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**Programme Specification**

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

**Date Specification Produced: August 2017**

**Date Specification Last Revised: Nov 2018**

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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 the Course Handbook and Module Descriptors.

**SECTION 1: GENERAL INFORMATION**

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| **Title:** | BEng (Hons) Aviation Engineering |
| **Awarding Institution:** | Kingston University |
| **Teaching Institution:** | Kingston University |
| **Location:** | Kingston University |
| **Programme Accredited by:** | Accreditation to be sought from the Royal Aeronautical Society |

**SECTION2: THE PROGRAMME**

1. **Programme Introduction**

Aviation Engineering is a branch of engineering dealing with the operation, maintenance, management, quality, safety, regulations and design of aircraft. The Roehampton Vale campus is located near the former factories of the British Aerospace/Hawker Siddeley Aviation (also formerly known as H.G. Hawker Engineering and Sopwith Aviation) in Kingston and Ham where many famous aircraft were designed and built. These include the legendary Harrier, Hawk, Hunters, Typhoon and Camel. It has a heritage of providing graduates to the aviation industry in Greater London, in particular around Heathrow and Gatwick. The Department has an extensive range of equipment, which includes a live Learjet business aircraft, flight simulators, composite materials lab and large wind tunnels, provides a hands-on and thus stimulating learning environment for students.

The Department of Aerospace and Aircraft Engineering currently delivers a wide range of undergraduate programmes in-house and through collaborative provision with partners. These programmes enhance interaction between the teaching team, aviation industry and the military. The teaching staff has strong expertise in the delivery of BSc(Hons) Aircraft Engineering and FD programmes with EASA approved B licence training. The teaching team has a diverse range of research areas that support student learning within and beyond the formal curriculum through Research-Informed Teaching (RIT). Staff are encouraged to adopt innovative teaching practices to enhance student learning experiences.

A wide variety of active learning techniques will be used in the programme. These include Project Based Learning, Problem-Based Learning, Collaborative Learning, Technology Enhanced Learning, Inquiry-Led Learning, and other active learning strategies. The assessment strategies are designed in such a way to ensure that they are authentic reflecting real-world engineering activities and enhancing graduate employability. An inclusive approach to teaching and learning is adopted to meet the diverse needs and preferences of all students regardless of their backgrounds, abilities and learning styles. The first year students will benefit from the multi-disciplinary group activities that involve the collaboration between Civil, Mechanical and Aerospace students to provide integrated solutions to engineering problems. This promotes the development of employability skills such as team working, communication, and project management skills. Furthermore, group work is embedded in various modules in Level 4 and 5 to develop their skills further and promote Collaborative Learning. The third year students will also have opportunities to work collaboratively with students from other universities on a virtual industrial project with direct entry top-up students from diverse backgrounds, such as students from Sri Lanka, UAE and other programmes with partners.

The BEng(Hons) Aviation Engineering is designed for undergraduates students who wish to pursue a professional engineering career within the aviation sector and aspire to the professional status of Incorporated Engineer (IEng) with the Royal Aeronautical Society. The programme is intended to equip graduates with knowledge, skills and behaviours to become professional aviation engineers or a wide range of other roles within the aircraft industry. Employability is a key element of the programme and hence the emphasis on the development of graduate attributes through the curriculum, industrial visits, placement, co-and extra-curriculum activities. It is important to nourish graduates’ attitudes and behaviours encouraging self-management, self- reflection, resilience and life-long learning. The course will equip students understanding of the context in which engineering is practised including economics, the environment, statutory regulations, safety requirements customer and societal needs. Students are encouraged to take up industrial placements to work on real engineering projects and develop their professional skills. The programme is designed to ensure that by the end of the second year, students have a set of knowledge and skills that are attractive to employers offering placements. Throughout the programme, students will develop practical skills and valuable hands-on experience to reinforce their theoretical knowledge gained from the programme.

