](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
3	N-THP-GPSD OccB19	Gas Turbine Performance, Simulation and Diagnostics	Prof Pericles Pilidis	65	0	20	N	01/04/20	09/03/20	26/05/20	50	EX	100				Exam Week 7	At the next available opportunity which will be approximately 6 months later
4	N-THP-TBC OccB19	Turbomachinery and Blade Cooling	Dr Pavlos Zachos	50	10	20	N	18/03/20	18/03/20	07/07/20	40	EX	100				Exam Week 8	At the next available opportunity which will be approximately 6 months later
5	N-THP-MDT Occ B19	Mechanical Design of Turbomachinery	Dr Panos Laskaridis	30		10	N	17/03/20	17/03/20	28/05/20	40	EX	100				Exam Week 7	At the next available opportunity which will be approximately six months later
6	G-MTI Occ B20	Management for Technology	Dr Richard Adams	27		10	Y	18/01/21	18/01/21	22/01/21	40	EX	100				25/01/21	At the next available opportunity which will be approximately six months later

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

Module Number	Module code	Title	Module Leader	Contact hours[12]	Total hours delivered by Visiting Lecturers[13]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[14] - 40% or 50%	Type of Assessment	Weighting within module[15] (%) of Independent assessments	Weighting within module of multi-part assessments[16](100%)	Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
7	N-THP-CFDGT Occ B19	Computational Fluid Dynamics for Gas Turbines	Dr Joao Amaral Teixeira	30	14	10	N	15/06/20	15/06/20	15/06/20	40	ICW	100				19/08/20	At the next available opportunity which will be approximately six months later
8	N-THP-PSPI Occ B19	Propulsion System Performance and Integration	Dr Devaiah Nalianda	30	4	10	N	27/07/20	27/07/20	31/07/20	40	EX	100				Exam Week 8	At the next available opportunity which will be approximately six months later
9	N-THP-FF Occ B19	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 B19	Gas Turbine Operations and Rotating Machines	Dr Uyioghosa Igie	30	22	10	N	29/06/20	29/06/20	03/07/20	40	ICW	100				03/08/20	At the next available opportunity which will be approximately six months later
11	N-THP-JEC Occ B19	Jet Engine Control	Dr Theoklis Nikolaidis	30	13	10	N	22/07/20	22/07/20	24/07/20	40	EX	100				Exam Week 8	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

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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 Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[14] - 40% or 50%	Independent Assessment Type of Assessment	Weighting within module15 (%) of Independent assessments	Weighting within module of multi-part assessments 16(100%)	Multi-part Assessment Type of Assessment	Weighting of individual elements of multi-part assessment[17]	Submission dates Assessment Submission and/or exam date[18]	Assessment / Exam Retake date
																		which will be approximately six months later
12	N-THP-THES/F Occ B19	Individual Research Project	Prof Pericles Pilidis	Various		100	N	13/03/20	13/03/20	06/01/21	50			100	THESIS OR	90 10	06/01/21 02/02/21	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

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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

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

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

7. **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.

A. Postgraduate Certificate

Award ILOs \ Module No.	ILO1	ILO2	ILO3
1		EX	EX

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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

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 OR		

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

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

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review. For collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focussed Review which looks at each course in depth. In addition occasional site inspection visits are made.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guidance provided by the QAA particularly in Chapter B7 (External Examining) which emphasises that external examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

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

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

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

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

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

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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

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COURSE SPECIFICATION

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

COURSE TITLE:	MSc in Through-life System Sustainment

Date of first publication/latest revision:	October 2019

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	2019/20
Valid entry routes	MSc
Additional exit routes	PgDip, PgCert
Mode of delivery	Part-time
Location(s)[1] of Study	Cranfield Campus
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
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	Part-time MSc - up to three years

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[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

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)
- 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 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:

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Through-Life System Sustainment COURSE SPECIFICATION
Version 2.0 Oct 2019

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
Module 2	10
Any 5 Taught Modules from Modules 3-9	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	0
Modules 2-9	80
Group Project	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	0
Modules 2-9	80
Group Project	40
Either:	
• Individual Research Project – for non-apprenticeship students	80
• End Point Assessment – for apprenticeship students	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 <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
    - o 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);
    - o 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);
    - o it is <u>not</u> 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. <u>How is the course structured?</u>

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.

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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%).

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	Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												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
1	I-TLS-INWK	Induction	Dr John Erkoyuncu	15		0	N		08/10/19	09/10/19	N/A	AO	N/A				N/A	
2	I-TLS-A1524	Managing Assets and Value	Prof Andrew Starr	32		10	N	04/11/19	04/11/19	08/11/19	40	ICW	100				06/01/20	At the next available opportunity which may not be until the course runs the

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Calendar		Minimum Mark[7] - 40% or 50%	Assessment						
									'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
																		following year
3	I-TLS-ETLS	Through-Life Business Models and Servitisation	Matthew Caffrey	32		10	N	13/01/20	13/01/20	17/01/20	40	ICW	100				28/02/20	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	32		10	N	09/03/20	09/03/20	13/03/20	40	ICW	100				24/04/20	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	18/05/20	18/05/20	22/05/20	40	ICW	100				06/07/20	At the next available opportunity which may not be until the course runs the following year
6	I-TLS-SNAM	Operational Availability and	Dr Isidro Durazo Cardenas	32		10	N	06/07/20	06/07/20	10/07/20	40	ICW	100				07/09/20	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

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Through-Life System Sustainment COURSE SPECIFICATION
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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Residential' Start Date	Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment			Submission dates	
												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
		Risk																which may not be until the course runs the following year
7	I-TLS-CENG	Optimising Whole Life Cost and Performance Management	Dr Leigh Kirkwood	32		10	Y	07/09/20	07/09/20	11/09/20	40	ICW	100				26/10/20	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	26/10/20	26/10/20	30/10/20	40	ICW	100				14/12/20	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	14/12/20	14/12/20	18/12/20	40	ICW	100				01/02/2021	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

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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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
10	I-TLS-GP	Group Project	Dr John Erkoyuncu	20		40	N	02/03/20	02/03/20	01/09/20	50			100	GCW GPRES ICW IPRAC	64 16 10 10	01/09/20 07/09/20 07/09/20 07/09/20	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	01/03/21	01/03/21	06/09/21	50	THESIS OR	90 10				31/08/21 06/09/21	
12	I-TLS-EPA	End Point Assessment	Dr John Erkoyuncu	20		80	N	01/03/21	01/03/21	06/09/21	50	IPROJ OR	60 20	20	ICW IPRES OR	40 30 30	30/07/21 27/08/21 06/09/21 06/09/21 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

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Through-Life System Sustainment COURSE SPECIFICATION
Version 2.0 Oct 2019

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

7. 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			
9	ICW							ICW

10

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		

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

The University has in place regular monitoring procedures for quality assurance including an Annual Reflective Review for each course and an in depth 6 year review of each School's (total) educational provision known as the Senate Review. For collaborative partnerships, in addition to the Annual Reflective Review there is an Annual Operating Statement and a 5 year review known as a Focussed Review which looks at each course in depth. In addition occasional site inspection visits are made.

