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**Programme Specification**

**Title of Course:** BSc (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:** | BSc (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 BSc 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 Incorporated Engineer (IEng). 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.

This BSc course aims to cultivate technical proficiency in Engineering including the ability to tackle a wide variety of practical problems. The course emphasises the development of a professional attitude to design, maintenance, sustainability, quality and safety. This BSc 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 BSc (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 for Incorporated 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 graduates to communicate effectively orally and in writing and to use sketches and diagrams to convey engineering ideas and concepts.
* To develop graduates with an aptitude for applying technology to engineering problems.
* To prepare graduates with an ability to solve design problems and the technical skills needed to realise these solutions.
* To equip graduates with the research skills required for postgraduate study and employability skills required for work in the construction industry.
* To furnish graduates with a firm grasp of sustainability and Health and Safety.

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/propulsion, fluid mechanics/aerodynamics 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 | Solve standard practical engineering design problems | C3 | Use a range of equipment, gaining a basic appreciation of the application of the 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 appropriate industry-standard computer software in the solution of practical problems |
| 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 Incorporated 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 |
|  |  |  |  |  |  |
|  | **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: 240 points to include A2 mathematics at grade C plus a suitable science.

BTEC: Distinction, Merit, Merit (DMM) from an engineering-related BTEC Extended Diploma including Distinctions for Mathematics for Technicians and 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 BSc (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 BSc level 4 modules; this is at the discretion of the Course Team. Intake to all modes of study is normally in September. Students with an excellent performance at level 4 have the opportunity to proceed to level 5 of the BEng (Hons) programme at the discretion of the Course Team and following the satisfactory completion of a bridging module. Advanced entry to the BSc programme is possible and will be at the discretion of the Course Team, taking into account the Applicant’s qualifications, age and experience.

**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 | |
| Engineering & Mechanical Principals | ME4111 | 30 | 4 | 1&2 | |
| Technology Mathematics, Computing & Electronic | ME4112 | 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** | |
| Electronics and Control Engineering Analysis | ME5112 | 30 | 5 | 1&2 | |
| Project Engineering & Management | ME5014 | 30 | 5 | 1&2 | |
| Aerospace Design Methods & Materials | AE5121 | 30 | 5 | 1&2 | |
| Aerospace Engineering | AE5122 | 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** | |
| Air Transport Economics | AE6601 | 30 | 6 | 1&2 | |
| Individual Project (IEng) | AE6100 | 30 | 6 | 1&2 | |
| Aerospace Group Project (IEng) | AE6110 | 30 | 6 | 1&2 | |
| Aircraft Systems | AE6101 | 30 | 6 | 1&2 | |
| Completion of Level 6 requires passes in all four modules to give 120 credits and qualify for BSc (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 ME5014, AE6124 and AE6125. 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 actives take them into, amongst other areas, materials research both coatings and compound, into fire and explosion research both cause and prevention, into active control research and on through sustainable power generation to electric vehicle technology with particular success of the zero emissions electric motorbike.

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 are often encouraged, through project work, 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 BSc 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, 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.

