Programme Specification

MSc in Aerodynamics and Computation 2018/19

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided.

Awarding Institution	University of Southampton
Teaching Institution	University of Southampton
Mode of study	Full time
Duration	1 year
Accreditation details	Royal Aeronautical Society, Institute of Mechanical Engineers
Final award	Master of Science
Name of award	Aerodynamics and Computation
Interim Exit awards	Postgraduate Certificate Postgraduate Diploma
FHEQ level of final award	Level 7
UCAS code	N/A
QAA Subject Benchmark or other external reference	QAA Subject Benchmark in Engineering. QAA Qualifications and Credit Framework (QCF). Engineering Council, UK-SPEC.
Programme Coordinator	Dr Zhiwei-Hu
Date specification was written	3rd April 2008
Date programme was validated	July 2014
Date specification last updated	August 2016

Programme Overview

This programme covers the major topics in aerodynamics and fluid flow simulation via computational fluid dynamics (CFD). It exploits the expertise of staff at Southampton in these topics that is recognised both nationally and internationally. Hence some of the specialist modules available in this programme contain material that is considered to be state-of-the art. The programme will prepare students well for careers in industrial research and development in this subject area, as well as those that are perhaps thinking of pursuing a PhD either at Southampton or elsewhere.

The taught element of the programme consists of a maximum of 8 modules totalling 60 ECTS/120 CATS, 4 of which are compulsory. This is followed by a substantial research project leading to a dissertation (30 ECTS/60 CATS). The specific educational aims are outlined in Educational Aims of the Programme, below.

Learning and teaching

The different subject matter of the modules lends itself to different teaching and learning techniques but these include lectures, tutorials, assignments and practical exercises. You are encouraged throughout to contribute your own professional experiences and thoughts to the learning of the whole class through a free exchange of ideas.

Assessment

Testing of the knowledge base is through a combination of unseen written examinations and assessed coursework in the form of problem solving exercises, assignments, laboratory reports and individual projects.

The assessment on the programme is undertaken through a variety of methods, enabling students to experience different ways to demonstrate their learning and understanding.

Many modules include assessed coursework assignments which require you to carry out a substantial study of selected topics, either as individuals or in groups, leading to considerable depth of understanding and specialist knowledge. Assessment is designed to show that you can rationally use taught material and have a fundamental understanding of the subject matter. Feedback on progress is given to students on all submitted work.

As a research-led University, we undertake a continuous review of our programmes to ensure quality enhancement and to manage our resources. As a result, this programme may be revised during a student's period of registration: however, any revision will be balanced against the requirement that the student should receive the educational service expected. Please read our Disclaimer to see why, when and how changes may be made to a student's programme.

Programmes and major changes to programmes are approved through the University's programme validation process which is described in the University's quality handbook.

Educational Aims of the Programme

The Faculty of Engineering and Physical Sciences hosts a spectrum of exciting and challenging programmes at undergraduate and postgraduate levels. Within this particular postgraduate taught (PGT) programme of study, we aim to provide you with a thorough professional knowledge of aerodynamics and computation, be that for design or fundamental analysis. It has been configured for graduates, or similarly-qualified individuals, with an engineering, scientific or mathematical background, who desire to specialise in aerodynamics and computation for further research or career-based reasons.

The programme emphasises the fundamentals of external fluid dynamics and computational methods for a range of high- and low-speed applications. The MSc programme has been accredited by the Royal Aeronautical Society (RAeS) and the Institute of Mechanical Engineers (IMechE) on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer. Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

The aims of the programme are to:

- give you an advanced knowledge of aerodynamics;
- give you an understanding of the use, and an appreciation of the limitations, of computational and experimental methods as applied to aerodynamics.
- enhance your transferable skills, including critical analysis, problem solving, project management, decision making, leadership, and communication by oral, visual and/or written means.
- equip you with specialist knowledge, scientific and technical expertise and research skills for further research and/or application in aerodynamics and computation.

The MSc programme provides opportunities for you to achieve and demonstrate the learning outcomes described below.