Each course has at least one External Examiner who monitors all aspects of the assessment process. This is in line with the guidance provided by the QAA particularly in Chapter B7 (External Examining) which emphasises that external examining is one of the principal means for maintaining UK threshold academic standards within autonomous higher education institutions.

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

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

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

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

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

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.

COURSE TITLE:	MSc Vehicle and Weapon Engineering USA (Defence Engineering Programme)

Date of first publication/latest revision:	02/09/19

1. What is the course?

Course information

Course Title	MSc Vehicle and Weapon Engineering USA (Defence Engineering Programme
Course code	MSVWEPTR, PDVWEPTR, PCVWEPTR, SPVWEPTR
Academic Year	2019/20
Valid entry routes	MSc, PgDip, PgCert
Exit routes	N/A
Mode of delivery	Part-time
Location(s)[1] of Study	Detroit, USA
School(s)	Cranfield Defence and Security
Theme	Defence and Security
Centre	Centre for Defence Engineering
Course Director	Prof Amer Hameed / Dr Thiru Thirulogasingam
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements
UK Qualifications Framework Level	QAA FHEQ level 7 (Masters)

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[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

1

Benchmark Statement(s)	N/A
Registration Period(s) available	Maximum of 5 years for MSc, 4 years for PgDip and 3 years for PgCert
Course Start Month(s)	The nature of the programme is such that prospective students can join the course at any time; however for administrative purposes it is preferred that students join the course in June.

Institutions delivering the course

This course is delivered by the Centre for Defence Engineering (CDE) in CDS where the research interests include various aspects of weapon and veicle systems such as mobility, lethality, survivability and systems integration. CDE is already delivering a similar suite of courses in Shrivenham to both UK Ministry of Defence (MOD) and members of Allied countries/forces. In addition, due to their expertise, CDE has provided consultancies to various government departments in the above areas.

The Defence Engineering programme (MS in Vehicle & Weapon Engineering) will be delivered on a part-time basis in Detroit in a flexible manner. The majority of the teaching and/or assessment will be provided by the CDE while two modules will be supported and delivered by the Centre for Systems Engineering (CSE). It's a CDS, Cranfield University initiative and the programme has no partners or collaborators.

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

Accreditation by Public, Statutory or Regulatory Bodies (PSRBs)

This course is not accredited by any external bodies.

2. <u>**What are the aims of the course?**</u>

Cranfield University offers this course in order to:

- provide education and training at postgraduate level for military officers, defence industry staff and government servants who may expect to fill technically demanding appointments concerned with the design, development, procurement and operation of weapon systems
- provide graduates with the technical qualities, transferable skills and independent learning ability necessary to make them effective in organisations that design, develop, procure or operate military vehicles and gun systems.

The syllabus is designed to deliver the aim in a flexible manner over not more than 5 years as a part-time course. Taught modules are offered that provide balanced coverage of the main design aspects of weapon and vehicle systems, with an option to select either weapon or vehicle as a speciality.

The course has significant theoretical content and students are expected to develop skills in independent learning in order to process the quantity of taught material effectively. A group design study in the AFVWSS module is used to build team-working skills and explore the integration and trade-offs required in the design and development of vehicle and weapon systems. Group study is also designed to understand the user requirements and learn to apply a systems engineering approach in optimising the design. Attendees will be required to present their design to a critical audience and defend their design judgement and decisions.

2

An individual or group project presents the students with the opportunity to gain in-depth knowledge of a particular area of automotive or weapon engineering.

This programme is intended for the following range of students:

- Test and evaluation engineers, design and development engineers, manufacturing and industrial engineers, specification engineers, physicists and mathematicians working in the weapon and vehicle design, researchers and analysts working in the design and development of fighting vehicles

- Military personnel, government civil servants, defence industry, acquisition and procurement staff from DoD

- Graduates, who intend to take up a career in defence technology (DoD and industry)

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

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

A. Postgraduate Certificate in Vehicle and Weapon Engineering
In completing this course, and achieving the associated award, a diligent student should be able to:

ILO 1. Demonstrate a systematic understanding of military vehicles and weapon systems technology including their systems engineering.

ILO 2. Critically assess the design and integration of vehicle and cannon systems in the face of conflicting and limited information.

ILO 3. Develop the modelling and simulation of weapon and vehicle components and systems using computer-based techniques; for example: ballistics, recoil, weapon control, ride, performance and handling.

ILO 4. Critically analyse and evaluate the impact of new gun and vehicle technology on changes and developments in and to the threat.

ILO 5. Apply the management and systems engineering techniques used in the integration of weapons and vehicles systems.

B. Postgraduate Diploma in Vehicle and Weapon Engineering
In addition to the intended learning outcomes outlined above, a diligent student would also be expected to:

ILO 6. Explain the engineering and physical limitations to the performance of weapon and vehicle systems in relation to their design.

ILO 7. Critically analyse and evaluate the impact of new weapon and vehicle technology on changes and developments in and to the threat

ILO 8. Illustrate the management and systems engineering techniques used in the integration of weapon and vehicles systems

3

ILO 9.   Defend the critical requirements of weapon and vehicle systems and be able to critically analyse the design specifications

C. MSc in Vehicle and Weapon Engineering

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

ILO 10.   Defend their design of Military Vehicle and Weapons systems

ILO 11.   Formulate a systematic approach and engineering judgement to the design and integration of vehicle and weapon systems in the face of conflicting and limited information

ILO 12.   Present and defend design solutions in an efficient manner

ILO 13.   Generate the key requirements of weapon and vehicle systems and be able to critically analyse the design specifications

4. How is the course taught?

The programme will provide students with the technical knowledge and understanding of weapon systems and military vehicles to make them effective in specification, design, development and assessment. Special attention will be given to recent advances in defence technology, and to educating students in the analysis and evaluation of systems against changes and developments in the threat.