1. **Aims of the Field/Course**

The general aims of the course are:

* To equip graduates with the engineering, design, management, business and general skills required to become aviation professionals, as well as enabling them to follow careers in related professional disciplines.
* To aligns with the current edition of the UK Standard for Professional Engineering Competence (UK-SPEC) and to meet the academic requirements for Incorporated Engineering (IEng) 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 aviation graduates who are equipped with the technical knowledge, understanding and skills; and behaviours required to be competent in the job roles within the aviation sector.
* To prepare graduates with an ability to solve design problems and the technical skills needed to realise these solutions in the fields of aircraft operation and maintenance.
* To equip students with a broader set of professional skills and attitudes that will enable them to manage their own continuous professional development when they leave the university; and to encourage them to be life-long learners.
* To provide students with the requisite skills and knowledge to progress to higher level study and work towards becoming aviation managers of the future.
* To furnish graduates with a firm grasp of sustainability, ethics, risks, legal obligations and economics.
1. **Intended Learning Outcomes**

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

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes as shown in Table 1.

The programme also provides an opportunity for the students to develop and demonstrate the key skills shown in Table 2.

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| **Programme Learning Outcome Areas** |
|  | **Knowledge and Understanding****On successful completion of the course students will be able to:** |  | **Intellectual skills****On successful completion of the course students will be able to:** |  | **Subject Practical skills****On successful completion of the course students will be able to:** |
| A1 | Apply their knowledge and understanding of essential facts, concepts, theories and principles associated with aviation engineering and the underpinning mathematics and science. | B1 | Recognise, evaluate and analyse problems; identify and investigate possible solutions and make sound decisions regarding the solution to adopt and/or the course of action to be taken. | C1 | Apply aircraft engineering principles to design and implement operational procedures and solve logistical problems through the use of engineering analysis |
| A2 | Demonstrate a knowledge and understanding of aircraft maintenance operations and project planning. | B2 | Locate, collect, collate, interpret and critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), and use it to make judgements, and to frame appropriate questions to help achieve a solution. | C2 |

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| Use workshop and laboratory equipment safely for manufacture and experimental investigation  |

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| A3 | Demonstrate a clear understanding of the legal obligations pertaining to aircraft engineers, the rules and regulations under which they must work and the need to always consider aviation safety. | B3 | Communicate clearly and succinctly orally, graphically and in writing having due regard for the receiving audience and intellectual property rights.  | C3 | Apply numerical and statistical methods to operational and commercial data to improve safety, procedures and gain a commercial advantage in the aviation industry and the wider transport sector. |
| A4 | Demonstrate understanding of the economical, ethical and sustainability challenges facing aviation and recognise the wider benefit of aviation to developing economies. | B4 | Manage their own personal and professional development by identifying gaps and/or shortfalls in their knowledge, understanding and skills and taking the necessary action to rectify it. | C4 | Use a range of office, engineering and aircraft industry related IT equipment and software confidently and effectively.  |
| A5 | Apply business methods to assess the economic and financial aspects of air transport and/or engineering projects.  | B5 | Exercise a clear understanding of both technical and commercial risk and risk management/mitigation | C5 | Work independently or as part of a team to initiate, investigate, plan, manage and drive projects to a successful conclusion and produce the associated documentation (proposals, plans, reports, presentations). |

**Table 1 – BEng(Hons) Aviation Engineering Programme Learning Outcomes**

In addition to the programme learning outcomes identified overleaf, the programme of study defined in this programme specification will allow

students to develop a range of Key Skills as follows:

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| **Key Skills** |
| **Self Awareness Skills** | **Communication Skills** | **Interpersonal Skills** | **Research and information Literacy Skills** | **Numeracy Skills** | **Management & Leadership Skills** | **Creativity and Problem Solving Skills** |
| Take responsibility for own learning and plan for and record own personal development | Express ideas clearly and unambiguously in writing and the spoken work | Work well with others in a group or team | Search for and select relevant sources of information | Collect data from primary and secondary sources and use appropriate methods to manipulate and analyse this data | Determine the scope of a task (or project) | Apply scientific and other knowledge to analyse and evaluate information and data and to find solutions to problems |
| Recognise own academic strengths and weaknesses, reflect on performance and progress and respond to feedback | Present, challenge and defend ideas and results effectively orally and in writing | Work flexibly and respond to change | Critically evaluate information and use it appropriately | Present and record data in appropriate formats | Identify resources needed to undertake the task (or project) and to schedule and manage the resources | Work with complex ideas and justify judgements made through effective use of evidence |
| Organise self effectively, agreeing and setting realistic targets, accessing support where appropriate and managing time to achieve targets | Actively listen and respond appropriately to ideas of others | Discuss and debate with others and make concession to reach agreement | Apply the ethical and legal requirements in both the access and use of information | Interpret and evaluate data to inform and justify arguments | Evidence ability to successfully complete and evaluate a task (or project), revising the plan where necessary |  |
| Work effectively with limited supervision in unfamiliar contexts |  | Give, accept and respond to constructive feedback | Accurately cite and reference information sources | Be aware of issues of selection, accuracy and uncertainty in the collection and analysis of data | Motivate and direct others to enable an effective contribution from all participants |  |
|  |  | Show sensitivity and respect for diverse values and beliefs | Use software and IT technology as appropriate |  | Respond to changes and demonstrate effective risk/issue management |  |

