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**Programme Specification**

**Title of Course:** BEng (Hons) Aerospace Engineering

**Date Specification Produced:** January 2013

**Date Specification Last Revised:** September 2016

This Programme Specification is designed for prospective students, current students, academic staff and potential 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 he/she takes full advantage of the learning opportunities that are provided. More detailed information on the teaching, learning and assessment methods, learning outcomes and content of each module can be found in Student Handbooks and Module Descriptors.

**SECTION 1: GENERAL INFORMATION**

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| **Title:** | BEng (Hons) Aerospace Engineering |
| **Awarding Institution:** | Kingston University |
| **Teaching Institution:** | Kingston University |
| **Location:** | Roehampton Vale Campus, Kingston |
| **Programme Accredited by:** | Royal Aeronautical Society (RAeS) |

**SECTION 2: THE PROGRAMME**

1. **Programme Introduction**

Aerospace Engineering is a branch of Engineering dealing with the design, development, construction and science of aircraft and spacecraft, aircraft operate in Earth’s atmosphere while spacecraft operate outside of it. The field covers the aerodynamic characteristics and behaviours of various components used to keep the vehicle in flight (fuselage, wing, tail) with propulsive systems acting as power plants. Flight vehicles are subjected to extreme conditions in terms of air characteristics such as pressure, density and temperature, with structural loads applied to the vehicle components. Consequently, There are a number of engineering disciplines involved in design and production of Aerospace vehicles which include aerodynamic, propulsion, avionics, materials science, structural analysis, Aero-elasticity and manufacturing, therefore aerospace engineering projects are carried out by teams of engineers, each having specialised area of expertise. Aerospace Engineers design, test and supervise the manufacture of aircraft, spacecraft and missiles, they also carry out research and develop new technologies for use in aviation, defense systems and space. UK is the second largest employer of Aerospace Engineers in the world with turnover of over £18 billions and employee population of over 150000.

The Aerospace Engineering course is a dynamic course taught by experts and enthusiastic staff. The Programme is designed for undergraduate students who wish to study Aerospace Engineering to Honours Degree level and aspire to achieve the professional status of Chartered Engineer (CEng). The Programme embraces recent developments in education and industry. The Programme design is based on the guidelines provided by the Engineering Council UK Standard for Professional Engineering Competence (UK-SPEC), the Quality Assurance Agency (QAA) Subject Benchmark Statement for Engineering, and the Royal Aeronautical Society (RAeS) Academic Accreditation Guidelines.

The Programme is intended to equip graduates with the knowledge, comprehension, intellectual ability and subject practical skills to become professional Aerospace engineers or to follow careers in related professional areas. Employability is a key element of the Programme and hence the emphasis on communication, interpersonal and other skills that today’s industry sees as enhancing employment prospects.

The Programme broadly follows four themes or threads, firstly the appreciation and application of the principles of engineering science through the core knowledge deepening subject areas of Aerospace structures and materials, Aerospace and mechanical systems, aerodynamics and propulsion are emphasised. Secondly, topics intended to widen the students’ knowledge base include electrical and electronic systems, control engineering and computing. Thirdly there is a professional theme, introducing the students to the practice of an Aerospace Engineer, covering such topics as professional practice, project management, quality and business management. Lastly there is a strong design theme linking together the other threads and emphasising the holistic nature of modern day engineering. Hence, the BEng provides both breadth and depth with an aim to develop the ability to identify, define and solve engineering problems from first principles.

This BEng Course emphasises the development of practical skills and experimentation through the extensive use of laboratories, workshop access and industrial visits. Sustainability and ‘Health and Safety’ are threaded throughout the Programme’s modules. There is a great deal of support available to students, both pastorally and academically, but in particular they are supported by a Personal Tutor Scheme (PTS) in which they are allocated a member of staff who, through one-to-one meetings, will assist and encourage students in their academic learning for the duration of their Course.

The BEng (Hons) is offered as a three-year full-time degree course or a four-year sandwich course with an industrial placement taken between level 5 and level 6.

1. **Aims of the Programme**

The general aims of the course are:

* To equip graduates with the engineering, design, management, business and personal skills required to become professional Aerospace Engineers, as well as enabling them to follow careers in related professional disciplines.
* To meet the academic requirements (when combined with approved further learning) for Chartered Membership of the Royal Aeronautical Society (RAes) by ensuring that the course is accredited by that body.

More specific aims of the course are:

* To produce graduates with a breadth and depth of knowledge and a comprehension of the key aspects of Aerospace Engineering.
* To allow students to develop analytical and problem-solving skills and an ability to evaluate evidence and assumptions to reach sound judgements and communicate these effectively.
* To provide graduates to industry who have a creative approach to the solution of design problems and the requisite technical skills to realise these solutions.
* To equip students with the research skills required for postgraduate study and the employability skills required for work in the Aerospace and related engineering industries.
* To furnish graduates with a firm grasp of sustainability and ‘Health and Safety within the context of their discipline.’
* To provide graduates who have the reflective skills to recognise the need to continually develop themselves in order to exercise their Professional judgement.