At the start of the course students will receive an induction programme covering administrative matters such as registration and being a CU student and academic related matters such as Study Skills, student support and use of the VLE via a videoed lecture.

The taught element of the programme will consist of 13 courses (modules) covering major aspects of defence technology, and providing a balanced and broad coverage of key aspects, critical issues and constraints associated with the design, development, performance and integration of weapon and vehicle systems.

The modular teaching programme culminates in an integrated Design Synthesis Course (Armoured Fighting Vehicle & Weapon Systems Study, AFVWSS). This draws together the material taught in the preceding courses and considers the design of the weapons and platform as a system, examining the compromises necessary to achieve optimum operational performance.

In addition to the teaching methods outlined above, students will be supported in their learning and personal development by undertaking computer based exercises specifically developed by the teaching team.

Linking theory to real examples adds credibility and builds confidence; therefore use of current and legacy equipment as a teaching aid to highlight design philosophy, design parameters and issues, constraints and trade-offs will be used as and when required.

To develop their confidence in conducting critical engineering analysis and systems evaluation, independent research and learning, students will undertake an AFVWSS design study.

Course tuition and project supervision will be undertaken as follows:

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- The Centre for Defence Engineering (CDE) plans to visit Detroit three times a year in April, June and Nov/Dec for two weeks each visit to deliver two courses per visit and 5 days of project supervision each year. This will allow delivery of 13 courses worth 120 credits, and project study worth 80 credits.
- During each visit, CDE will send a team of 3-6 academics and a module leader/course director to deliver the respective courses and supervision to the students.
- To ensure students are well prepared for courses, where required the course director will provide pre-reading material four weeks prior to the delivery of the course. Pre-reading material will be designed to provide background information necessary for the understanding of the critical design issues taught during the course. This pre-reading material is optional and will require no more than 2 -15 hours of private study.
- Each course will consist of lectures to develop better understanding in the students and will be supported by tutorials, (video) laboratory and computer based exercises to explain the application of engineering and applied science using real life examples.
- Depending upon the type of course, written examination and course work assessment will be undertaken. This element will require 40-45 hours of private study. If the course is assessed by course work, students will be given eight weeks after the delivery of the course to complete their work and submit the assessment.
- Unless discussed and agreed prior to the class, assessment by written examination will be undertaken on the last day of the course. Coursework feedback will be given to students in accordance with University regulations. Project feedback will be given the week following each visit.
- During each visit, the project supervisor along with course director will organise one-to-one meetings with the students to discuss and monitor their progress. Project supervisors will also provide guidance and direction to the student(s). Any concerns and achievements will be documented and appropriate action will be taken to ensure that students' concerns are satisfactorily addressed.

The Individual Project

Aim
The overall aim of the project is to enable an individual student to develop, by first-hand experience, his expertise in engineering research, design or development in the field of military vehicle technology.

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

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

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

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

Description	Credits

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COMPULSORY MODULES:	
Any combination of the PgDip modules with an accumulated credit of 60.	60
ELECTIVE MODULES:	
TOTAL:	**60**

B.   Postgraduate Diploma

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

Description	Credits
COMPULSORY MODULES:	
Module 1a or 1b Module 2 a or 2b Modules 3, 4, 6, 7, 8, 9, 11, 12, and 13	5 5 9 x 10
SPECIALISMS – CHOOSE EITHER VEHICLE OR WEAPONS SPECIALISM	
Vehicle	
Module 5a Module 10a	10 10
Weapons	
Module 5b Module 10b	10 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:	
Module 1a or 1b Module 2a or 2b Modules 3, 4, 6, 7, 8, 9, 11, 12, and 13 Projects	5 5 9 x 10 80
SPECIALISMS – CHOOSE EITHER VEHICLE OR WEAPONS SPECIALISM	
Vehicle	
Module 5a Module 10a	10 10
Weapons	
Module 5b Module 10b	10 10
TOTAL:	**200**

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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 <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

Please see the course structure document for details on the individual elements of the course. Overall, the programme is offered off-campus on a part-time basis only. The programme is divided into 2 main parts: the taught phase and the project/design study. Taught phase of the MSc course will be delivered over 4 years in Detroit. Two modules will be taught per visit with two to three visits per year. The project/design study will be integrated throughout the taught phase. The nature of the programme is such that prospective students can join the course at any time; however for administrative purposes it is preferred that students join the course in June.

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[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%).

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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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
1a	R-VWE-FVD	Fighting Vehicle Design	Prof Amer Hameed	38	1	5	Y	31/05/21	14/06/21	18/06/21	50			100	ICW EX	50 50	16/08/21 18/06/21	TBC TBC
1b	R-VWE-FEDE	Finite Elements in Defence Engineering	Dr Shaun Forth	35	N/A	5	N	31/05/21	14/06/21	18/06/21	50	ICW	100				16/08/21	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.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