Programme Learning Outcomes

The programme provides opportunities for you to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas. The programme outcomes have been developed with reference to the Accrediting Institution guidelines and the UK-SPEC Degree Output Standards General and Specific Learning Outcomes.

Knowledge and Understanding

Having successfully completed this programme you will be able to demonstrate knowledge and understanding of:

a) Fundamental scientific principles and concepts that underpin the discipline of Aerodynamics, with particular application to high performance sports vehicles;
b) Analytical and computational tools appropriate to Race Car Aerodynamics;
c) Current problems and developments in Race Car Aerodynamics, informed by the forefront of research within the field;
d) Essential facts, concepts and principles relevant to Race Car Aerodynamics;
e) Issues, terminology and technical background sufficient to permit study of the current research literature, and to engage in meaningful discussion with peers, about critical issues within the broader field of Aerodynamics.

At the PG Diploma level you are expected to reach broadly MSc-equivalent level for items (a), (b), (c) and (d), with some elements of (e).

At the PG Certificate level you are expected to reach PG Diploma level over a restricted range of topics.

Teaching and Learning methods:

Items (a), (b) and (c) are provided through lectures in designated common and core engineering modules (levels 6 and 7), supported through directed example questions together with coursework assignments and laboratory experiments.

Items (d) and (e) are provided through lectures, coursework and project work in modules at level 7, together with a major research project into a specific aspect of Race Car Aerodynamics.

Items (c), (d) and (e) are also developed through regular research seminars and occasional guest lectures offered in term-time, which you are strongly encouraged to attend.

Assessment methods:

Your knowledge and understanding will be assessed through a combination of unseen written examinations [items (a)-(e)], problem-solving exercises [(a)-(e)], laboratory assignments [(a)-(e)], a group design project report [(a)-(e)] and a major research dissertation [(d), (e)].

Subject Specific Intellectual and Research Skills

Having successfully completed this programme you will be able to:

a) Solve problems by identifying information needs and assembling information from different sources, in order to build a clear overall picture of a complex problem or situation;
b) Evaluate different types of information critically in a variety of formats;
c) Analyse and solve engineering problems, using appropriate mathematical methods and models as necessary;
d) Select appropriate computational methods to model engineering problems and critically appraise the results of such modelling;
e) Apply creative and original thought in order to propose appropriate new solutions to complex problems.

At the PG Diploma level you are expected to reach broadly MSc-equivalent level for skills (a), (b), (c) and (d).

At the PG Certificate level you are expected to develop skills (b) and (c) within the limited range of subjects studied.

Teaching and Learning methods

- Skills (a) and (b) are acquired through your self-learning associated with taught modules, together with individual assignments/laboratory work. A further source is provided by the research project, through its requirement that you critically appraise the state of knowledge in your selected research field.

- Skill (c) is acquired through the solution of directed examples given in taught modules and in completing assignments.

- Skills (d) and (e) are acquired through your individual assignments in specified modules and the research project.

Assessment methods

- Your intellectual skills will be assessed through unseen written examinations [(a)-(c)], directed problem-solving questions [(a)-(c)], individual assignments [(a)-(e)], and the research dissertation [(d)-(e)].

Transferable and Generic Skills

The following skills are developed progressively throughout the MSc programme. The levels attained by MSc/PG Diploma/PG Certificate students will reflect the differing length of study.

a) Learning: independent study and skills development;
b) Problem solving: recognition, definition, analysis and solution;
c) Information processing (including IT skills): literature searching, abstracting documents and collating information for the purposes of technical writing;
d) Data manipulation (including IT skills): analysis of data, application of statistical methods, interpretation of results;
e) Communication: oral and written presentation or information, scientific writing;
f) Individual: critical and creative thinking, decision-making, initiative-taking, self-motivation and direction, personal responsibility and reflection, leadership;
g) Management: safe and effective project planning and execution, time management (more highly developed for MSc through research project).

Teaching and Learning methods:

- Skills (a)-(b), (d)-(f) are acquired through your individual work associated with specific taught modules.

- Skills (a), b), (f) are acquired through directed problem-solving exercises and your self-learning associated with taught modules, and coursework assignments set for the taught modules.