1. **Programme Learning Outcomes**

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, intellectual skills and subject practical skills as outlined in the following tables. The learning outcomes are referenced to the QAA subject benchmarks for Engineering (2010) and the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (2008).

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| **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 the core aerospace engineering subjects of statics, dynamics, materials, thermodynamics/aerodynamics, fluid mechanics/propulsion and design | B1 | Apply fundamental theoretical principles that underpin engineering and specifically Aerospace engineering | C1 | Use workshop and laboratory equipment safely for manufacture and experimental investigation |
| A2 | Demonstrate knowledge of electrical and electronic systems, control and manufacturing | B2 | Use mathematics as a tool for solving complex problems, communicating results, concepts and ideas | C2 | Undertake practical work and analyse the data obtained for use in planning and design |
| A3 | Show a knowledge of broader technical and non-technical engineering subjects | B3 | Think creatively and imaginatively to solve design problems | C3 | Use a range of technical equipment and instruments, gaining a basic understanding of their underlying technology |
| A4 | Relate management and business applications to Aerospace engineering | B4 | Manage projects, people, resources and time taking account of legal and statutory requirements, risk, safety, quality and reliability | C4 | Use computer technology to assist with information retrieval, management and problem solving |
| A5 | Demonstrate their understanding of the importance of Health and Safety in the engineering industry | B5 | Demonstrate a positive attitude to learning that encourages continuing professional development throughout their careers | C5 | Comply with Health and Safety regulations within the work place and as they apply to Aerospace design |
| A6 | Relate all their studies to a knowledge and understanding of sustainability and the environmental impact of their industry | B6 | Recognise the importance of professional bodies and the professional conduct expected of Chartered Engineers |  |  |

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| **Key Skills** | | | | | |
|  | **Self-Awareness Skills** |  | **Communication Skills** |  | **Interpersonal Skills** |
| AK1 | Take responsibility for own learning and plan for and record own personal development | BK1 | Express ideas clearly and unambiguously orally and in writing | CK1 | Work effectively with others in a group |
| AK2 | Recognise own academic strengths and weaknesses, reflect on performance and respond to feedback | BK2 | Present, challenge and defend ideas and results effectively orally and in writing | CK2 | Work flexibly and respond to change |
| AK3 | Organise effectively, agreeing and setting realistic targets, accessing support and managing time to achieve targets | BK3 | Listen actively and respond appropriately to ideas of others | CK3 | Discuss and debate with others and make concessions to reach agreement |
| AK4 | Work effectively with limited supervision | BK4 | Prepare reports in prescribed and recommended forms | CK4 | Give, accept and respond to constructive feedback |
|  |  |  |  | CK5 | Show sensitivity and respect for diverse values and beliefs |
|  | **Research and information Literacy Skills** |  | **Numeracy Skills** |  | **Management & Leadership Skills** |
| DK1 | Search for and select relevant sources of information | EK1 | Collect data from primary and secondary sources and use appropriate methods to manipulate and analyse these data | FK1 | Determine the scope of a task or project |
| DK2 | Critically evaluate information and use it appropriately | EK2 | Present and record data in appropriate formats | FK2 | Identify resources needed to undertake the task or project and schedule and manage the resources |
| DK3 | Apply the ethical and legal requirements in the access and use of information | EK3 | Interpret and evaluate data to inform and justify arguments | FK3 | Show the ability to successfully complete and evaluate a task or project, revising the plan where necessary |
| DK4 | Accurately cite and reference information sources using the recommended standard method | EK4 | Be aware of issues of selection, accuracy and uncertainty in the collection and analysis of data | FK4 | Motivate and direct others to enable an effective contribution from all participants |
| DK5 | Use software and ICT as appropriate |  |  |  |  |
|  | **Creativity and Problem Solving Skills** |  |  |  |  |
| GK1 | Apply scientific and other knowledge to analyse and evaluate information and data and to find solutions to problems |  |  |  |  |
| GK2 | Work with complex ideas and justify judgements made through effective use of evidence |  |  |  |  |

**D. Entry Requirements**

The minimum entry qualifications for the programme are:

From A levels: A minimum of 280 UCAS points with a minimum of C in A level mathematics .plus two suitable science/ Further Maths subjects.

BTEC: A minimum of 320 UCAS points; Distinction, Distinction, Merit (DDM) from an engineering-related BTEC Extended Diploma including Distinctions in Further Mathematics and Further Mechanical Principles.

Plus: GCSE (A\*-C) minimum of 5 subjects including English Language and Mathematics.

A minimum International English Language Testing System (IELTS) score of 6.0 (min 5.5 in Speaking, Writing, Listening and Reading) or equivalent is required for those for whom English is not their first language.