**Table 2 – Kingston University Key Skills**

1. **Entry Requirements**

The minimum entry qualifications for the programme are:

A Levels: 96 points from three A Levels to include a Maths and Science subject. General studies and Native Language are not included in tariff points.

BTEC National: Extended Diploma or Diploma: In Engineering or related subject (Aerospace/Aeronautical/Electrical/Electronic/Manufacturing and Mechanical Engineering considered) – 112 points.

Access to HE in a suitable Engineering subject considered: pass required with all. Maths and Science modules at Level 3 with Merit grades.

Plus GCSE A\*–C (or comparable numeric score under the newly reformed GCSE gradings): five subjects including English Language and Mathematics.

1. **Field/Course Structure**

This programme is offered in full-time and sandwich modes, this leads to the award of BEng (Hons) Aviation Engineering. Intake to both modes of study is normally in September. Entry is normally at Level 4 with A-level or equivalent qualifications (See section D). Transfer from a similar course is possible at Level 5 with passes in comparable Level 4 modules – but is at the discretion of the course team. Intake is normally in September.

**E1. Professional and Statutory Regulatory Bodies**

 Accreditation for the programme will be sought from the Royal Aeronautical Society once the course has been validated.

**E2. Work-based learning, including sandwich courses**

All students are encouraged to make use of the opportunity to enhance their learning and personal development by undertaking an industrial placement after the second year of their programme. All placements are reviewed to ensure that they provide a relevant experience in which students can apply their learning in a practical situation. Students have the responsibility for securing an industrial placement; placement is not guaranteed. All students on the course receive support from the placement specialists (Talent Preparation Officers) within the KU Talent team in securing a position and while in the workplace.

This allows students to reflect upon their own personal experience of working in an applied setting, to focus on aspects of this experience that they can clearly relate to theoretical concepts and to evaluate the relationship between theory and practice. Historically many sandwich placements are reasonably well remunerated.

**E3. Outline Programme Structure**

The course structure diagram is shown in figure 1. Each level is made up of four modules each worth 30 credit points. Typically a student must complete 120 credits at each level. Full details of each module will be provided in module descriptors and student module guides.

The programme is operated in accordance with the KU Undergraduate Regulations and modules are compulsory; there are no optional modules available. All students must complete 120 credits worth of modules at each Level to progress to the next Level. To be awarded a BEng (Hons) Aviation Engineering degree, students must pass all 360 credits. A student is eligible for the award of an unclassified bachelor degree if they successfully complete 300 credits of the programme.

**Figure 1: BEng (Hons) in Aviation Engineering**

**LEVEL 6**

**LEVEL 5**

**LEVEL 4**

Air Transport Economics

AE6601

Operations Research and Aviation Safety AE5506

Engineering Design and Professional Practice

EG4010

 **Industrial Placement**

Individual Project (IEng)

AE6200

Engineering Project Management

EG5014

Engineering Mechanics, Structures and Materials

EG4011

Aircraft Maintenance Operations

AE6201

Aircraft Systems AE5101

Engineering Mathematics and Computing Applications

EG4012

Aerospace Technology

AE6204

Aerospace Engineering

AE5122

Fluid Mechanics and Engineering Science

EG4013

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| **Level 4** (all core) |
| **Compulsory modules** | **Module code** | **Credit** **Value** | **Level**  | **Teaching Block** |
| Engineering Design and Professional Practice | EG4010 | 30 | 4 | 1&2 |
| Engineering Mechanics, Structures and Materials | EG4011 | 30 | 4 | 1&2 |
| Engineering Mathematics and Computing Applications | EG4012 | 30 | 4 | 1&2 |
| Fluid Mechanics and Engineering Science | EG4013 | 30 | 4 | 1&2 |

Progression to Level 5 requires completion of 120 credits worth of modules 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 (CertHE)

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| **Level 5**  |
| **Compulsory modules** | **Module code** | **Credit****Value** | **Level** | **Teaching Block** |
| Operation Research and Aviation Safety | AE5506 | 30 | 5 | 1&2 |
| Engineering Project Management | EG5014 | 30 | 5 | 1&2 |
| Aircraft Systems | AE5101 | 30 | 5 | 1&2 |
| Aerospace Engineering | AE5122 | 30 | 5 | 1&2 |

Progression to Level 6 requires completion of 120 credits worth of modules 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 (DipHE).

