Template C4

Kingston University London

Programme Specification

Title of Course: *MSc Aerospace Engineering*

Date first produced	30/09/2012
Date last revised	28/08/2024
Date of implementation of current version	01/08/2024
Version number	7
Faculty	Faculty of Engineering, Computing and the Environment
School	School of Engineering
Department	Department of Aerospace and Aircraft Engineering
Delivery Institution	Kingston University

This Programme Specification is designed for prospective students, current students, academic staff and employers. It provides a concise summary of the main features of the programme and the intended learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if they take full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes and content of each modules can be found in the course VLE site and in individual Module Descriptors.

SECTION 1: GENERAL INFORMATION

Award(s) and Title(s): ***Up to 10 pathways***	MSc Aerospace Engineering
Intermediate Awards(s) and Title(s): ***There are 4 Intermediate awards for each pathway***	PgDip PgCert
Course Code ***For each pathway and mode of delivery***	PPAEN1AEN01 PFAEN1AEN01
UCAS code ***For each pathway***	N/A

RQF Level for the Final Award:	MSc
Awarding Institution:	Kingston University
Teaching Institution:	Kingston University
Location:	Roehampton Vale
Language of Delivery:	English
Modes of Delivery:	Full Time Part-time With Professional Placement
Available as:	
Minimum period of registration:	Full Time - 1 Part-time - 2 With Professional Placement - 2
Maximum period of registration:	Full Time - 2 Part-time - 4 With Professional Placement -
Entry Requirements:	**1. The minimum entry qualifications for the field are:** Applicants for the MSc are normally required to have a good honours degree (2.2) or academic equivalent, in aerospace engineering or a related discipline (such as aircraft or mechanical engineering). **2. Typical entry qualifications set for entrants to the field are:** Applicants for the MSc for all fields should normally have a good honours degree accredited in partial fulfilment of the academic requirements for Chartered Engineering Status Any other student admitted joining the course would normally have a minimum 2.2 honours or academic

	equivalent, with some working experience in the industry. International students for whom English is not the first language are required to have achieved an English language qualification prevailing currently at time of application or approved equivalent. Kingston University postgraduate English requirements can be found at this link. http://www.kingston.ac.uk/international/studying-at-kingston/language-requirements/
Programme Accredited by:	Royal Aeronautical Society in May 2014
QAA Subject Benchmark Statements:	Engineering
Approved Variants:	None
Is this Higher or Degree Apprenticeship course?	

For Higher or Degree Apprenticeship proposals only	
Higher or Degree Apprenticeship standard:	n/a
Recruitment, Selection and Admission process:	n/a
End Point Assessment Organisation(s):	n/a

SECTION 2: THE COURSE

A. Aims of the Course

The main aims of MSc Aerospace Engineering course are to:

- Provide a "period of further learning" which is a requirement of the Royal Aeronautical Society for Chartered Engineer status for students with an accredited BEng.
- Further the students' knowledge and understanding of subjects within the broad areas of materials, computational aerodynamics, structures and aerospace design.
- Enable students to develop a wider perspective and understanding of the issues facing the aerospace engineering industries and in particular to study subjects such as business, finance, management, environmental issues more broadly and in greater depth than in the BEng (Hons) programme.
- Develop an awareness of work in a multi-disciplinary team within an engineering organisation within real industrial constraints.
- Demonstrate a range of transferable skills including written, oral and graphical communication, independent learning, analytical skills, and engineering based computing skills.
- To develop research and investigative skills, and a critical, research-oriented approach to the study of relevant areas of aerospace engineering.
- Give students on the 2 year version an opportunity to develop further skills, preparing them for higher levels of employment

B. Intended Learning Outcomes

The field/course provides opportunities for students to develop and demonstrate knowledge and understanding specific to the subject, key skills and graduate attributes in the following areas. The programme outcomes are referenced to the QAA subject benchmarks for master's level Engineering (2015) and the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (2008), and relate to the typical student.