- Skills (a)-(g) are acquired through your research project.

Assessment methods:

Transferable and generic skills are assessed through unseen written examinations, problem-solving exercises, assignments and your individual research dissertation.

Subject Specific Practical Skills

During this programme, you will learn to:

a) Use computational tools and packages effectively for the solution of engineering problems;
b) Use appropriate mathematical models for analysing Aerodynamics problems;
c) Design and conduct an appropriate research programme in order to obtain research objectives;
d) Evaluate computational or experimental results and their validity;
e) Use scientific and technical literature effectively.

Teaching and Learning methods

- Skill (a) is acquired through your individual assignments and project work associated with specific taught modules.
- Skills (b) and (d) are acquired through directed problem-solving exercises and your self-learning associated with taught modules, coursework assignments and your research project.
- Skills (c) and (e) are acquired through your research project.

Assessment methods

Practical skills are assessed through problem-solving exercises, assignments/laboratory exercises and your individual research dissertation.

Programme Structure

The programme involves 90 ECTS (180 CATS) distributed between taught and research components. The taught component consists of modules worth 60 ECTS/120 CATS, of which at least 45 ECTS/ 90 CATS are at level 7. You will take a number of compulsory modules and select the remaining from a given list. Details of the compulsory and optional modules are shown in Appendix 1. Any of these modules can form part of a Postgraduate Certificate, requiring at least 30 ECTS/60 CATS to be completed successfully. A Postgraduate Diploma requires 60 ECTS/120 CATS to be completed successfully. The MSc requires successful completion of 90 ECTS/180 CATS, of which 30 ECTS/60 CATS are due to the research project.

The MSc programme lasts for 12 months. The first 8 months are spent mainly on the taught component, with lectures divided into two 12-week periods (Semesters 1 and 2), with exams at the end of each semester. The final four months are spent full-time on a research project, for which some preparation is done in Semester 2. It is important that you commence project work before the Semester 2 exams to allow yourself maximum time, especially where practical work is involved.

The MSc award depends on passing the examinations and on successful completion of a dissertation on the project.

Typical course content

You will study a number of core and optional subjects during both semesters (see appendix 1 for details). These provide sound preparation for the final part of the degree, the Research Project.

Special Features of the programme

As a student of this programme you will be integrated into the Aerodynamics and Flight Mechanics Research Group and will, for example, be encouraged to attend regularly-held research seminars and any guest lectures related to this field of study that are organised.

This programme has been accredited by the Royal Aeronautical Society (RAeS) and the Institute of Mechanical Engineers (IMechE) on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer. Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.

As an accredited programme in the field of aerospace engineering it qualifies for the UK Government's Aerospace MSc Bursary Scheme. For further details of this scheme please see: http://aerosociety.com/Careers-Education/aeromscbursary

Programme details

The programme follows university guidelines for inclusivity and flexibility and provides and array of teaching and learning approaches that will enable any student who meets the entry requirements to access the curriculum and demonstrate achievement of all the intended learning outcomes.

Additional Costs

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. Costs that students registered for this programme typically also have to pay for are included in Appendix 2.

Progression Requirements

The programme follows the University's regulations for ***Progression, Determination and Classification of Results: Standalone Masters Programmes*** as set out in the University Calendar: http://www.calendar.soton.ac.uk/sectionIV/sectIV-index.html

Intermediate exit points

ou will be eligible for an interim exit award if you complete part of the programme but not all of it, as follows:

Qualification	Minimum overall credit in ECTS/CATS credits	Minimum ECTS/CATS credits required at level of award
Postgraduate Diploma	at least 60/120	45/90
Postgraduate Certificate	at least 30/60	20/40

Programme outcomes for different exit points

Level 7	You will have shown originality in the application of knowledge, and you will understand how the boundaries of knowledge are advanced through research. You will be able to deal with complex issues both systematically and creatively, and show originality in tackling and solving problems individually and as part of a team. You will have the qualities needed for employment in circumstances requiring sound judgement, personal responsibility and initiative, in complex and unpredictable professional environments.