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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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
2a	R-VWE SEAP	Systems Engineering and Assured Performance	Mr Rick Adcock	35	1	5	N	23/11/20	07/12/20	11/12/20	50			100	ICW EX	70 30	01/03/21 11/12/20	TBC TBC
2b	R-VWE-MSCDE	Modelling, Simulation and Control for Defence Engineering	Dr Thiru Thirulogasingam	38		5	Y	29/11/21	13/12/21	17/12/21	50	ICW	100				28/02/22	TBC
3	R-VWE-WST	Weapon Systems Technology	Prof Amer Hameed	38	5	10	Y	02/05/22	16/05/22	20/05/22	50			100	ICW EX	50 50	18/07/22 20/05/22	TBC TBC
4	R-VWE-FB	Fundamentals of Ballistics	Dr Clare Knock/ Prof Amer Hameed	38	-	10	Y	26/04/21	10/05/21	14/05/21	50			100	ICW EX	50 50	12/07/21 14/05/21	TBC TBC
5a	R-VWE-MVP	Military Vehicle Propulsion (for vehicle speciality)	Dr Thiru Thirulogasingam	38	-	10	N	28/03/22	11/04/22	15/04/22	50			100	ICW EX	50 50	03/06/22 15/04/22	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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
										Calendar			**Assessment**					
												Independent Assessment		**Multi-part Assessment**		**Submission dates**		
5b	R-VWE MVP D	Military Vehicle Propulsion and Dynamics (for weapon speciality)	Dr Thiru Thirulogas ingam	38		10	N	28/03/22	11/04/22	15/04/22	50			100	ICW EX	60 40	13/06/22 15/04/22	TBC TBC
6	R-VWE EDT	Electric Drive Technologies	Dr John Economou	35	2	10	N	27/04/20	11/05/20	15/05/20	50			100	ICW EX	50 50	13/07/20 15/05/20	TBC TBC
7	R-VWE LWD	Light Weapon Design	Mr Steve Champion	38	3	10	Y	29/03/21	12/04/21	16/04/21	50			100	ICW EX	50 50	14/06/21 16/04/21	
8	R-VWE MAV	Military Autonomous Vehicle	Dr John Economo u	38	3	10	Y	01/06/20	15/06/20	19/06/20	50			100	ICW EX	50 50	17/08/20 19/06/20	TBC TBC
9	R-VWE-SUR V	Survivability	Dr Gareth Appleby Thomas	38		10	N	08/03/21	22/03/21	26/03/21	50			100	ICW EX	50 50	24/05/21 26/03/21	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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
									Calendar				**Independent Assessment**	**Multi-part Assessment**			**Submission dates**	
10a	R-VWE MVD	Military Vehicle Dynamics (for Vehicle speciality)	Mr Ajay Kumar	38		10	Y	30/03/20	13/04/20	17/04/20	50			100	ICW EX	40 60	15/06/20 17/04/20	TBC TBC
10b	R-VWE GSD	Ordnance Design	Prof Amer Hameed	38		10	N	02/05/22	16/05/22	20/05/22	50	ICW	100				18/07/22	TBC
11	R-VWE-VSI	Vehicle Systems Integration	Mr David Diskett	38		10	N	07/06/21	21/06/21	25/06/21	50			100	ICW EX	70 30	23/08/21 25/06/21	
12	R-VWE-RSE	Reliability and System Effectiveness	Laura Lacey / Dr Aimee Helliker	38		10	N	18/11/19	02/12/19	06/12/19	50			100	ICW EX	70 30	24/02/20 06/12/19	TBC TBC
13	R-VWE-AFV WSS	Armoured Fighting Vehicle and Weapon	Prof Amer Hameed / David Diskett	55		10	N	21/11/22 20/11/23	05/12/22 04/12/23	16/12/22 15/12/23	50 50	ICW ICW	100 100				27/02/23 26/02/24	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

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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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
		Systems Study (2 weeks course)																
14	R-VWE-THESIS	Project	Prof Amer Hameed	100		80	N	20/07/19	05/08/19	30/07/20	50	THESIS	100				30/07/20	

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

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

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
R-VWE-FB	Fundamentals of Ballistics	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-MAV	Military Autonomous Vehicles	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-FVD	Fighting Vehicle Design	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-MSCDE	Modelling, Simulation and Control for Defence Engineering	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-LWD	Light Weapon Design	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-WST	Weapon Systems Technology	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-MVP	Military Vehicle Propulsion	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology
R-VWE-MVD	Military Vehicle Dynamics	Vehicle and Weapon Engineering, USA	Expeditionary Warfare Systems Engineering and Technology

7. **How are the ILOs assessed?**

The following assessment types are utilised:

The course uses a range of assessment types including written examination, coursework, thesis and oral examination.

This approach has been adopted to assess the intended learning outcomes and the weighting of assessment, particularly the use of written examinations addresses the educational expectation of the USA market.

Assessment and ILO Mapping

A. Postgraduate Certificate

Award ILOs / Module No.	ILO 1.	ILO2.	ILO3	ILO4	ILO5
1a	X	X		X	X

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Module No. \ Award ILOs	ILO 1.	ILO2.	ILO3	ILO4	ILO5
1b	X		X		
2a	X			X	X
2b	X	X	X	X	X
3	X	X	X	X	
4	X	X			
5a	X	X			
5b	X	X			
6	X			X	X
7	X			X	X
8	X		X	X	X
9	X			X	
10a	X	X		X	
10b	X	X		X	
11				X	X
12					
13	X	X	X	X	X

B. Postgraduate Diploma

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

Module No. \ Award ILOs	ILO6	ILO7	ILO8	ILO9	
1a					
1b	X				
2a	X				
2b					
3	X				
4	X	X			
5a	X	X	X	X	
5b	X	X	X	X	
6	X	X		X	
7	X	X	X	X	
8	X	X		X	
9	X	X	X	X	

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Award ILOs / Module No.	ILO6	ILO7	ILO8	ILO9	
10a	X	X	X	X	
10b	X	X	X	X	
11	X			X	
12	X	X	X	X	
13	X	X	X	X	

C. MSc

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

Award ILOs / Module No.	ILO10	ILO11	ILO12	ILO13	
1a		X	X		
1b		X	X		
2a		X	X		
2b		X	X		
3		X	X		
4		X	X		
5a			X		
5b			X		
6			X		
7			X		
8			X		
9	X	X	X	X	
10a	X	X	X	X	
10b	X	X	X	X	
11				X	
12	X				
13	X	X	X	X	
14	X	X	X	X	

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

Title	Modules Covered	Assessment	
		Type	Weight (%)

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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

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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.

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

This programme is intended for the following range of students as part of their continuing professional development to improve their skills in their current role and to enhance career progression opportunities within their current organisations:

- Test and evaluation engineers, design and development engineers, manufacturing and industrial engineers, specification engineers, physicist and mathematicians working in the weapon and vehicle design, researchers and analysts working in the design and development of fighting vehicles

- Military personnel, government civil servants, defence industry, acquisition and procurement staff from DoD

- Graduates, who intend to take up a career in defence technology (DoD and industry)

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COURSE SPECIFICATION

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

COURSE TITLE: MSc in Water and Sanitation for Development

Date of first publication/latest revision: 10/04/17 / May 2019

1. What is the course?

Course information

Course Title	Water and Sanitation for Development
Course code	MSWVDFTC, MSWVDPTC, PDWVDFTC, PDWVDPTC, PCWVDFTC, PCWVDPTC
Academic Year	2019/20
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 Paul Hutchings
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Minimum 2nd class UK honours degree or equivalent or relevant industrial experience. Language proficiency for non-UK students: TOEFL: 237 (computer version), 580 (paper version), or TOEIC: 830, or IELTS: 6.5 minimum, or Cambridge Certificate: C or above
UK Qualifications	QAA FHEQ Level 7 (Masters)

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[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

Framework Level	
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 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. <u>What should students expect to achieve in completing the course?</u>

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 and design water sources in rural areas of lower-income countries, so the quality and quantity of water available is sustained

ILO 2. Evaluate water resource management methods

ILO 3. Plan and design sanitation facilities in lower-income countries and appraise different management methods

ILO 4. Explain different management and finance models for water, sanitation and hygiene services and evaluate how these might ensure access for the poorest.