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| **Level 6**  |
| **Compulsory modules** | **Module code** | **Credit** **Value** | **Level**  | **Teaching Block** |
| Air Transport Economics | AE6601 | 30 | 6 | 1&2 |
| Individual Project | AE6200 | 30 | 6 | 1&2 |
| Aircraft Maintenance Operations | AE6201 | 30 | 6 | 1&2 |
| Aerospace Technology | AE6204 | 30 | 6 | 1&2 |

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

The BEng course in Aviation has been designed, taking into account the Kingston University Curriculum Design Principles, to help develop students into graduates that are professional, thoughtful, creative, resilient, proactive, globally aware, and independent, equipping them to be lifelong learners.

**Development of Independent learning through the course**

The learning, teaching and assessment strategy of the course is aimed at supporting progression in curriculum content and skills development through the levels of study. At level 4 there is a clear structure and guidance for students’ learning with an emphasis on the acquisition of fundamental engineering knowledge and skills (e.g. Mathematics and IT in **EG4012** **Engineering Mathematics and Computing**, practical skills (**EG4011** and **EG4013**) and the initial development of key employability skills in **EG4010**). This provides a solid foundation for students to undertake a deeper study in a specific engineering discipline at level 5. At level 5 there will be an increased expectation of independent study, supported by a reduced emphasis on the use of traditional lectures. Students will continue to receive clear guidance on how to assess their understanding of the material through self-assessment questions and at scheduled tutorials. At level 6 students will be expected to take greater ownership of their independent study with academics taking on more of a supervisory role of student independent study, this is exemplified in **AE6020**  **Individual project** and the Project-Based group work of **AE6201 Aircraft Maintenance Operations.** Self-Assessment questions and tutorials are used in the other two modules at this level to support independent learning.

Module guides set out clear expectations for guided independent learning. Students will be directed to reading and Technology Enhanced Learning (TEL) packages to prepare for individual topics or sessions and also to problem sets or exercises to consolidate and test their learning afterwards. This will be introduced at level 4.The Virtual Learning Environment (VLE) at Kingston will support learning throughout the course through a variety of TEL objects such videos, screencasts, on-line MCQs, discussion boards and interactive teaching packages. It will also deliver teaching material such as lecture notes/presentations, problems sets and worked examples. For example, an extensive library of engineering videos mapped to every lecture topicis embedded in the VLE for the module **AE5122 Aerospace Engineering**. This helps support an inclusive approach as studentscan access learning material at their convenience and work through it at their own pace with the opportunity to pause and rewind as they wish.

**Integrated first year and interdisciplinary collaboration**.

All engineering students at Kingston University take a common set of four (30 credit) modules. This allows all students to experience various engineering disciplines before deciding on an area of specialisation. Due to a specialist strand in TB2 for one of the modules, students are expected to pick the chosen engineering pathway at the end of TB1. Although students may have a firm idea of which branch of engineering they would like to study when they start (e.g. civil and infrastructure) exposure to a variety of branches in the first teaching block will allow students to make a more informed choice. The opportunity to study and work with students from different branches of engineering is a distinct feature of the course at Kingston and is extended into the second year when all students take a common level 5 module. In **EG4010** **Engineering Design and Professional Practice** students will be introduced to the principles and importance of group work. Project-based learning (PjBL) is employed requiring interdisciplinary teams to design, build and present solutions to small scale engineering challenges, the outputs of these will be part of the summative assessment. Interdisciplinary group work will be further developed at level 5 in **EG5014 Engineering Project Management** where students are taught about group project management in TB1 and then will spend much of TB2 working on a more complex challenge that will comprise 60% of the module assessment. In this module students are likely to tackle a live, real-world problem supplied by a well know company or organization. This will give the students an opportunity to talk about how they have worked with an external company on an engineering problem as part of a team when they apply for an industrial placement At level 6, students will consolidate their group working skills in **AE6021 Aircraft Maintenance Operations** when undertaking a group design project in their own engineering discipline, using the team working skills learned in earlier years.