Support for Student Learning

There are facilities and services to support your learning some of which are accessible to students across the University and some of which will be geared more particularly to students in your Faculty or discipline area.

The University provides:

- library resources, including e-books, on-line journals and databases, which are comprehensive and up-to-date; together with assistance from Library staff to enable you to make the best use of these resources
- high speed access to online electronic learning resources on the Internet from dedicated PC Workstations onsite and from your own devices; laptops, smartphones and tablet PCs via the Eduroam wireless network. There is a wide range of application software available from the Student Public Workstations.

- computer accounts which will connect you to a number of learning technologies for example, the Blackboard virtual learning environment (which facilitates online learning and access to specific learning resources)
- standard ICT tools such as Email, secure filestore and calendars.
- access to key information through the MySouthampton Student Mobile Portal which delivers timetables, Module information, Locations, Tutor details, Library account, bus timetables etc. while you are on the move.
- IT support through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Student Services Centre
- Enabling Services offering assessment and support (including specialist IT support) facilities if you have a disability, dyslexia, mental health issue or specific learning difficulties
- the Student Services Centre (SSC) to assist you with a range of general enquiries including financial matters, accommodation, exams, graduation, student visas, ID cards
- Career Destinations, advising on job search, applications, interviews, paid work, volunteering and internship opportunities and getting the most out of your extra-curricular activities alongside your degree programme when writing your CV
- a range of personal support services : mentoring, counselling, residence support service, chaplaincy, health service
- a Centre for Language Study, providing assistance in the development of English language and study skills for non-native speakers.

The Students' Union provides

- an academic student representation system, consisting of Course Representatives, Academic Presidents, Faculty Officers and the Vice-President Education; SUSU provides training and support for all these representatives, whose role is to represent students' views to the University.
- opportunities for extracurricular activities and volunteering
- an Advice Centre offering free and confidential advice including support if you need to make an academic appeal
- Support for student peer-to-peer groups, such as Nightline.

In the Faculty and your Discipline you will be able to access:

- Coursebooks for each year of the programme.
- Introductory sessions for all years of the programme.
- Library information retrieval seminar.
- Workshop training.
- Small group tutorials in Part of the programmes.
- Engineering Development and Manufacturing Centre (EDMC) equipped with a range of workshop equipment, CAD/CAM.
- Engineering and specific software available on all computers.
- Personal tutors to assist you with personal problems and to advise on academic issues (contact maintained during periods of studying abroad). A senior tutor is also available.
- Access to academic staff through an open door policy as well as timetabled tutor meetings, appointment system and e-mail.
- Research seminars and invited lectures.
- Faculty Student Office for the administration of your programme.

Methods for Evaluating the Quality of Teaching and Learning

You will have the opportunity to have your say on the quality of the programme in the following ways:

- Anonymous student evaluation questionnaires for each module of the programme.
- Student representation on the Staff-Student Liaison Committee, which typically meets two or three times per academic year.
- Meetings, individually or as a group, with the Programme External Examiner.
- University Student Experience Questionnaire

It should be noted that meetings with your personal tutor can also be used to comment on quality related issues.

The ways in which the quality of your programme is checked, both inside and outside the University, are:

- External examiners, who produce an annual report
- Annual review of the modules via Subject Panels and Module Co-ordinators.
- Annual appraisal of academic staff and staff development activity.
- Informal and Formal Examination Boards.
- Periodic meetings of the Faculty Industrial Advisory Board
- Periodic accreditation by professional institutions (RAeS and IMechE)
- Periodic Programme Review by the University

Taught component

Each of the modules that make up the programme will be taught at the University of Southampton. The academic coordinator of the module (Module Lead) is responsible for ensuring appropriate content of modules and quality of delivery.

Assessment procedures for each module will be administered by the Faculty of Engineering and Physical Sciences (or the Faculty owning the specific module) in accordance with University policy.

Research component

Each research project will be supervised by a member of academic staff. A second assessor will be allocated who will normally be an academic or senior consulting engineer from within the Faculty. The supervisor and second assessor conduct a formal progress review with the student, normally during July.