ILO 5. Assess how services might vary in different contexts, specifically rural, urban and emergencies.

ILO 6. Critically evaluate water, sanitation and hygiene programmes, research and technologies.

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 7. 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 8. 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.

3

ILO 9. 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	20
Water and Wastewater Treatment for Development	10
Management and Governance for Water and Sanitation	10
Health, Hygiene and Sanitation	10
Communities and Development	10
Water in Cities	10
Emergency Water Supply and Environmental Sanitation	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:	

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Induction	0
Water Resource Engineering	20
Water and Wastewater Treatment for Development	10
Management and Governance for Water and Sanitation	10
Health, Hygiene and Sanitation	10
Communities and Development	10
Water in Cities	10
Emergency Water Supply and Environmental Sanitation	10
Group Project (Full Time Students)	40
ELECTIVE MODULES:	
Part Time Students: Group Project OR Dissertation	40 40
TOTAL:	**120**

C.   MSc

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

Description	Credits
COMPULSORY MODULES:	
Induction	0
Water Resource Engineering	20
Water and Wastewater Treatment for Development	10
Management and Governance for Water and Sanitation	10
Health, Hygiene and Sanitation	10
Communities and Development	10
Water in Cities	10
Emergency Water Supply and Environmental Sanitation	10
Group Project (Full Time Students)	40
Thesis project	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:

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- 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 <u>not</u> 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 <u>on the first attempt</u> for the significant majority of the taught assessments, noting that:
  - o 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);
  - o 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);
  - o it is <u>not</u> 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. <u>How is the course structured?</u>

Please see the course structure document for details on the individual elements of the course. Each module is taught over two 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. Instead they are offered individual guidance on the best sequence of study based on their prior knowledge and availability to attend.

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[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%).

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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 Module Start Date (eg Pre-course task)	Calendar 'Residential' Start Date	Calendar 'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment Type of Assessment	Independent Assessment Weighting within module8 (%) of Independent assessments	Multi-part Assessment Weighting within module of multi-part assessments [9](100%)	Multi-part Assessment Type of Assessment	Multi-part Assessment Weighting of individual elements of multi-part assessment[10]	Submission dates Assessment Submission and/or exam date[11]	Submission dates Assessment / Exam Retake date
1	I-WAT-INWK	Induction Week	J MacAdam	24		0	Y	07/10/19	07/10/19	11/10/19	N/A	AO	N/A				N/A	
2	I-WAM-WRE	Water Resource Engineering	A Parker	60		20	Y	14/10/19	14/10/19	01/11/19	40	ICW	100				FT 09/11/19 PT 23/11/19	June 20
3	I-WAM-WC	Water in Cities	H Smith	30		10	Y	11/11/19	18/11/19	22/11/19	40	IPRES	100				FT & PT – 21/11/19	June 20
4	I-WAM-A1162	Health, Hygiene and Sanitation	S Tyrrel	25		10	Y	25/11/19	02/12/19	06/12/19	40	ICW	100				FT 07/12/19 PT 21/12/19	June 20

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
									Calendar			Independent Assessment		Multi-part Assessment			Submission dates	
5	I-WAM-WWTD	Water and Wastewater Treatment for Development	F Hassard	37		10	Y	09/12/19	09/12/19	13/12/19	40	ICW	100				FT 21/12/19 PT 11/01/20	June 20
6	I-WAM-A1170	Communities and Development	P Hutchings	33		10	Y	13/01/20	13/01/20	17/01/20	40	ICW	100				FT 25/01/20 PT 08/02/20	June 20
7	I-WAM-MGWS	Management and Governance for Water and Sanitation	P Hutchings	33		10	Y	27/01/20	27/01/20	31/01/20	40	ICW	100				FT 08/02/20 PT 22/02/20	June 20
8	I-WAM-A1168	Emergency Water Supply and Environmental Sanitation	T Gould	30		10	Y	10/02/20	10/02/20	14/02/20	40	ICW	100				FT 22/02/20 PT 07/03/20	June 20
PROJECTS																		
9	I-WAT-GRPP	Group Project	P Hutchings	16		40	Y	24/02/20	24/02/20	08/05/20	50	GPROJ	80	80	GPRES GPROJ	20 80	01/05/20 01/05/20	

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

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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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
											50	ICW	20	20	ICW Observed Behaviour	50 50	09/05/20 N/A	
10	I-WAT-DISS	Dissertation (PT MSc and PgDip only)	P Hutchings	10		40	Y	01/10/19	01/10/19	11/09/20	50	IPROJ IPRES	80 20				25/09/20 21/09/20	
11	I-WAT-THESIS	Individual Thesis	P Hutchings	20		80	Y	11/05/20	11/05/20	11/09/20	50	THESIS OR	90 10				07/09/20 31/08/20-07/09/20	Sept 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

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

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that share the module
I-WAM-WC	Water in Cities	Environmental Water Management	Water and Sanitation for Development Water WISER CDT WIRe CDT
I-WAM-WRE	Water Resource Engineering	Water and Sanitation for Development	Water WISER CDT
I-WAM-A1162	Health, Hygiene and Sanitation	Water and Sanitation for Development	Water WISER CDT
I-WAM-WWTD	Water and Wastewater Treatment for Development	Water and Sanitation for Development	Water WISER CDT
I-WAM-A1170	Communities and Development	Water and Sanitation for Development	Water WISER CDT
I-WAM-MGWS	Management and Governance for Water and Sanitation	Water and Sanitation for Development	Water WISER CDT
I-WAM-A1168	Emergency Water Supply and Environmental Sanitation	Water and Sanitation for Development	Water WISER CDT

7. How are the ILOs assessed?

The following assessment types are utilised:

- the taught modules (40%) are assessed by in-module assessment (including coursework, which focuses on application of principles studied and class tests, which support underpinning knowledge);
- group projects (20%) are assessed by means of a written group report and presentations;
- the research project (40%), is assessed by a thesis and an oral examination.

This approach has been adopted because:

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.)

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A. Postgraduate Certificate

Award ILOs Module No.	ILO1	ILO2	ILO3	ILO4	ILO5
1					
2	ICW			ICW	ICW
3		IPRES		IPRES	
4			ICW	ICW	ICW
5		ICW	ICW	ICW	
6			ICW	ICW	ICW
7	ICW	ICW	ICW		
8	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.	ILO7
9	GPROJ ICW
10	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.	ILO8	ILO9
11	THESIS OR	THESIS OR

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

Title	Modules Covered	Assessment	
		Type	Weight (%)

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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:

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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.