1. **Programme Structure**

This Programme is offered in full-time and sandwich modes, this leads to the award of BEng (Hons) Aerospace Engineering. Intake to both modes of study is normally in September.

Entry to the full-time and sandwich programme is normally at level 4 with A-level or equivalent qualifications (See section D). Transfer from a similar programme is possible at level 5 with passes in comparable BEng level 4 modules; this is at the discretion of the Course Team.

**i. Professional and Statutory Regulatory Bodies**

The Royal Aeronautical Society (RAeS).

**ii. Work-based learning, including sandwich programmes**

Work placements are actively encouraged, with sandwich students generally taking an Industrial Placement year after level 5. It is the responsibility of individual students to source and secure such placements, but the Faculty offers considerable assistance to find employment. Industrial placements allow students to reflect upon their own personal experience of working in an applied setting. This opportunity enables students to focus on aspects that can clearly relate theoretical concepts to practice. Historically many sandwich placements are reasonably well remunerated.

**iii. Outline Programme Structure**

Each level comprises four modules worth 30 credits. A student must complete 120 credits at each level. 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.

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| **Level 4** (all core) | | | | |
| **Compulsory modules** | **Module code** | **Credit**  **Value** | **Level** | **Teaching Block** | |
| Introduction to Aerospace Engineering | AE4020 | 30 | 4 | 1&2 | |
| Thermofluid & Mechanical Systems 1 | ME4011 | 30 | 4 | 1&2 | |
| Analytical Methods, Computing & Electronic Systems | ME4012 | 30 | 4 | 1&2 | |
| Engineering Design, Materials & Manufacture 1 | ME4013 | 30 | 4 | 1&2 | |
| Progression to level 5 requires passes in all four modules to give 120 credits at level 4  Students exiting the programme at this point, who have successfully completed 120 credits, are eligible for the award of Certificate of Higher Education. | | | | |

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| **Level 5** (all core) | | | | |
| **Compulsory modules** | **Module code** | **Credit**  **Value** | **Level** | **Teaching Block** | |
| Aerospace Engineering Design and Project Management | AE5021 | 30 | 5 | 1&2 | |
| Electronic Systems, Control & Computing | ME5012 | 30 | 5 | 1&2 | |
| Aerospace Structures, Materials and Dynamics | AE5022 | 30 | 5 | 1&2 | |
| Aerodynamics, Propulsion and Analytical Methods | AE5020 | 30 | 5 | 1&2 | |
| Progression to level 6 requires passes in all four modules to give 120 credits at level 5.  Students exiting the programme at this point, who have successfully completed 120 credits, are eligible for the award of Diploma of Higher Education. | | | | |

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| **Level 6** (all core) | | | | |
| **Compulsory modules** | **Module code** | **Credit**  **Value** | **Level** | **Teaching Block** | |
| Further Aerodynamics and Propulsion and Computational Techniques | AE6020 | 30 | 6 | 1&2 | |
| Further Aerospace Structures, Materials and Dynamics | AE6022 | 30 | 6 | 1&2 | |
| Business and Project Management and Group Design Project | AE6023 | 30 | 6 | 1&2 | |
| Individual Project (CEng) | AE6024 | 30 | 6 | 1&2 | |
| Completion of Level 6 requires passes in all four modules to give 120 credits and qualify for BEng (Hons) | | | | |

1. **Principles of Teaching Learning and Assessment**

This programme has been designed taking into account the Kingston University Curriculum Design Principles to help develop student learning from dependent to independent learning and encourage lifelong learners. A wide range of teaching and learning methods is utilised, allowing students to be fully engaged throughout the course. Teaching, learning and assessment methods are constructed to align with the learning outcomes and syllabus content of the modules. The assessment regime of a module is designed to provide formative opportunities that allow students to improve their performance following feedback in preparation for later summative assessment. Key skills are developed throughout the programme, which are assessed formatively and summatively. Students also have access to S3 (SEC Academic Skills Centre) for additional support on a drop-in basis giving students the opportunity to take responsibility for their own achievements and consequent learning. Generally the course will be delivered by instructional lectures whilst associated tutorials, laboratory practicals, ,industrial visits and design classes are used to enhance the lecture material. The course is devised to encourage and develop students making them confident in their interpersonal and communication skills, as well as emphasising group work, data analysis and ICT skills. The contact hours associated with a module very much depends on the module type, but typically a module would comprise five hours per week of contact, which would include lecture, seminar/tutorial and design/practical sessions in various combinations.

The teaching and learning strategies utilised in this course are formulated to cultivate key transferable skills considered central to academic, vocational and personal development. These skills underpin how students learn, their ability to recognise their own achievement and ability, to review and evaluate that achievement and identify future learning requirements.

Academic skills are developed in the first year modules such as AE4020 and are practised in the modules needing report writing and mathematical and other skills. The skills of becoming independent learners and the research methods are introduced and developed through levels 5 and 6 in modules AE5021, AE6023 and AE6024. Students are expected to carry out individual and group projects in Level 6 in which all the above skills are required and would be fully developed and practised.