External Examiner

In accordance with standard University practice, the examination setting and marking procedures will be evaluated by the External Examiner at all stages. The External Examiner will be a senior academic from a UK University actively involved in teaching and research. He/she will serve a period of office of normally 3 years.

Career Opportunities

This programme will prepare you well for a career in a research and development in range of industries, including aerospace, either in the UK or abroad. Alternatively, the programme provides an excellent platform for further study leading towards a PhD in this area of research.

External Examiners(s) for the programme

Name Dr Matthew Stickland
Institution University of Strathclyde

Students must not contact External Examiner(s) directly, and external examiners have been advised to refer any such communications back to the University. Students should raise any general queries about the assessment and examination process for the programme with their Course Representative, for consideration through Staff: Student Liaison Committee in the first instance, and Student representatives on Staff: Student Liaison Committees will have the opportunity to consider external examiners' reports as part of the University's quality assurance process.

External examiners do not have a direct role in determining results for individual students, and students wishing to discuss their own performance in assessment should contact their personal tutor in the first instance.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided. More detailed information can be found in the programme handbook at https://www.southampton.ac.uk/studentservices/academic-life/faculty-handbooks.page and at http://www.southampton.ac.uk/engineering/postgraduate/taught_courses/engineering/msc_aerodynamics_aerodynamics_and_computation.page?

Revision History

1	Created 3rd April 2008
2	Module code and numbers merged
3	Updated September 2009
4	Checked August 2012 (N.W. Bressloff)
5	Regulations updated March 2013 (D Mead)
6	Updated to reflect new curriculum structure July 2013 (G Roberts)_CQA 251113
7	Updated June 2014 (G. Roberts)_CQA_130614_DM_name of prog'n regs link
8	Update to Programme Overview (CMA Changes) – September 2015
9	CQA textual updates August 2016, April 2017
10	Updated to reflect 201819 version and removal of Admissions Criteria – CQA March 2018
11	Updated Faculty name to Faculty of Engineering and Physical Sciences July 2018

MSc in Aerodynamics and Computation

Appendix 1

Programme Structure

The information within this Appendix is liable to change in minor ways from year to year. It is accurate at the time of writing.

Output Standards Matrix for MSc Aerodynamics and Computation / MSc Race Car Aerodynamics