**Focus on active learning and enhancing student engagement**

A feature of the learning, teaching and assessment strategy in the School of Engineering is that many instructional lectures have been replaced by collaborative, problem-solving or enquiry-based learning workshops and tutorials. These require students to prepare for, and participate in, the classroom activities, rather than passively listening to the lecturer. Students are expected to engage with the guided learning to prepare for these teaching sessions and consolidate their learning after the session. These interactive sessions also provide students with opportunities for peer learning, group work and presentation practice. In these sessions the lecturer facilitates learning by supporting students in creating their own knowledge and understanding. Lecturers may also introduce and summarize key concepts with short mini-lectures. Project-based Learning (PBjL) is introduced in **EG4010** and developed further in **EG5014 and EG6023**.These collaborative activities encourage students to draw on their own set of experiences and cultural backgrounds when tackling real world challenges. The Flipped classroom approach is introduced in **EG4010**. Where the curriculum (lecture content) of a small topic is delivered via on-line materials (screencasts, videos or study packs) and then developed and applied in workshops (4 hours). At level 5 and 6, a flipped class approach will be adopted in **AE5122 Aerospace Engineering, AE5101 Aircraft Systems,** and **AE6204 Aerospace Technology**.

Active and collaborative learning is also incorporated in traditional lectures which may have question-and-answer sessions, brief student discussions, clicker activities integrated into the lecture. These methods ensure that valuable contact time is focussed on the application and critical analysis of knowledge and the development of key skills such as problem-solving, communication, and group-work.

The high percentage use of active learning sessions in the teaching hours is aimed at improving student engagement, creativity, confidence and self-reliance. The course endeavours to further secure student engagement by making students feel part of a community and increasing their sense of belonging which is supports to improve retention and progression. This is achieved by providing opportunities to interact with staff and students both socially and academically. In addition, to the active learning sessions and group work, this is achieved through: the PT scheme, field work, industrial visits, extra-curricular seminars, research internships, course representative system, student ambassador work, peer mentoring, PAL civic engagement and outreach opportunities.

**Development of employability skills**

The progressive development of a range key employability skills is another feature of the course as exemplified in teamwork/group work discussed above. Regarding communication skills, at level 4 the focus is on writing individual practical reports (**EG4013 Fluid Mechanics & Engineering Science**) using a standard format and style, and encouraging students to orally communicate the outcomes of small group exercises in the active learning teaching sessions in **EG4010 and EG4011(Engineering Mechanics, Structures & Materials)**. At level 5 students will be required to produce a substantial written group report and present their individual findings in **EG5014** and in other module e.g. **AE5122 Aerospace Engineering**, individual laboratory reports on more challenging topics. To help development of these skills student will be required to submit a draft of a report for **EG4011** to the Support for Academic Success Centre for feedback and to discuss this with their personal tutor. At level 6, in the **AE6200 Individual Project** module, students will be taught how to synthesise and critical review information from a variety of sources and report this and their research results in a formal research report and an oral presentation.

To complement the development of employability skills within the curriculum, Personal tutors will encourage students to engage in a range of extra-curricular activities such as student representation, part-time work, sports and recreation,  society membership,  volunteering ; student ambassadorship, leadership and mentoring; cultural and creative activities;   academic and professional collaboration; placement activity; enterprise activity; KU Talent events and opportunities. Activity in these areas is recognised by the university’s Kingston Award Scheme. KU Talent offers a range of events, including Careers Uncovered fairs, which include employers coming to campus to promote internship, placement and graduate opportunities, Spotlight on engineering networking activities where employers and alumni are invited on campus to talk about career pathways.

Engineering is fundamentally a creative industry and innovation is embedded throughout the curriculum, primarily through individual and group project work. This starts in level 4 with **EG4010** and is further developed in **EG5014.** In **EG6023**, a major group project is embedded within the Applied Business Management module. This encourages students to consider the broader business context in their project work. In addition, this module gives students the opportunity to compete in the annual Bright Ideas competition, which is a university wide competition to encourage entrepreneurship.