***Practical 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 assessment regime for each module has been designed to provide formative opportunities that allow students to improve their performance, following feedback, in preparation for summative assessment. The development of skills is threaded through the programme and assessed both formatively and summatively. 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
* **A Field Leader** to help students understand their programme structure and provide academic support
* **A Personal Tutor** (PT) to provide academic and personal support
* **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
* **An 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
* **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 BSc 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 Incorporated Engineer (IEng) status. Most graduates will aspire to careers in Aerospace and Mechanical related industries and to becoming Incorporated 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 AE6124) 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 | ME4013 | ME4111 | ME4112 | ME5112 | ME5014 | AE5121 | AE5122 | AE6601 | AE6100 | AE6110 | AE6101 |
| **Programme Learning Outcomes** | **Knowledge & Understanding** | A1 | F | SF | SF |  |  |  | SF |  |  | SF | S | SF |
| A2 |  | SF |  | SF | SF |  | SF |  |  | SF | F | SF |
| A3 | F | SF |  | F | F | SF | SF | SF | SF | SF | S | SF |
| A4 | F | F |  |  |  | SF | F | SF | SF | F | SF | F |
| A5 | F | F |  |  |  | SF |  | SF |  | SF | SF | SF |
| A6 | F | SF | F |  |  | SF | F | SF | SF | SF | S | SF |
| **Intellectual Skills** | B1 |  | SF | SF | SF | SF |  | SF |  |  | F | F | F |
| B2 |  | F | SF | SF | SF | F | F | F | F | F | F | F |
| B3 |  | SF |  |  | F | F | SF | F |  | SF | S | SF |
| B4 | SF | SF |  |  |  | SF | F | SF | F | F | F | F |
| B5 | SF | F |  |  |  | SF | F | SF | F | S | S | SF |
| B6 | SF |  |  |  |  | SF |  | SF | SF | F | F | F |
| **Practical Skills** | C1 | SF | SF | F | F | F |  | F |  |  | F | F | F |
| C2 | SF | SF | SF | SF |  |  | SF |  |  | F | F | F |
| C3 | SF |  | F | SF |  |  | F |  |  | F | SF | F |
| C4 |  | SF | F | SF | SF | SF | SF | SF | F | F | SF | F |
| C5 | SF | SF | SF | F |  | SF | F | SF |  | F | SF | F |

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

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

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|  |  |  | **Level 4** | | | | **Level 5** | | | | **Level 6** | | | |
|  | **Module Code** |  | AE4020 | ME4111 | ME4112 | ME4013 | ME5112 | ME5014 | AE5121 | AE5122 | AE6601 | AE6100 | AE6110 | AE6101 |
| **Programme Learning Outcomes (Key Skills)** | **Self-Awareness** | AK1 | F |  |  | F | F | F | F | SF | F | S | S | S |
| AK2 | SF | F | F | F | F | F | F | SF | SF | S | S | S |
| AK3 | F |  |  | SF |  |  |  | F | F | SF | S | SF |
| AK4 |  |  |  | F | F | F | F |  | F | S | S | S |
| **Communication** | BK1 | F | F |  | SF | SF | F | F | F | S | SF | SF | SF |
| BK2 | SF |  | F |  | F |  |  | F | SF | SF | SF | SF |
| BK3 | F |  |  | SF |  |  |  | F | F | S | S | S |
| BK4 | SF | SF | F | SF | SF | F | F | SF | S | SF | S | SF |
| **Interpersonal** | CK1 | SF | F | F | SF | SF | SF | SF | SF |  |  | SF |  |
| CK2 |  |  |  | F | F | F | F | F | F | S | S | S |
| CK3 | F |  | F | F | F | F | F | F |  |  | SF |  |
| CK4 | SF | F | F | F | F | F | F | SF | S | S | S | S |
| CK5 | F |  |  | SF |  |  |  | F | SF | SF | S | SF |
| **Research and Information Literacy** | DK1 | SF | F | F | F | F |  | F | SF | F | SF | S | SF |
| DK2 | SF |  |  | F | F | F | F | F | F | SF | SF | SF |
| DK3 | F | F | F | SF | F | F | F | F | S | SF | S | SF |
| DK4 | SF | F | SF | SF | F | F | SF | F |  | S | S | SF |
| DK5 | SF | SF | SF | F | F | SF | SF | F |  | SF | SF | S |
| **Numeracy** | EK1 | F | SF | SF |  | SF | SF | SF | F | F | SF | SF | SF |
| EK2 | F | F | F | F | SF | SF | SF | F | F | SF | SF | SF |
| EK3 | F | SF | SF | F | SF | SF | SF | F |  | SF | SF | SF |
| EK4 | SF |  | F | SF | SF | SF | F |  | F | S | S | SF |
| **Management and Leadership** | FK1 | F |  |  | SF |  | F | SF | F |  | SF | S | S |
| FK2 | F |  |  | SF |  | SF | F | F |  | S | S | SF |
| FK3 | F | F |  | SF | F | F | F | F |  |  |  | S |
| FK4 | SF | SF | SF | SF | F | F | SF | F | SF | S | S |  |
| **Creativity and Problem Solving** | GK1 | F | F |  |  | SF | SF | F | F | SF | S | S | S |
| GK2 |  | F |  |  | F | F | SF |  | SF | S | S | S |