						GENERAL				UNDER-PINNING ...			ENGINEERING ANALYSIS			DES-IGN	ECON., SOCIAL ...		ENGINEERING PRACTICE			METHODS OF ASSESSMENT											
	core (oc) compulsory (c) optional (O)	core (oc) compulsory (c) optional (O)	CODE	Level	CATS points	... DEVELOP, MONITOR AND UPDATE A PLAN ...	... PROGRAMME OF WORK ...	... INITIATIVE AND PERSONAL RESPONSIBILITY ...	... NEW THEORIES ... UNFAMILIAR SITUATIONS	... SCIENTIFIC PRINCIPLES ...	... CURRENT PROBLEMS ... AT FOREFRONT ...	... CONCEPTS, SOME OUTSIDE ENG. ... EVALUATE AND APPLY ...	... NEW AND EMERGING TECHNOLOGIES	... MODELS FOR SOLVING PROBLEMS ... ASSESS LIMITATIONS	... ANALYSE DATA ... USE ENGINEERING TOOLS ... UNFAMILIAR PROBLEMS	... ORIGINAL THOUGHT ... PRACTICAL SOLUTIONS ...	... MANAGEMENT AND BUSINESS PRACTICES ...	... EVALUATION OF RISKS ...	... CURRENT PRACTICE AND ITS LIMITATIONS ... NEW DEVELOPMENTS	... ENGINEERING MATERIALS AND COMPONENTS	... APPLY TECHNIQUES ... COMMERCIAL / INDUST. CONSTRAINTS	EXAM	TEAMWORK	ESSAY	LABORATORY	REPORT	PRESENTN	ASSESSED PROBLEMS & CASE STUDIES	PROJECT	CAA	IN-CLASS TEST	OTHER
Advanced Computational Methods I	O	O	FEEG6002	7	15		✓		✓	✓	✓	✓	✓	✓		✓			✓	✓					10%			50%			40%	
Advanced Computational Methods II	O	O	FEEG6003	7	15				✓		✓								✓									100%				
Aeroacoustics	O		FEEG6004	7	15		✓		✓	✓	✓	✓		✓	✓							70%						30%				
Aerothermodynamics	C		SESA3029	6	15		✓		✓	✓	✓		✓	✓	✓							90%						10%				
Applications of CFD	C	C	FEEG6005	7	15	✓	✓		✓	✓	✓		✓	✓					✓		✓	65%						35%				
Automobile Systems		O	SESM3031	6	15				✓	✓		✓	✓									80%						20%				
Automotive Propulsion		O	SESM6037	7	15				✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	80%			20%							
Biological Flow	O		SESA6066	7	15				✓	✓	✓	✓		✓	✓							100%										
Design Search and Optimisation (DSO)	O	O	FEEG6009	7	15		✓		✓	✓		✓				✓		✓	✓		✓	65%						35%				
Experimental Methods for Aerodynamics	O	C	SESA6070	7	15	✓				✓	✓	✓	✓	✓	✓										60%			40%				
Flow Control	O	O	SESA6067	7	15				✓	✓	✓	✓	✓	✓	✓	✓					✓	100%										
Hypersonic and High Temp Gas Dynamics	O		SESA6074	7	15		✓		✓	✓	✓	✓	✓	✓	✓				✓		✓	90%									10%	
Numerical Methods	O	O	MATH6141	7	15		✓	✓	✓	✓		✓	✓	✓		✓			✓			60%						30%			10%	
Race Car Aerodynamics	O	C	SESA6072	7	15	✓	✓		✓	✓	✓	✓	✓	✓	✓					✓		60%			40%							
Research Project MSc	OC	OC	FEEG6012	7	60	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓						10%		90%			
Systems Reliability		O	FEEG6006	7	15		✓	✓	✓	✓		✓		✓	✓			✓	✓		✓	65%						35%				
Turbulence Physics Modelling	C	C	SESA6061	7	15		✓	✓	✓	✓	✓		✓		✓			✓	✓		✓	100%										
Wing Aerodynamics	O	O	SESA3033	6	15					✓	✓		✓	✓								90%						10%				
Race Car Design (GDP)		C	SESA6038	7	30	✓	✓		✓	✓	✓	✓	✓	✓	✓				✓				✓			90%	10%					

The list below reflects the modules that are planned to be offered in 2014-15, and is subject to minor alteration from year to year. Each module has an ECTS/CATS value of 7.5 ECTS/15 CATS or 15 ECTS /30 CATS at level 6 or 7. A maximum of 15 ECTS/30 CATS can be taken at level 6.

A 7.5 ECTS/15 CATS module has a total load of 150 notional hours, typically made up of 36 lectures, laboratory work, self-learning and assessment. Some modules are assessed based solely on examinations, others involve significant project work. Syllabuses indicate the broad outline of content for each subject. Detailed elements of content may change from year to year depending on the emphasis deemed necessary by the lecturer and the need to keep modules up to date.

Over Semester 1 and 2, students must study modules totalling 60 ECTS/120 CATS, with a minimum of 45 ECTS/90 CATS at level 7.

Compulsory modules

The following modules are compulsory for this theme and total 30 ECTS/60 CATS. All modules are level 7 except as indicated.

Module Code	Module Title	ECTS/CATS credits	Semester
FEEG6012	MSc Research Project **(core)**	30/60	1/2
FEEG6002	Advanced Computational Methods I	7.5/15	1
FEEG6005	Applications of CFD	7.5/15	1
SESA3029	Aerothermodynamics (level 6)	7.5/15	1
SESA6061	Turbulence: Physics & Modelling	7.5/15	1

Optional modules

Please select a total of 30 ECTS/60 CATS from the following lists of level 6 and level 7 modules.

Please bear in mind the balance of modules between the semesters (note all mandatory modules are in Semester 1).