**Hands-on Practical work**

Hands-on practical experience in workshops and laboratories is a fundamental in developing practical skills as well as enhancing data collection and analysis skills. Students will have the opportunity to work in laboratories and workshops in most of their modules. Practical work is closely related to the taught content to provide context for the theoretical work. At level 4 students are introduced to basic measurement and manufacturing processes and how to apply these in a laboratory and testing environment **EG 4010 Engineering Design and Professional Practice** At level 5 the focus is performing more complex measurements in the materials and wind tunnel laboratory in **AE5122 Aerospace Engineering**. Students also will learn the basic flying skills and aircraft stability modes using the Merlin motion flight simulator in **AE5122**. In **AE5101 Aircraft Systems,** theLearjet business jet will be used to demonstrate the typical operation of each of the aircraft systems. This is delivered through supervised practical sessions with experiment protocols. At level 6 students and expected to select and apply requisite practical skills in their own independent research work in **AE6200 the Individual project** module.

**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. These activities take them into, amongst other areas, materials research both coatings and compound, fire and explosion research both cause and prevention, dynamics and control research and on through sustainable power generation to electric vehicle technology with the particular success of the zero emissions electric motorbike. The modules at levels 5 and 6 are mainly taught and managed by academic staff, who are engaged in research in areas such as materials, aerodynamics, aero elasticity, control engineering and structural analysis. Students 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 evidence in an argument, which is 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 VLE system. The use of an Electronic Voting System in the class room for summative and formative assessments is another example of pedagogic research undertaken by the teaching staff. This reflective, evidence-based professional practice by academic staff serves as exemplar to students in their future professional practice

**Assessment for Learning**

The assessment strategy has been designed help students to learn and prepare them for employment, rather than just a tool to measure their learning. The assessment is designed to be authentic, inclusive and transparent. The assessment tasks focus on the real world-engineering activities that enhance students’ employability. For example, the **AE6201** **Aircraft Maintenance Operations** moduleprovides students opportunities to work on a collaborative group work based on a virtual industrial environment in which they have to develop a realistic and cost effective maintenance solution for an airline operation. Students will develop the ability to solve open-ended problems with real-world constraints and airline regulatory requirements. All modules have explicit formative assessments to provide opportunities for practice and the chance to use ‘feed-forward’ to help students improve their work in subsequent summative assessments (give examples- module codes). Examinations are still used as they are an effective way of assessing basic knowledge and understanding, and professional bodies expect to see examination covering key curriculum content. However, the strategy recognises that other assessment methods are better suited to assessing higher level problem-solving skills. This is reflected in the decreasing use of examination from level 4&5 to level 6. The use of a well-balanced range of assessment methods is a key part to of our inclusive assessment strategy. Group and teamwork assessment is instrumental in developing and recognising this important employability skill.

**Engineering curriculum**

The purpose of the Level 4 stage of the programme is to enable students from various academic backgrounds to transition smoothly to a Higher Education environment and harness the provision of academic and pastoral support provided by the University. The BEng (Hons) Aviation Engineering programme shares a common Level 4 with the BEng (Hons) Aerospace, Mechanical and Civil Engineering programmes. The BEng (Hons) Aviation Engineering students will typically have lower entry tariff points, coming from more diverse academic and socioeconomic backgrounds. At Level 4, the PTS is a core feature of the programme that is used proactively to identify specific weakness and support needed by the students in each module. They are required to have a learning logbook for the problem sets for self-monitoring. The personal tutors will monitor their progress periodically and signpost any support available.

The **EG4010 Engineering Design and Professional Practice** is designed to develop students’ knowledge, understanding of the engineering design processes and construction processes to specification using appropriate software tools. It develops students’ awareness of legal, political and social constraints. This includes the regulatory requirements, government policies, code of practice and environmental impact. It also promotes understanding of health and safety, environmental and commercial risk assessment and sustainability requirements. Students will acquire key employability skills such as communication, presentation, team-working, and planning and project management. It also provides an opportunity for students to adapt reflective practice and develop engineering skills and transferable skills to support Continuous Professional Development (CPD).The **EG4011 Engineering Mechanics, Structures & Materials** allowsstudents todevelop theoretical and numerical skills that are necessary in the design of real-world structures. It highlights the sustainability issues relating to engineering materials including their carbon footprint, global warming and its effects.The **EG4012 Engineering Mathematics and Computing** equips students with the mathematical and statistical skills for solving engineering problems. It also introduces the use of computing methods in engineering with the use of the mathematical and statistical software. The module **EG4013 Fluid Mechanics & Engineering Science** enables students to develop the ability and skills to solve fluid mechanics and engineering science problems.