9. **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)

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COURSE SPECIFICATION

Cranfield University: Course Specifications

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

COURSE TITLE: MSc in Water and Wastewater Engineering

Date of first publication/latest revision: 26/01/16 – March 2019

1. What is the course?

Course information

Course Title	Water and Wastewater Engineering
Course code	MSWWEFTC, MSWWEPTC, PDWWEFTC, PDWWEPTC, PCWWEFTC, PCWWEPTC
Academic Year	2019-20
Valid entry routes	MSc, PgDip, PgCert
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 Bajon Fernandez
Awarding Body	Cranfield University
Is this an AP Contract course?[2]	No
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 • Where applicable minimum IELTS score of 6.5 or TOEFL 580
UK Qualifications Framework Level	QAA FHEQ Level 7 (Masters)
Benchmark Statement(s)	N/A

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[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

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 Sciences 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:

- Teaching and assessment is provided by an Engineering Consultant (Richard Hill, Whitewater Ltd). A number of lectures are delivered by representatives from UK water utilities, regulators and consultancies.

- 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.

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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.

3

ILO 6.   To communicate their individual research via a thesis and in an oral presentation in a style suitable for academic and professional audiences.

4. How is the course taught?

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

- Understanding is developed through the application of knowledge from the taught modules and laboratory practicals to deliver optimum solutions to specified process design briefs.
- The 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 enhanced 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
ELECTIVE MODULES:	
60 credits from the following modules:	
Water and Wastewater Treatment Principles	10
Process Science and Engineering	10
Hydraulics and Pumping Systems	10
Chemical Processes	10
Physical Processes	10
Biological Processes	10
Water & Wastewater Assets: Lifecycles, Risks and Futures	20
TOTAL:	**60**

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B.   Postgraduate Diploma

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

Description	Credits
COMPULSORY MODULES:	
Induction	0
Water and Wastewater Treatment Principles	10
Process Science and Engineering	10
Hydraulics and Pumping Systems	10
Chemical Processes	10
Physical Processes	10
Biological Processes	10
Water & Wastewater Assets: Lifecycles, Risks and Futures	20
Group Project (Full-time students)	40
ELECTIVE MODULES:	
Part Time Students: Group Project OR Dissertation	40 40
TOTAL:	**120**

C.   MSc

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

Description	Credits
COMPULSORY MODULES:	
Induction	0
Water and Wastewater Treatment Principles	10
Process Science and Engineering	10
Hydraulics and Pumping Systems	10
Chemical Processes	10
Physical Processes	10
Biological Processes	10
Water & Wastewater Assets: Lifecycles, Risks and Futures	20
Group Project (Full-time students)	40
Individual Research Project	80
ELECTIVE MODULES:	
Part Time Students: Group Project OR Dissertation	40 40
TOTAL:	**200**

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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 <u>not</u> 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 <u>on the first attempt</u> 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 <u>not</u> 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. <u>How is the course structured?</u>

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.

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[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%).

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Each module is taught over two weeks, with the second week largely free of structured teaching to allow time for more independent learning and reflection on the previous weeks work.

The 20 credit module (Water and Wastewater Assets: Lifecycles, Risk and Futures) is structured slightly differently from the previous modules. The "contact days" are spread across the duration of the whole module (four weeks) with independent/individual study time more structured to increase formative feedback opportunities throughout the module.

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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			Minimum Mark[7] - 40% or 50%	Assessment						Submission dates	
								Module Start Date (eg Pre-course task)	' Residential' Start Date	' Residential' End Date		Independent Assessment		Multi-part Assessment					
												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
1	I-WAT-INWK	Induction Week	J MacAdam	24		0	Y	07/10/19	07/10/19	11/10/19	N/A	AO	N/A					N/A	
2	I-WSC-A1096	Water and Wastewater Treatment Principles	I Carra Ruiz	30		10	Y	14/10/19	14/10/19	18/10/19	40	ICW	100					FT 26/10/19 PT 09/11/19	June 20
3	I-WSC-A1093	Process Science and Engineering	M Pidou	30		10	Y	28/10/19	28/10/19	01/11/19	40	EX	100					07/01/20 (Exam week 2)	w/c 14 Sept 20

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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

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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			Minimum Mark[7] - 40% or 50%	Assessment						
								Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date		Independent Assessment		Multi-part Assessment			Submission dates	
												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
4	I-WSC-A1507	Hydraulics and Pumping Systems	I Bortone	27		10	Y	11/11/19	11/11/19	15/11/19	40	ICW	100				FT 23/11/19 PT 07/12/19	June 20
5	I-WSC-A1089	Chemical Processes	E Goslan	30		10	Y	25/11/19	25/11/19	29/11/19	40	EX	100				Exam 06/12/19	w/c 14 Sept 20
6	I-WSC-A1092	Physical Processes	P Jarvis	30		10	Y	09/12/19	09/12/19	13/12/19	40	EX	100				10/01/20 (Exam week 2)	w/c 14 Sept 20
7	I-WSC-A1087	Biological Processes	A Soares	30		10	Y	13/01/20	13/01/20	17/01/20	40	ICW	100				FT 01/02/20 PT 08/02/20	June 20
8	I-WSC-A1099	Water and Wastewater Assets: Lifecycles, Risks and Futures	J MacAdam	60		20	Y	27/01/20	27/01/20	21/02/20	40	ICW	100				FT 22/02/20 PT 07/03/20	June 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

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment Type of Assessment	Weighting within module8 (%) of Independent assessments	Weighting within module of multi-part assessments 9(100%)	Multi-part Assessment Type of Assessment	Weighting of individual elements of multi-part assessment[10]	Assessment Submission and/or exam date[11]	Assessment / Exam Retake date
Module 9 - Legacy Students only																		
9	I-WSC-A1095	Risk Management and Reliability Engineering	J Macadam	30		10	N	10/02/20	10/02/20	14/02/20	40			100	GCW ICW	70 30	22/02/20 07/03/20	June 20
PROJECTS																		
10	I-WAT-GRPP	Group Project	Y Bajon Fernandez	16		40	Y	24/02/20	24/02/20	08/05/20	50 50	GPROJ ICW	80 20	80 20	GPRES GPROJ ICW Observed Behaviour	20 80 50 50	01/05/20 01/05/20 09/05/20 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