***Research Informed Teaching***

The majority of the course team are either engineering research active or are involved in industry related professional activities, through KTPs or other direct involvement with industry. These activities played a major part in informing the course design and content, as did the direct input from industry through the activities of the Industrial Advisory Board.

Most of the teaching staff are also actively involved in the various Research Centres and/or Research Groups of the Faculty, or may be following interest areas of their own. Their activities take them into, amongst other areas, materials research both coatings and compound, into fire and explosion research both cause and prevention, into Dynamics and Control research and on through sustainable power generation to electric vehicle technology with particular success of the zero emissions electric motorbike. The modules at levels 6 and 7 are mainly taught by academic staff who are engaged in research in various areas and teach their research findings as well as more classic topics, for example in the module AE6022, the areas such as structure, Materials and composites, structural Dynamics, modal testing, Rotating machinery are taught and in the module AE6020 the research in Aerodynamics and CFD are discussed.

Students are also able to and are encouraged to develop their own research skills which are a fundamental part of the curriculum throughout all levels of the programme. They all have to do an individual project and a Group project and are therefore encouraged, to work with research active staff on elements of live projects, and these research skills enable students to determine, distinguish and present appropriate evidentiary information in an argument, which are of great value to employers.

Academic staff are also engaged widely with the research and development of ideas in teaching and learning in Higher Education and into wider pedagogic issues which will then feed through to support learning in lectures and other forms of student engagement the programme, both formal and extra-curricular. As parts of pedagogic research computing resources in fundamental subjects such as Maths and Mechanics/Physics have been developed and been embedded into the study space. Use of Electronic Voting System in the class room for summative and formative assessments is another example of the pedagogic research.

***Types of contact***

Contact with students and engagement with the programme takes many forms, some of the more widely encountered on the BEng course are:

***Lectures***

Lectures are formal staff-led sessions designed to introduce new topics and material or provide an overview of a topic for further student study. Lectures make use of various media, supplemented by material uploaded to StudySpace. The School’s academic staff is convinced that students learn better through active participation and hence lectures would generally overlap with tutorials in expecting students to be actively involved in sketching, designing and calculating.

***Tutorials***

Academic tutorials are provided where lecturers assist students in solving typical engineering problems and in discussing lecture material. In many modules the tutorials and lectures will be integrated as described above.

***e-Learning***

The main resources to support lectures and tutorials are provided through a Virtual Learning Environment called StudySpace/My Kingston, which uses a range of e-learning experiences. Specialist Computer software such as Computer Aided Drawing and Design packages (CAD), Simulation packages such as Finite Elements for solids and Computational Fluid Dynamics (CFD) for Fluid analysis as well as Mathematics packages such as MATLAB which are all widely used in industry are taught and students are expected and encouraged to use them in most of their modules including the project works.

**Work-related Learning**

Between level 5 and level 6 students are given the opportunity to pursue a year’s placement in industry in the UK or abroad, providing significant learning and employability enhancement opportunities.

***Design workshops***

Workshops may be staff-led or student-led where students participate in group design work emphasising the need for effective oral communication. Design classes, case studies and workshops often integrate material from different academic areas and would include a practical real-world emphasis. The students have the opportunity of using Computational methods and packages.

***Practical and laboratory sessions***

Practical sessions are designed to enable students to acquire practical and analytical skills through the application of theory. The sessions will include data collection, analysis, presentation and reporting. Practical work will generally be carried out in small groups, requiring the production of individual or group reports depending on the nature of the activity.

***Engineering workshop sessions***

Throughout the first year of the course the students are given a basic introduction to common hand and machine tools, this helps reinforce design and manufacturing topics. In the following years of the programme students will have access to the engineering workshops in support of their project and design work.

***Group work***

Good team-working skills are an essential skill for graduates aspiring to work in any engineering industry; hence, teamwork plays an important role in the academic development of an Aerospace Engineering undergraduate. Group work projects throughout all three levels illustrate the value of team work, developing interpersonal skills and fostering cooperation and supportive peer relationships.

***Individual project***

A fundamental element of level 6 is the individual capstone project allowing students to integrate material from their programme in an independent study of a research topic. A student’s research skills will be developed with the assistance of targeted lectures, as well as an assigned supervisor, encouraging students to work effectively independently, communicating their findings clearly and succinctly through graphical, oral and written presentation.

***Self-Directed Study***

Students are expected and in some case signposted to undertake private reading, engagement with e-learning resources, reflection on feedback and assignment research or preparation work for lectures, practicals, presentations and other such module activities.

Personal Tutors: All students are assigned an Advisor of Studies who can advise essentially on academic matters.