The programme learning outcomes are the high-level learning outcomes that will have been achieved by all students receiving this award. They must align to the levels set out in the 'Sector Recognised Standards in England' (OFS 2022).

Programme Learning Outcomes					
	Knowledge and Understanding On completion of the course students will be able to:		**Intellectual Skills** On completion of the course students will be able to		**Subject Practical Skills** On completion of the course students will be able to
A1	Demonstrate knowledge and understanding of aerospace engineering subjects.	B6	Develop original thought	C1	Select and apply computer-based and other advanced technologies to a wide range of aerospace engineering applications
A3	Demonstrate applications of design principles and analysis tools to solve aircraft design problems.	B5	Carry out a focused critical literature review	C2	Select and use appropriate software tools for the design and analysis of aerospace components and systems.
A4	Demonstrate knowledge of entrepreneurship, management and environmental issues in engineering.	B3	Carry out independent data collection and synthesise it so as to resolve problems/issues	C3	Demonstrate an in-depth understanding of the aerospace engineering business environment, including legal aspects, and apply modern operations and financial management techniques and good practices in a range of contexts.
A5	Demonstrate a range of engineering skills.	B1	Submit areas studied to critical analysis and evaluation		
A2	Apply modelling techniques and analytical methods to solve engineering problems.	B2	Analyse problems and issues, taking due account of any incompleteness of data or information, and arrive at well-reasoned and supportable conclusions		
		B4	Design and develop a programme of independent research and data collection/analysis		

In addition to the programme learning outcomes, the programme of study defined in this programme specification will allow students to develop the following range of Graduate Attributes:

1. Creative Problem Solving
2. Digital Competency
3. Enterprise
4. Questioning Mindset
5. Adaptability
6. Empathy
7. Collaboration
8. Resilience
9. Self-Awareness

C. Outline Programme Structure

This programme is part of the University Postgraduate Regulations (PR). Programmes in the PR are made up of modules which are designated at level 7. Single modules in the framework are valued at 30 credits and the programme consists of 4 subject specific single modules (3 core and 1 optional) and the capstone project module valued as 2 single modules (60 credits). A Postgraduate Certificate (PgCert) or Postgraduate Diploma (PgDip) may be offered as an exit award, with the minimum requirement for a PgCert of 60 credits and PgDip of 120 credits. The Master degree is achieved with 180 credits completion of (all modules and the final individual project).
The course offers the PG Certificate and PG Diploma only as an exit award.
All students will be provided with the University regulations and specific additions that are sometimes required for accreditation by outside bodies (e.g. professional or statutory bodies that confer professional accreditation).
Full details of each module will be provided in module descriptors and student module guides.
Students on placement must complete a portfolio assessment which includes a reflection on how the theories they have learnt during their teaching year have helped them in their placement and demonstrate ability to apply their teaching in a real world situation.
Duration and academic year structure

- The maximum duration of the MSc is one year full-time, two years (with professional placement) and two-four years part-time.
- Students may commence in September, January or March.
- The taught modules will normally run from September to May each year.
- Part-time students will normally complete their taught modules over two years and then complete their project.

To successfully complete the MSc, students must pass three core modules, one option module, and complete an individual project which is normally industry/research related with distinctive emphasis of industrial applications.
See also diagrammatic representation of the course structure Appendix A.

Level 7							
MSc Aerospace Engineering							
Core modules	**Module code**	**Credit Value**	**Level**	**Teaching Block**	**Pre-requisites**	**Full Time**	**Part Time**
Advanced Computational Fluid Dynamics	EG7704	15	7	TB1	None	1	1
Advanced Engineering Materials	EG7703	15	7	TB1	None	1	1
Advanced Structural Analysis	EG7705	15	7	TB2	None	1	2
Aerospace Design and Analysis	needs a AE code	30	7	TY13	None	1	2
Dissertation	AE7743	60	7	TY13	None	1	2
Research Techniques, Innovation & Sustainability	AE7742	30	7	TY13	None	1	1
Optional Modules							
Advanced CAD\/CAM Systems	ME7722	15	7	TB1	None	1	1
Advanced Control Systems	ME7025	15	7	TB2		1	2
Professional Placement	CI7900	120	7	TY13	None	1	2