Level 6 option

Module Code	Module Title	ECTS/CATS credits	Semester
SESA3033	Wing Aerodynamics	7.5/15	2

Level 7 options

Module Code	Module Title	ECTS/CATS credits	Semester
FEEG6003	Advanced Computational Methods II	7.5/15	2
FEEG6004	Aeroacoustics	7.5/15	2
FEEG6009	Design Search & Optimisation	7.5/15	2
MATH6141	Numerical Methods	7.5/15	1
SESA6066	Biological Flow	7.5/15	2
SESA6067	Flow Control	7.5/15	1
SESA6070	Experimental Methods for Aerodynamics	7.5/15	1
SESA6072	Race Car Aerodynamics	7.5/15	2
SESA6074	Hypersonic & High Temperature Gas Dynamics	7.5/15	2
SESA6077	Aeroelasticity	7.5/15	1

Note: It is possible that module prerequisites may be omitted at the discretion of the module lecturer depending on previous experience.

12

Appendix 2:

Additional Costs

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. In addition to this, students registered for this programme typically also have to pay for the items listed in the table below.

In some cases you'll be able to choose modules (which may have different costs associated with that module) which will change the overall cost of a programme to you. Details of such costs will be listed in the Module Profile. Please also ensure you read the section on additional costs in the University's Fees, Charges and Expenses Regulations in the University Calendar available at www.calendar.soton.ac.uk.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
Approved Calculators		Candidates may use calculators in the examination room only as specified by the University and as permitted by the rubric of individual examination papers. The University approved models are Casio FX-570 and Casio FX-85GT Plus. These may be purchased from any source and no longer need to carry the University logo.
Stationery		You will be expected to provide your own day-to-day stationary items, e.g. pens, pencils, notebooks, etc). Any specialist stationery items will be specified under the Additional Costs tab of the relevant module profile.
T**extbooks**		Where a module specifies core texts these should generally be available on the reserve list in the library. However due to demand, students may prefer to buy their own copies. These can be purchased from any source. Some modules suggest reading texts as **optional** background reading. The library may hold copies of such texts, or alternatively you may wish to purchase your own copies. Although not essential reading, you may benefit from the additional reading materials for the module.
Equipment and Materials	Design equipment and materials:	Standard construction/modelling materials will be provided where appropriate, unless otherwise specified in a module profile.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
		For customisation of designs/models calling for material other than standard construction/ modelling materials, students will bear the costs of such alternatives.
	Excavation equipment and materials:	
	Field Equipment and Materials:	A number of essential items will be provided to you e.g.: field notebook(s); compass-clinometer; geological hammer; steel tape measure; map case; pocket lens (x 10); safety helmet; safety goggles; bottle of dilute hydrochloric acid. If items provided are lost replacements can be purchased from: However, you will need provide yourselves with a ruler; a pair of compasses; set squares; protractor; pencils (including coloured); eraser; calculator, penknife. These can be purchased from any source.
Clothing	Lab Coats	
	Protective Clothing: Hard hat; safety boots; hi-viz vest/jackets;	
	Fieldcourse clothing:	You will need to wear suitable clothing when attending fieldcourses, e.g. waterproofs, walking boots. You can purchase these from any source.
	Wet Suits?	
	Uniforms?	
Printing and Photocopying Costs		Reasonable expenses for travel and materials of up to £300 may be reclaimed through the Faculty Student Office. For project costs in excess of £300 students should discuss possible sources of funding with their supervisor and should not proceed with any expenditure until a further funding source has been agreed. The printing costs associated with dissertation are the responsibility of the student (FEEG2012)

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
		Students are expected to cover the costs associated with the printing and binding of reports, including any drawings and graphic presentations. Two copies will need to be submitted. Depending on the quality of printing and binding chosen students can expect to pay approximately £25-30 per copy, totalling approximately £50-60 for both copies.(FEEG2012) In some cases, coursework and/or projects may be submitted electronically. Where it is not possible to submit electronically students will be liable for printing costs, which are detailed in the individual Module Profile and can be found in Appendix 2.
Optional Visits (e.g. museums, galleries)		Some modules may include additional optional visits. You will normally be expected to cover the cost of travel and admission, unless otherwise specified in the module profile.