***Assessment methods***

Various assessment methods are adopted in each module to enable students to demonstrate their acquisition of knowledge and skills as outlined in the module learning outcomes. The development of skills is threaded through the programme and assessed both formatively and summatively. Formative assessments provide opportunities that allow students to carry out effective revision and practice to receive feed forward on their performance in preparation for the summative assessments. Students are supported by their allocated personal tutors to draw together the themes of the curriculum enabling them to design their own reflection model to demonstrate achievement of a range of learning outcomes from across a number of modules. The methods of assessment used in the course comprise:

* Report writing
* Individual and group project reports
* Individual and group designs
* Investigation of case studies
* Model building
* Short in-class tests
* Unseen and seen formal written examinations
* Individual and group practical laboratory reports
* Computer software and output analysis
* Individual and group oral presentations
* Posters

1. **Support for Students and their Learning**

Students are supported by:

* **A Module Leader** for each module: will make sure that assignment guidelines and grading criteria are clearly communicated to students. Additionally, remind students of resources available for help throughout the academic year.
* **A Field Leader** to help students understand their programme structure and provide academic support
* **A Personal Tutor** (PT) to provide academic and personal support: provides students with a point of contact should they need advice and inform students of the procedures necessary to get help.
* **A Student Support Officer** (SSO) who provides additional pastoral and practical advice and support, especially to students encountering difficulties
* A dedicated Undergraduate Course Administrator
* **An induction programme** and study skills sessions at the start of each academic year
* A**n Academic Study Centre** to provide support and advice to students on a daily ‘drop-in’ basis
* **StudySpace** – a versatile on-line interactive intranet and learning environment accessible both on-site and remotely
* **A Staff Student Consultative Committee** with student Course Representatives for each level; the committee meets twice during the academic year and provides a point of communication between students and staff in the school of Aerospace and Aircraft Engineering.
* **A University Careers** and Employability Service
* Comprehensive University support systems including the provision of advice on finance, regulations, legal matters, accommodation, international student support, disability and equality support.
* The Students’ Union
* An Academic Team that seeks to maintain an open door policy in the spirit of supporting students.

**Personal Tutor Scheme (PTS) in the School of Aerospace and Aircraft Engineering**

The following provides the aims and structure of the Personal Tutor Scheme (PTS) for the School of Aerospace and Aircraft Engineering. It is intended that the PTS be embedded within the provision of the BEng programme.

**Overall Aims**

* To build a rapport between staff and students and contribute to personalising students’ experience within the School of Aerospace and Aircraft Engineering
* To support students in the development of their academic skills providing appropriate advice and guidance to students throughout their time at Kingston, while monitoring their progress, helping to identify individual needs and referring students to other University services as appropriate
* To help students to develop the ability to be self-reliant and confident self-reflective learners who use feedback to their best advantage
* To encourage students to reflect on how their learning relates to a wider context and their personal career progression

**Allocation of Personal Tutors**

* Personal tutors will be allocated during induction week
* Tutors will be allocated on a course basis where appropriate with student numbers being equally divided amongst the staff within the school
* Students will keep the same tutor throughout their course of study

There are specific aims and outcomes for each level, as the PTS is progressive and cumulative students will find that they are building on the skills developed in previous levels. Formative assessment will be provided in the form of regular feedback during meetings.

**Level 4: Settling in and building confidence**

**Aims and Learning Outcomes**

* To assist students in making the transition to Higher Education and to generate a sense of belonging to the School of Aerospace and Aircraft Engineering with an emphasis on widening participation issues
* To help students to develop good academic habits and to gain the confidence to operate successfully in a university context
* To prepare students to make the most of feedback throughout their course

**Contact:**

* Teaching block 1: three one-to-one meetings during induction week, weeks 2 and 6-7
* Teaching block 2: two one-to-one meetings during week 1 and week 6-7
* End of academic year individual ‘wrap up’ email

**Level 5: Stepping it up and broadening horizons**

**Aims and Learning Outcomes**

* To help students comprehend and plan for the academic demands of level 5 and to support increasing independence
* To encourage students to look forward, to take up opportunities to develop wider skills and to take responsibility for their personal development
* To foster students’ ability to build on and respond proactively to the feedback they have received
* To assist students in reflecting on the skills that they are developing and consider how they relate to employability

**Contact:**

* One-to-one meeting in week 1
* Email contact at the end of teaching block 1
* Individual ‘wrap up’ email at end of academic year

**Level 6: Maximising success and moving on**

**Aims and Learning Outcomes**

* To support students with the planning necessary to maximise success in their final undergraduate year
* To encourage students to reflect on the employability skills they have developed and be proactive in moving towards a professional life and/or further study
* To help students to make best use of the feedback they have received so that they can build on their strengths and take steps to address any weaknesses

**Contact:**

* One-to-one meeting in week 1
* Email contact at the end of teaching block 1
* Individual ‘wrap up’ email at end of academic year

Personal Tutors would have access to all the formative and summative assessment results of their tutees and would be responsible to discuss them with their tutees and assist them to prepare plans for further improvements and advise on any academic issues they may have. The personal tutors are also responsible for giving a bigger and more complete picture of learning, teaching, learning outcome and assessment and their linkage to the tutees.