D. Principles of Teaching, Learning and Assessment

The principles of teaching, learning and assessment are in line with the University's strategy. The fields are designed to give students a balanced portfolio of theoretical and practical experience, embracing diversity and individuality.
Taught materials and knowledge gained from the practical and case studies embedded within each module give students specialised knowledge, tools and techniques. It will equip them with the skills and methods for extracting and synthesising the information. These activities promote rigour, curiosity, excellence, originality and breadth of knowledge.
They must then further explore and exploit the information given, research and define outcomes accurately to produce detailed solutions and innovative work for each module and project dissertation.
It is recognised that teamwork is a very important aspect in the industry and this is implemented in the modules. The course ensures that the students are exposed to team working through group presentations, joint report writing, joint research and lab work, promoting consideration, courtesy and collegiality.
The course teams are aware of the need for effective communication, both written and verbal, and take pride in the fact that the courses provide, in this regard, a means of preparing the students for their longerterm career plans and Continuous Professional Development (CPD.) Apart from the project itself, each student has to deliver verbal presentations during the modules, normally to the student’s peer group and module leader. Students are also helped with verbal communication skills through seminars,

tutorials and discussion groups. Most modules are assessed by written assignments which are designed to improve students' research and evaluation skills.
A combination of assessment methods will be used throughout the course. These elements include module assignments, module examinations, in-class tests, experiment reports, industrial visit reports, seminars, verbal presentations and the project dissertation. Each module leader is responsible for ensuring that the method of assessment reflects the aims and learning objectives of the module, is demanding and stimulating and at the appropriate Master level. The level and content of courses are relevant and satisfy the Engineering Council's guidance and criteria.
The course uses formative assessment opportunities to provide students with essential feedback. Early feedback can help students to improve their motivation and academic performance. This teaching and learning strategy is implemented through small group tutorials, seminars, group feedback sessions, draft reports with intermediate feedback, peer assessment in group work, project plans, reflective blogs and face-to-face meetings with supervisor.
The programme embraces the use of Technology Enhanced Learning (TEL) to engage students actively. Some of the most widely used technologies in problem-solving activities are computer simulations and modelling which encompass Finite Elements Analysis (FEA), Computational Fluid Dynamics (CFD), Computer Aided Design (CAD) in the curriculum. Digital tools such as a team's work file syncs DropBox, cloud-based project management tool Gantter, Tumblr Aerospace blog, Facebook study group, VLE assessment and YouTube videos are used to enhance the quality of student learning experience.
Research Informed Teaching (RIT) is an important component of our commitment to academic excellence by bringing the findings from staff research into the curriculum contents and using assignments which involve elements of research processes. The curriculum is designed around inquiry-based activities where students can explore their research aspirations and propose new hypotheses. They also learn about the latest staff research findings from lectures within the modules such as Aerospace Stress Analysis and Advanced Materials, Computational Fluid Dynamics for Aerospace Applications, Finite Element Analysis and experimental studies of aerospace composite materials, Large Eddies Simulations of complex and compressible turbulent flows, fire simulation, drag reduction using Nano paint coating, and prediction of turbulent transition of wavy boundary layers.
Engineering curriculum

The **Engineering Research Techniques, Entrepreneurship and Quality Management ME7711** introduces the students the skills to conduct a research project and develop their knowledge and skills in business and management, with emphasis on entrepreneurship and innovation in products or services. They will develop the analytical skills to solve business and management problems in an engineering environment. It will ensure students to have an awareness of the ethical, legal, social and economic implication in a broader context. The module provides the knowledge and understanding of the Total Quality Management in the engineering environment.