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Module Number	Module code	Title	Module Leader	Contact hours [5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark [7] - 40% or 50%	Independent Assessment		Multi-part Assessment		Submission dates	
												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
11	I-WAT-DISS	Dissertation (PT MSc and PgDip only)	Y Bajon Fernandez	10		40	Y	01/10/19	01/10/19	11/09/20	50	IPROJ IPRES	80 20				25/09/20 21/09/20	
12	I-WAT-THESIS	Individual Research Project	Y Bajon Fernandez	20		80	Y	11/05/20	11/05/20	11/09/20	50	THESIS OR	90 10				07/09/20 31/08/20-07/09/20	Sept 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

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

Module code	Module title	Course that owns the module	Other course(s)/ programme(s) that use the module
I-WSC-A1096	Water and Wastewater Treatment Principles	MSc in Water and Wastewater Engineering	• Water WISER CDT • WIRe CDT
I-WSC-A1093	Process Science and Engineering	MSc in Water and Wastewater Engineering	• Water WISER CDT
I-WSC-A1507	Hydraulics and Pumping Systems	MSc in Water and Wastewater Engineering	• Water WISER CDT • WIRe CDT
I-WSC-A1089	Chemical Processes	MSc in Water and Wastewater Engineering	• Water WISER CDT • WIRe CDT
I-WSC-A1092	Physical Processes	MSc in Water and Wastewater Engineering	• Water WISER CDT • WIRe CDT
I-WSC-A1087	Biological Processes	MSc in Water and Wastewater Engineering	• Water WISER CDT • WIRe CDT
I-WSC-A1099	Water and Wastewater Assets: Lifecycles, Risks and Futures	MSc in Water and Wastewater Engineering	• Water WISER CDT

7. **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 3 written examinations, a maximum of 8 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.

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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.
2	ICW		
3	EX		
4	ICW		
5		EX	EX
6		EX	EX
7		ICW	ICW
8		IPRES	IPRES

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 4.
10	GPROJ ICW
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 (%)

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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

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.

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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.

9. **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.

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COURSE SPECIFICATION

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

COURSE TITLE:	Weapon and Vehicle Systems Programme
	• Military Vehicle Technology (MVT)
	• Gun Systems Design (GSD)

Date of first publication/latest revision:	2019/20

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	2019-20
Valid entry routes	MSc, PgDip, PgCert
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
Teaching Institution	Cranfield University
Admissions body	Cranfield University
Entry requirements	Standard University entry requirements

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[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	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) 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 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 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. Postgraduate Diploma in Gun Systems Design

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

Description	Credits
COMPULSORY MODULES:	
Modules IS and CAD Modules MSC, FEE, FoB, WST, ED, Surv., MVP&D, VSI and AFVWSS	0 90

Module GSD	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	0
Modules MSC, FEE, FoB, WST, ED, Surv., MVP&D, VSI and AFVWSS	90
Module GSD	20
Project	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	20
Plus one of modules Surv., UMVS, VSI or RSE	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	0
Modules: MSC, FEE, WST, Surv., VSI and AFVWSS	60
Module: MVD and MVP	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	0
Modules: MSC, FEE, WST, Surv., VSI and AFVWSS	60
Module: MVD and MVP	40
Project	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. For ref only (please see the relevant senate handbook for definitive details)

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

- An overall average mark of ≥50%;
- An average mark of ≥50% across the taught assessment;
- All assessments need to be completed and the minimum mark attained: no more than one failure to complete an assessment (as defined in Section 2.3) will be permitted throughout the course of your studies (Please note that the board of examiners does <u>not</u> 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 <u>on the first attempt</u> 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

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[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). For ref only

[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 capped at 50% would be insufficient to achieve an overall average mark of ≥50% across the taught assessments);

   o 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);

   o it is <u>not</u> 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. <u>How is the course structured?</u>

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:

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.

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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 Module Start Date (eg Pre-course task)	Calendar 'Residential' Start Date	Calendar 'Residential' End Date	Minimum Mark[7] - 40% or 50%	Assessment Independent Assessment Type of Assessment	Assessment Independent Assessment Weighting within module[8] (%) of Independent assessments	Assessment Multi-part Assessment Weighting within module of multi-part assessments [9] (100%)	Assessment Multi-part Assessment Type of Assessment	Assessment Multi-part Assessment Weighting of individual elements of multi-part assessment[10]	Assessment Submission dates Assessment Submission and/or exam date[11]	Assessment Submission dates Assessment / Exam Retake date
SEPTEMBER 2019 – ADMISSIONS DAY FOR THE COURSE – MONDAY 2nd																		
1	R-ESD-IS	Introductory Studies	Dave Simner	30		0	N	N/A	02/09/19	06/09/19	N/A	N/A					N/A	N/A
2	R-ESD-CAD	Solid Modelling and CAD	Alan Peare	30		0	N	N/A	09/09/19	13/09/19	N/A	N/A	N/A				N/A	N/A
3	R-ESD-MSC	Modelling Simulation and Control	Thiru Thirulogasin gam	35		10	N	N/A	16/09/19	20/09/19	50	ICW OR	70 30				30/09/19 FT 14/10/19 PT 02/12/19	By individual arrangement

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

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

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

[8] For **independent assessments** please record type and weighting of each separate piece of assessment individually.

[9] For **multi-part assessments** please record the overall weighting of module which should be 100%.

[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.

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	Calendar 'Residential' Start Date	Calendar 'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment Type of Assessment	Independent Assessment Weighting within module8 (%) of Independent assessments	Multi-part Assessment Weighting within module of multi-part assessments[9] (100%)	Multi-part Assessment Type of Assessment	Multi-part Assessment Weighting of individual elements of multi-part assessment[10]	Submission dates Assessment Submission and/or exam date[11]	Submission dates Assessment / Exam Retake date
4	R-ESD-FE	Finite Elements in Engineering	Shaun Forth	35	0	10	N	N/A	23/09/19	27/09/19	40	ICW	100				28/10/19 FT 11/11/19 PT	By individual arrangement
OCTOBER 2019: – Private Study Week 14th – 18th October (Note That Monday 14th October May Be Used As A Presentation Day For The Msc Module.)																		
5	R-ESD-FB	Fundamentals of Ballistics	Clare Knock	32	0	10	N	N/A	30/09/19	04/10/19	50	EX	100				06/12/19	By individual arrangement (Block 2)
6	R-ESD-WST	Weapon Systems Technology	Hugh Goyder	30	0	10	N	N/A	07/10/19	11/10/19	40	ICW	100				13/01/20 FT 27/01/20 PT	By individual arrangement
7	R-ESD-MVD	Military Vehicle Dynamics	Ajay Kumar	70	0	20	N	N/A	21/10/19	01/11/19	50 50	ICW EX	50 50				20/01/20 FT 03/02/20 PT 13/12/19	By individual arrangement (Block 2)
8	R-ESD-GSD	Ordnance Design	Steve Champion	70	0	20	N	N/A	21/10/19	01/11/19	50	ICW	100				02/03/20 FT 16/03/20 PT1 29/06/20 (L)	By individual arrangement
NOVEMBER 19 – PRIVATE STUDY WEEK 4 – 8 November (ALL)– 11th – 22ns November (GSD)																		
9	R-ESD-MVP	Military Vehicle Propulsion	Dave Simner	70	0	20	N	N/A	11/11/19	22/11/19	50	ICW	100				10/02/20 FT 24/02/20 PT	By individual arrangement