1. **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

Quality is also assured by the requirement for professional body (RAeS) reaccreditation, generally at a five year interval.

1. **Employability Statement**

This curriculum embeds the development of employability skills throughout the Course and is designed to equip students with the ability to relate the knowledge and skills that they have learnt to the real world contexts in which they may work in the future. Students are required to produce a CV early at level 5 and to improve this following feedback. The School strongly encourages and supports all students in applying for positions in industry for an Industrial Placement year between level 5 and level 6; the School emphasises the benefits to be obtained from an approved placement in industry.

An Industrial Placement comprises a period of at least 36 weeks with an approved employer. Students are required to maintain a log book of their activities and involvement and produce a final report on their placement, they are supported throughout the period by their personal tutor, who will visit them at their place of work on at least one occasion. The tutor will discuss progress with the student and employer and will recommend any improvements to the learning opportunities. Students fulfilling the requirements for an Industrial Placement will be awarded a Sandwich Degree on the completion of level 6.

This Course has been designed to fulfil the core curriculum requirements (with further learning) for Chartered Engineer (CEng) status. Most graduates will aspire to careers in Aerospace and Mechanical related industries and to becoming Chartered Engineers. Graduates develop careers in all branches of aerospace and related engineering industries both here in the UK and throughout the world; as contract and consulting engineers, within local authorities, utility, manufacturing and transport companies, government organisations and the defence industry. In many cases, students taking an industrial placement are able to secure employment with the placement organisation following graduation. The academic and key skills developed throughout an engineering course also allow graduates to follow careers in other professions such as ICT, finance, accountancy and teaching. In addition, a number of graduates will progress to MSc courses in Aerospace and Mechanical Engineering and related specialist areas before continuing their career in industry or research.

Professional practice in Aerospace Engineering is introduced in the first year in the newly designed module ‘Introduction to Aerospace Engineering AE4020’, in which the students are introduced to the employment opportunities in the Aerospace field, this is followed through all other modules at levels 5 and 6, specifically in Project management and Individual Project modules (AE5021 and AE6024) as well as more specialised modules.

1. **Approved Variants from the UMS**

There are no variants to the Undergraduate Modular Scheme (UMS)

1. **Other sources of information that you may wish to consult**

Engineering subject benchmark:

www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/Subject-benchmark-statement-Engineering-.aspx

Professional bodies:

[www.raes.org/](http://WWW.raes.org/) [www.imeche.org/](http://www.imeche.org/)

Professional accreditation:

[www.engc.org.uk/](http://www.engc.org.uk/) [www.raes.org/](http://WWW.raes.org/)

[www.imeche.org/](http://www.imeche.org/)

School Website:

<http://sec.kingston.ac.uk/about-SEC/schools/aerospace-and-aircraft-engineering/>

**Development of Programme Learning Outcomes in Modules**

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

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|  |  |  | **Level 4** | | | | **Level 5** | | | | **Level 6** | | | |
|  | **Module Code** |  | AE4020 | ME4011 | ME4012 | ME4013 | AE5020 | ME5012 | AE5021 | AE5022 | AE6020 | AE6022 | AE6023 | AE6024 |
| **Programme Learning Outcomes** | **Knowledge & Understanding** | A1 | F | SF |  | SF | SF |  | SF | SF | SF | SF |  | SF |
| A2 |  |  | SF | SF |  | SF | SF |  |  |  | SF | SF |
| A3 | F |  | F | SF | F | F | SF | F | F | F | F | SF |
| A4 | F |  |  | F |  |  | SF |  |  |  |  | F |
| A5 | F |  |  | F |  |  |  |  |  |  |  | SF |
| A6 | F | F |  | SF | F |  | F | F | F | F | F | SF |
| **Intellectual Skills** | B1 |  | SF | SF | SF | SF | SF | SF | SF | SF | SF | SF | SF |
| B2 |  | SF | SF | F | SF | SF | F | SF | SF | SF | SF | SF |
| B3 |  |  |  | SF |  | F | SF | F | F | F | F | SF |
| B4 | SF |  |  | SF |  |  | SF |  |  |  |  | F |
| B5 | SF |  |  | F |  |  | F |  |  |  | F | SF |
| B6 | SF |  |  |  |  |  |  |  |  |  |  | F |
| **Practical Skills** | C1 | SF | F | F | SF | F | F | F | F |  |  | SF | F |
| C2 | SF | SF | SF | SF | SF |  | SF | SF |  |  | SF | F |
| C3 | SF | F | SF |  | SF |  | F | F |  |  | F | F |
| C4 |  | SF | SF | SF | F | SF | SF | SF | SF | SF | SF | SF |
| C5 | SF | SF | F | SF | F |  | F | F |  |  | F | F |