The **Computational Fluid Dynamics for Aerospace Applications AE7724** is designed to provide students with computational skills to enhance their employability in the engineering sector. They will acquire the knowledge and skills in computational fluid dynamics and the advanced mathematics governing the flow problems. They will be able to interpret, evaluate and apply the results of the computational analysis and modelling in order to make aerodynamic improvement of engineering components.

The **Aerospace Stress Analysis & Advanced Materials AE7723** focuses on the analytical techniques of modern materials and structures and their advanced manufacturing process. The computational technique finite element methods will be introduced to evaluate the structural performance of an engineering design. Students will assess aspects of quality assurance to advanced materials with an awareness of the economic constraints.

The **Engineering Individual project ME7761** provides the students a challenge to identify an industry based (or research focused) project area, establish a feasible hypothesis, find creditable solutions, analyse results and offer recommendations. The theme of the project is an open-ended problem with lots of uncertainties, demanding research, analyses, and design optimisation. Students will develop the understanding of the process and methodologies underpinning aircraft design. The design solutions will be critically evaluated by theoretical analyses, computer-based modelling and experimental testing techniques. They will develop awareness for the latest innovation, cost, sustainability and environmental issues, such as engine noise emission, carbon foot prints, aerodynamic and fuel efficiency. Students are made aware of the regulatory requirements from the civil aviation regulatory bodies. The part-time students can choose their own individual projects with themes usually relevant to their full-time engineering jobs.

The **Engineering Projects and Risk Management ME7712** covers the comprehensive knowledge and understanding of the techniques and skills required in project management with an engineering environment. Students will be equipped with the ability to identify commercial risks and appraise the opportunities. They will analyse the cause of failures and success of real projects through the case studies. The module introduces project management modelling approaches and software tool to produce an effective project framework.

The **Advanced CAD/CAM ME7722** develops students' knowledge and understanding of the advanced CAD/CAM techniques in conceptual design and manufacturing process. The module focuses on surface modelling, reverse engineering, machining operations simulation and rapid manufacturing methods. Students will have to analyse critically and optimise the machining operation using the leading industrial CAD/CAM package.

The **Green Engineering & Energy Efficiency ME7725** is designed to provide knowledge and understanding of sustainable development in the engineering environment. The module will equip the students the skills and the ability to apply quantitative techniques in order to enhance energy efficiency and minimise the environmental impact or risk of the products and operations. It provides an understanding of energy efficient code, product life cycle and the sustainability context taking account of the environmental, social and economic considerations. The module will develop their ability to synthesize and evaluate design solutions are energy efficient and environmentally friendly.

The **Professional Placement CI7900 i**s the core module of the two-year work-based learning. Students will spend a minimum of 10 months and a maximum of 12 months working in an engineering environment. It provides students with the opportunities to apply and gain both the engineering and general skills in a work environment. They will develop a wide range of engineering practice abilities, graduate attributes and employability skills such as interpersonal, communication, team-working, management and leadership skills. Students are required to keep a reflective log that will enable them to reflect on their experiences and improve their performance encouraging Continuous Professional Development CPD.

E. Support for Students and their Learning

Students are supported by:

- A Module Leader for each module

- A Course Leader to help students understand the programme structure
- Personal Tutors to provide academic and personal support
- A placement tutor to give general advice on placements
- Technical support to advise students on IT and the use of software
- A designated programme administrator
- An induction week at the beginning of each new academic session
- Staff Student Consultative Committee
- Canvas – a versatile on-line interactive Virtual Learning Environment (VLE)
- A substantial Study Skills Centre that provides academic skills support
- Student support facilities that provide advice on issues such as finance, regulations, legal matters, accommodation, international student support etc.
- Disabled student support
- The Students' Union
- Careers and Employability Service

At level 7, the course leader or project supervisor acts as the personal tutor throughout their course. The Personal Tutor Scheme (PTS) is embedded in the provision through one-to-one and group meetings with the Course Leader. It aims to help students to make the transition to Master's degree level and to encourage them in fulfilling their academic /research aspirations. The first group meeting will last half an hour during the induction week. It will be followed by several sessions of one-to-one meetings lasting about 15 minutes. The project supervisor will also see students weekly during the project meetings over the summer period that provides plenty of opportunities for face-to-face contact. For the part-time level students, one-by-one contacts can be conducted by emails or by phone. A personal tutor will act as the default referee and encourage students to keep in touch.