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' End Date	Minimum Mark[7] - 40% or 50%	Independent Assessment		Multi-part Assessment		Submission dates	
												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
10	R-ESD-SURV	Survivability	Gareth Appleby-Thomas	35	0	10	N	N/A	25/11/19	29/11/19	50	ICW	100				24/02/20 FT 09/03/20 PT	By individual arrangement
December 2019: Block 1 Examinations 10th – 14th December – Official timetable will be published by Registry Christmas Break Saturday 21st December 2019 – 1st January 2020 inc																		
11	R-ESD-ED	Element Design	Dave Simner	35	0	10	N	N/A	09/12/19	13/12/19	50	ICW	100				23/03/20 FT 06/04/20 PT	By individual arrangement
JANUARY 2020																		
12	R-ESD-MVPD	Military Vehicle Propulsion and Dynamics	Dave Simner	32	0	10	N	N/A	06/01/20	10/01/20	50	ICW	100				02/03/20	By individual arrangement
13	R-MAA-GW	Guided Weapons	Derek Bray	32	0	10	Y	N/A	13/01/20	17/01/20	50	ICW	100				16/03/20 (As MAA)	By individual arrangement
14	R-ESD-UMVS	Uninhabited Military Vehicle Systems	John Economou	35	0	10	N	N/A	20/01/20	24/01/20	50	ICW	100				02/03/20	By individual arrangement

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers[6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
												Independent Assessment		**Multi-part Assessment**			**Submission dates**	
15	R-MAA-MA	Military Avionics	Alessio Balleri			10	Y	N/A	20/01/20	24/01/20	50	ICW	100				23/03/20 (as MAA)	By individual arrangement
16	R – ESD-VSI	Vehicle Systems Integration	David Diskett	35	0	10	N	N/A	27/01/20	31/01/20	50	ICW	100				09/03/20 FT 23/03/20 PT	By individual arrangement
FEBRUARY 2020																		
17	R-ESD-RSE	Reliability and Systems Effectiveness	Aimee Helliker	29	0	10	N	N/A	03/02/20	07/02/20	50	ICW	100				16/03/20	By individual arrangement
18	R-EOS-RMP	Rocket Motors and Propellants	Phil Gill and Derek Bray	28	0	10	Y	N/A	10/02/20	14/02/20	50	EX	100				30/03/20 (As EOE)	22/05/20
19	R-ESD-LWD	Light Weapon Design	Steve Champion	34	0	10	N	N/A	24/02/20	28/02/20	50 / 50	OR / EX	20 / 80				28/02/20 / 02/04/20	By individual arrangement
MARCH 2020:			Part of March, April, May And June – PROJECT – (Hand In Date Is July -See Below)															
APRIL 2020: 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 – 10th April 2020 & Easter Monday – 13th April 2020																		
JULY 2020:																		

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Module Number	Module code	Title	Module Leader	Contact hours[5]	Total hours delivered by Visiting Lecturers [6]	Credits	Is the module shared? Y/N	Module Start Date (eg Pre-course task)	'Residential' Start Date	'Residential' 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
									Calendar				Independent Assessment	Multi-part Assessment			Submission dates	
20	R-ESD-AFVWS	Armoured Fighting Vehicle and Weapon Systems Study	David Diskett	35	0	10	N	N/A	14/07/20	24/07/20	50	ICW	100				27/07/20	By individual arrangement
21	R-ESD-THESIS	Thesis	Dave Simner	10	0	80	N	N/A	02/03/20	13/07/20	50	THESIS	100				13/07/20	By individual arrangement

PRESENTATION DAY – Wednesday 22nd July 2020 (Planning assumption) – To include a meeting of the Industrial Advisory Panel – Date will be confirmed nearer to the time.
PROJECT VIVA VOCE EXAMS – 27th-28th July
INTERNAL/DEPARTMENTAL EXAMINATION BOARD – Friday 31st July 2020 – FORMAL EXAMINATION BOARD – Thursday 8th October 2020 (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.

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

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

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7. How are the ILOs assessed?

The following assessment types are utilised:

Students will undertake a range of examinations, assessed coursework and project work. The mix of coursework and examinations will depend on the modules undertaken. Coursework (and to some extent examinations) will cover a range of question styles, including descriptive, technical discussions, analysis of engineering problems, and simulation of systems using computer aided engineering tools. In the final module (PgDip and MSc) students have to present their findings and defend their solution to a system problem. In addition to the above, the MSc students are also assessed in their ability to orally present and defend the findings of their project in a viva voce examination.

Assessment and ILO Mapping

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.)

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.

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					

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Module Name / No. \ Award ILOs	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	ILO 7	ILO 8	ILO 9	ILO 10	ILO 11
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

MSc

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

Module Name / No. \ Award ILOs	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

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

New course proposals are reviewed by a Course Validation Panel, comprising at least the following membership: normally one subject matter expert external to the School or University, at least 3 academic staff not associated with the proposal. The Panel may include 1 member of professional staff. Panels are supported by an appropriately trained Secretary who acts as advisor to the Panel. Proposals are reviewed in line with the Quality Assurance Agency for Higher Education (QAA) Quality Code, in particular Chapter B1 (Programme Design and Approval) and in the case of partnership arrangements in accordance with Chapter B10 (Managing Higher Education with Others). New courses are ultimately approved by the University's Education Committee, on behalf of Senate.

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

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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;

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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.

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

Invariably, students are sponsored on the course by their employer. The main reason for the sponsor providing this support is to ensure they (the students) are equipped to undertake senior positions within weapon or vehicle engineering teams in the organisation. This may be within procurement teams for ministry sponsored students or system design and development teams for industrially sponsored students.

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