**S**  indicates where a summative assessment occurs.

**F** where formative assessment/feedback occurs.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Level 4** | | | | **Level 5** | | | | **Level 6** | | | |
|  | **Module Code** |  | AE4020 | ME4011 | ME4012 | ME4013 | AE5020 | ME5012 | AE5021 | AE5022 | AE6020 | AE6022 | AE6023 | AE6024 |
| **Programme Learning Outcomes (Key Skills)** | **Self-Awareness** | AK1 | F |  |  | F | F | F | F | F | F | F | F | S |
| AK2 | SF | F | F | F | F | F | SF | F | F | F | F | S |
| AK3 | F |  |  | SF | F |  | F | F | F | F | F | SF |
| AK4 |  |  |  | F | F | F | F | F | F | F | F | S |
| **Communication** | BK1 | F | F |  | SF | SF | F | SF | SF | S | S | S | SF |
| BK2 | SF |  | F |  | F |  | SF | F | S | S | S | SF |
| BK3 | F |  |  | SF |  |  | F |  |  |  | F | S |
| BK4 | SF | SF | F | SF | SF | F | SF | SF | S | S | S | SF |
| **Interpersonal** | CK1 | SF | F | F | SF | SF | SF | SF | SF |  |  | SF |  |
| CK2 |  |  |  | F | F | F |  | F | F |  | F | S |
| CK3 | F |  | F | F | F | F | F | F | F | F | F | F |
| CK4 | SF | F | F | F | F | F | F | F | F | F | SF | S |
| CK5 | F |  |  | F |  |  |  |  |  |  | F | SF |
| **Research and Information Literacy** | DK1 | SF |  |  | SF | F |  | SF | F | S | S | SF | SF |
| DK2 | SF | F | F | F | F | F | SF | F | S | S | S | SF |
| DK3 | F |  |  | F | F | F |  | F | F | F | F | SF |
| DK4 | SF | F | F | SF | F | F | SF | F | S | S | S | SF |
| DK5 | SF | F | SF | SF | F | SF | SF | F | S | S | S | S |
| **Numeracy** | EK1 | F | SF | SF | F | SF | SF | F | SF | F | S | SF | SF |
| EK2 | F | SF | SF |  | SF | SF | SF | SF | S | S | S | SF |
| EK3 | F | F | F | F | SF | SF | F | SF | S | S | S | SF |
| EK4 | SF | SF | SF | F | SF | SF | SF | SF | S | S | S | SF |
| **Management and Leadership** | FK1 | F |  | F | SF |  | F | F |  | F |  | F | S |
| FK2 | F |  |  | SF |  | SF | F |  | F |  | F | SF |
| FK3 | F |  |  | SF | F | F | F | F | S |  | F | S |
| FK4 | SF | F |  | SF | F | F |  | F | F |  | SF |  |
| **Creativity and Problem Solving** | GK1 | F | SF | SF | SF | SF | SF | SF | SF | SF | S | S | S |
| GK2 |  | F |  |  | F | F | SF | F | SF | S | SF | S |

**Mapping of Learning Outcomes for Professional Body Accreditation:**

EC UK-SPEC

Summary of Outcome Statements for a Bachelors (Honours) Degree for CEng

**Specific Learning Outcomes in Engineering**

Graduates from accredited programmes must achieve the following five learning outcomes, defined by broad areas of learning. As set out here, the outcomes apply to accredited programmes at Bachelors (Honours) level leading to CEng registration.

The weighting given to these different broad areas of learning will vary according to the nature and aims of each programme.

**Underpinning science and mathematics, and associated engineering disciplines, as defined by the relevant engineering institution (US..)**

1- Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current, and future developments and technologies;

2- Knowledge and understanding of mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems;

3-Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.

**Engineering Analysis (E..)**

1-Understanding of engineering principles and the ability to apply them to analyse key engineering processes;

2- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques;

3-Ability to apply quantitative methods and computer software relevant to their engineering discipline, in order to solve engineering problems;

4-Understanding of and ability to apply a systems approach to engineering problems.

**Design (D..)**

Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real problems. Graduates will therefore need the knowledge, understanding and skills to:

1- Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues;

2-Understand customer and user needs and the importance of considerations such as aesthetics;

Identify and manage cost drivers;

3-Use creativity to establish innovative solutions;

4-Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal;

5-Manage the design process and evaluate outcomes.

**Economic, social and environmental context (S..)**

1-Knowledge and understanding of commercial and economic context of engineering processes;

2-Knowledge of management techniques which may be used to achieve engineering objectives within that context;

3-Understanding of the requirement for engineering activities to promote sustainable development;

4-Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues;

5-Understanding of the need for a high level of professional and ethical conduct in engineering.