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

EC UK-SPEC

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

**Specific Learning Outcomes in Engineering**

In relation to the specific learning outcomes, the focus on the application of developed technology and the attainment of know-how means that the accredited honours degree programmes leading to IEng registration will have a different emphasis to those intended for CEng. In particular, they are likely to give a greater weighting to developing knowledge and understanding of engineering practice and processes, and to have less focus on analysis. Design will still comprise a significant component, especially in the integration of a range of knowledge and understanding, but the emphasis will be on the design of products, systems and processes to meet defined needs.

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

1- Knowledge and understanding of scientific principles underpinning relevant technologies, and their evolution;

2- Knowledge and understanding of mathematics necessary to support application of key engineering principles;

**Engineering Analysis (E..)**

1- The ability to monitor, interpret and apply the results of analysis and modelling in order to bring about continuous improvement;

2- The ability to apply quantitative methods and computer software relevant to their engineering technology, frequently within a multidisciplinary context;

3- An ability to use the results of analysis to solve engineering problems, apply technology and implement engineering processes;

4- The ability to apply a systems approach to engineering problems through know-how of the application of the relevant technologies;

**Design (D..)**

Graduates will need the knowledge, understanding and skills to:

1- Define a problem and identify constraints;

2- Define solutions according to customer and user needs;

3- Use creativity and innovation in a practical context;

4- Ensure fitness for purpose (including operation, maintenance, reliability etc.);

5- Adapt designs to meet their new purposes or applications;

**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..)**

1- An understanding of and ability to use relevant materials, equipment, tools, processes, or products;

2- Knowledge and understanding of workshop and laboratory practice

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

4- The ability to use and apply information from technical literature;

5- The ability to use appropriate codes of practice and industry standards

6- An understanding of the principles of managing engineering processes;

7- An awareness of quality issues and their application to continuous improvement;

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Output Standards Matrix: IEng Degree** | |  |  |  |  |  |  |  |  |  |  |  |
| BSc (Hons) Aerospace Engineering | **Level 4** | | | | **Level 5** | | | | **Level 6** | | | |
|  | **Module numbers (where the output criteria statements are addressed)** | | | | | | | | | | | |
|  | AE4020 | ME4111 | ME4112 | ME4013 | ME5014 | ME5112 | AE5121 | AE5122 | AE6601 | AE6100 | AE6110 | AE6101 |
| **Specific Learning Outcomes** |  |  |  |  |  |  |  |  |  |  |  |  |
| **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):** | BSc (Hons) Aerospace Engineering |
| **Intermediate Award(s):** | Cert HE in Aerospace Engineering  Dip HE in Aerospace Engineering  BSc 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:** | H400 |
| **UCAS Code:** | H400 (full-time, part-time) H401 (sandwich) |
| **Course Code:** | NAEKUDH3F (full-time)  NAEKUDH4S (sandwich) |
| **Route Code:** | NFAED (full-time) NWAED (sandwich) |
|  |  |

Key:

ica = in-course assessment

ex = examination

prac ex = practical exam

**BSc (Hons) in Aerospace Engineering**

**LEVEL 4**

**LEVEL 5**

**LEVEL 6**

**Industrial Placement**

Technology Mathematics, Computing & Electronics

ME4112

50% ica 50% prac ex

Engineering Design, Materials & Manufacture 1

ME4013

70% ica 30% ex

Engineering & Mechanical Principals

ME4111

40% ica 60% ex

Introduction to Aerospace Engineering

AE4020

70% ica 30% ex

Aerospace Design Methods & Materials

AE5121

50% ica 50% ex

Aerospace Engineering

AE5122

50% ica 50% ex

Project Engineering & Management

ME5014

40% prac ex 60% ex

Electronics & Control Engineering Analysis

ME5112

50% ica 50% ex

Aerospace Group Project (IEng)

AE6110

100% ica

Aircraft Systems

AE6101

50% ica 50% ex

Individual Project (IEng)

AE6100

100% ica

Air Transport Economics

AE6601

50% ica 50% ex