F. Ensuring and Enhancing the Quality of the Course

The University has several methods for evaluating and improving the quality and standards of its provision. These include:

- External examiners
- Boards of study with student representation
- Annual review and development
- Periodic review undertaken at the subject level
- Student evaluation
- Moderation policies

G. Employability and work-based learning

Students who successfully complete the MSc will have acquired significant research, analytical and transferable skills in the broader issues relating to aerospace engineering and should therefore have substantially enhanced their prospects of gaining employment and progressing their career in the aerospace industry. They will have a systematic understanding of knowledge in subjects that are both specific and complementary to

aerospace engineering. The programme is built on a comprehensive application of techniques such as advanced computer-based design, Computational Fluid Dynamics (CFD) and Finite Elements Analysis (FEA). It enables students to also gain management and business skills necessary for employment.

The individual project provides a challenge to the candidates to undertake a real-world problem because most projects are industrially orientated in a virtual environment. During the project students will be expected to apply the knowledge and skills learnt during the course to achieve agreed deliverables, whilst satisfying any given constraints and demonstrating originality in solving problems. They will have to demonstrate the exercise of initiative and personal responsibility. Key skills in communication, presentation, research, problem analysis, project planning, decision making and solution justification are all part of the learning objectives defined in the field which fosters the development of their employability skills.

Postgraduates of this course have taken up posts in a variety of employment settings including CAA, Rolls Royce, Sterling Aerospace, Marshall Aerospace, The Royal Navy, Pall Europe, Amsafe, Armour, Solion Solar Energy, EasyJet, Lufthansa, Flybe, Hawkerhind and Precision Press Parts Corp. Some postgraduates have continued their studies in PhD research projects. The employability skills taught in the course are outlined in section F.

Work-based learning, including sandwich courses and higher or degree apprenticeships

The professional placements team, aided by the Employability Co-ordinator, helps to prepare the students for interview and work, for example, with mock interview sessions, CV workshops, and industry speakers on employers' needs. The optional professional placement for 1 year (10 to 12 months) occurs after the formal taught modules and the final project. You must pass all modules including the research project to progress to a placement.
Industry-hosted major projects are actively encouraged. It is the responsibility of individual students to source and secure such arrangements giving them more experience and employability skills after their Master's degree.

H. Other sources of information that you may wish to consult

Engineering Council UK-SPEC:
https://www.engc.org.uk/ukspec

Royal Aeronautical society Accreditation Handbook:
https://www.aerosociety.com/media/4238/membershiphandbook.pdf

Kingston University Web site:
http://www.kingston.ac.uk/postgraduate-course/aerospace-engineering-msc/

I. Development of Course Learning Outcomes in Modules

This table maps where course learning outcomes are **summatively** assessed across the modules for this course. It provides an aid to academic staff in understanding how individual modules contribute to the course aims, a means to help students monitor their own learning, personal and professional development as the course progresses and a checklist for quality assurance purposes.

Module Code		Level 7								
		EG7703	EG7704	EG7705	CI7900	needs a AE code	ME7722	AE7742	ME7025	AE7743
Knowledge & Understanding	A1									
	A3									
	A4									
	A5									
	A2						S			
Intellectual Skills	B6						S			
	B5									
	B3						S			
	B1						S			
	B2						S			
	B4						S			
Practical Skills	C1						S			
	C2						S			
	C3									

Students will be provided with formative assessment opportunities throughout the course to practise and develop their proficiency in the range of assessment methods utilised.