**Engineering Practice (P..)**

Practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. This can include:

1- Knowledge of characteristics of particular materials, equipment, processes, or products;

2-Workshop and laboratory skills;

3-Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology development, etc.);

4-Understanding use of technical literature and other information sources;

5-Awareness of nature of intellectual property and contractual issues;

6-Understanding of appropriate codes of practice and industry standards;

7-Awareness of quality issues;

8-Ability to work with technical uncertainty.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Output Standards Matrix: BEng (Hons) Degree** | | |  |  |  |  |  |  |  |  |  |  |
| BEng (Hons) Aerospace Engineering | **Level 4** | | | | **Level 5** | | | | **Level 6** | | | |
|  | **Module numbers (where the output criteria statements are addressed)** | | | | | | | | | | | |
|  | **AE4020** | ME4011 | ME4012 | ME4013 | ME5012 | AE5020 | AE5021 | AE5022 | AE6020 | AE6022 | AE6023 | AE6024 |
| **Specific Learning Outcome** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Underpinning Science & Mathematics** | | | | | | | | | | | | |
| US1 |  |  |  |  |  |  |  |  |  |  |  |  |
| US2 |  |  |  |  |  |  |  |  |  |  |  |  |
| US3 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Engineering Analysis** | | | | | | | | | | | | |  |  |  |  |  |  |  |  |
| E1 |  |  |  |  |  |  |  |  |  |  |  |  |
| E2 |  |  |  |  |  |  |  |  |  |  |  |  |
| E3 |  |  |  |  |  |  |  |  |  |  |  |  |
| E4 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Design** | | | | | | | | | | | | |
| D1 |  |  |  |  |  |  |  |  |  |  |  |  |
| D2 |  |  |  |  |  |  |  |  |  |  |  |  |
| D3 |  |  |  |  |  |  |  |  |  |  |  |  |
| D4 |  |  |  |  |  |  |  |  |  |  |  |  |
| D5 |  |  |  |  |  |  |  |  |  |  |  |  |
| D6 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Economic, social & environmental context** | | | | | | | | | | | | |
| S1 |  |  |  |  |  |  |  |  |  |  |  |  |
| S2 |  |  |  |  |  |  |  |  |  |  |  |  |
| S3 |  |  |  |  |  |  |  |  |  |  |  |  |
| S4 |  |  |  |  |  |  |  |  |  |  |  |  |
| S5 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Engineering Practice** | | | | | | | | | | | | |
| P1 |  |  |  |  |  |  |  |  |  |  |  |  |
| P2 |  |  |  |  |  |  |  |  |  |  |  |  |
| P3 |  |  |  |  |  |  |  |  |  |  |  |  |
| P4 |  |  |  |  |  |  |  |  |  |  |  |  |
| P5 |  |  |  |  |  |  |  |  |  |  |  |  |
| P6 |  |  |  |  |  |  |  |  |  |  |  |  |
| P7 |  |  |  |  |  |  |  |  |  |  |  |  |
| P8 |  |  |  |  |  |  |  |  |  |  |  |  |

**Technical Annex**

|  |  |
| --- | --- |
| **Final Award(s):** | BEng (Hons) Aerospace Engineering |
| **Intermediate Award(s):** | Cert HE in Aerospace Engineering  Dip HE in Aerospace Engineering  BEng Aerospace Engineering |
| **Minimum period of registration:** | FT – 3 years |
| **Maximum period of registration:** | FT – 6 years |
| **FHEQ Level for the Final Award:** | Level 6 |
| **QAA Subject Benchmark:** | Engineering |
| **Modes of Delivery:** | Full-time, Sandwich and Part-time |
| **Language of Delivery:** | English |
| **Faculty:** | SEC |
| **School:** | Aerospace and Aircraft Engineering |
| **JACS code:** | H421 |
| **UCAS Code:** | H421 (full-time, part-time) H422 (sandwich) |
| **Course Code:** | NAEKUDH3F (full-time)  NAEKUDH4S (sandwich) |
| **Route Code:** | NFAEE (full-time) NWAEE (sandwich) |
|  |  |

Key:

ica = in-course assessment

ex = examination

prac ex = practical exam

**BEng (Hons) in Aerospace Engineering**

**LEVEL 4**

**LEVEL 5**

**LEVEL 6**

**Industrial Placement**

Analytical Methods, Computing, Electrical & Electronic Systems

ME4012

80% ica 20% prac ex

Engineering Design, Materials & Manufacture 1

ME4013

70% ica 30% ex

Thermofluid & Mechanical Systems 1

ME4011

40% ica 60% ex

Introduction to Aerospace Engineering

AE4020

70% ica 30% ex

Aerospace Engineering Design & Project Management

AE5021

100% ica

Aerospace Structures, Materials & Dynamics

AE5022

50% ica 50% ex

Electronic Systems, Control & Computing

ME5012

50% prac ex 50% ex

Aerodynamics & propulsion & Analytical Methods

AE5020

50% ica 50% ex

Business & Project Management & Group Design Project

AE6023

100% ica ?

Individual Project (CEng)

AE6024

100% ica

Further Aerospace Structures, Materials & Dynamics

AE6022

50% ica 50% ex

Further Aerodynamics & Propulsion & Computational Techniques

AE6020

50% ica 50% ex