Level 5 of the core programme builds on the fundamental knowledge and skills gained at Level 4. It focuses on knowledge and understanding of the engineering principles underpinning aircraft technologies and aviation operations The **AE5506** **Operations Research and Aviation Safety** focuses on the statistical methods and techniques used in airline operations, safety and incident analysis, the legal aspect of aviation safety, and the effective implementation of Safety Management System. The module enables students to apply mathematical methods to analyse complex data for the purpose of improving efficiency, optimising processes and quantifying risk. The identification, management and mitigation of risk is a significant aspect within the aviation environment. The module is designed to develop students’ knowledge and skills around risk. This includes the applications of Safety Management System (SMS) to hazard identification, risk assessment and management, safety culture and assurance. The problem-based and inquiry-based group work on human factors in safety fosters collaborative thinking and develops attributes expected of an aviation graduate.

The **AE5122 Aerospace Engineering** introduces the application of aerospace engineering principles to aircraft aerodynamics, propulsion, materials and structural analysis. The module enhances the development of students’ analytical, problem-solving, critical thinking and laboratory skills. It provides an understanding of how the principles of aerodynamics, propulsion, structures and materials science all determine the configuration and performance of fixed and rotary wing aircraft. It also develops the software modelling skills of analysing composite aerospace structures using FEM techniques. The module involves the use of wind tunnel laboratories and the flight simulator to enhance students learning experience through Learning-By-Doing. Staff encourages students to develop curiosity and a desire to learn for life using active learning techniques.

The **AE5101 Aircraft Systems** module is designed to give students knowledge and understanding of the aircraft systems, and the regulatory requirements for maintaining the airworthiness of aircraft and the licensing of maintenance personnel. It enables students to develop an integrated systems engineering perspective to look at the interaction and integration of the systems. It also ensures students to have a thorough understanding of the operation of maintenance production and aircraft maintenance planning. The live Learjet business aircraft is used to demonstrate the typical operation of each of the systems and to facilitate Learning-By-doing through the hands-on practice of real-world hardware.

The **EG5014 Engineering Project Management Module** introduces the principles and commercial practices for the management of engineering projects and related wider business operations. The nature of project engineering and business management is considered in the context of time, quality, risk and sustainability aspects. It introduces the legal, commercial, social and ethical framework in engineering environments. Students will develop an awareness of quality issues in engineering projects including the ISO 9000 quality management systems This module provides opportunities for developing the team-working and communication skills in group discussions and seminars.

Level 6 of the programme continues the aviation theme but it emphasises the development of self-management, independent learning, professional skills, and deep understanding of knowledge required in aviation engineering.

In the **AE6201 Aircraft Maintenance Operations** module students are taught about maintenance logistics, maintenance cost drivers and the key aspects of project planning before engaging in a group project based in this field and drawing on knowledge and experience gained previously. It will consist of substantial Project-Based Learning (PjB) driven by the students with supervisor/facilitators encourage professionalism and leadership in a group activity support. The theme of the project is an open-ended problem on the theme of airline operation consisting of incomplete information and uncertainty. It provides students with an understanding of the process of project planning and an opportunity to put theory into practice in a virtual industrial project. Students will apply problem-solving skills to produce plans and design a maintenance solution that can satisfy the cost, customer and regulatory constraints. The module encourages professionalism and leadership in a collaborative group setting in which sustainability and ethicsare embeddedwithin the project context (virtual industrial). Students will need to demonstrate a high level of professional and ethical conduct within the virtual industrial based group project.

The AE6601 Air Transport Economics provides students with the knowledge and understanding of air transport economics, business and management techniques required by professional engineers. Students will be encouraged to develop an awareness of the economic, legal and environmental constraints in the air transport industry. For examples, they will have to appreciate the wider engineering context such as airport environmental impact, international business, trade barriers and globalisation.

The **AE6204 Aerospace Technology** encompasses the principles of aerodynamics, propulsion, structures and materials science and performance of fixed and rotary wing aircraft. The module enables students to apply quantitative engineering analyses and modelling techniques to solve engineering problems and to optimise the performance of an aircraft system or components. The module develops the analytical and problem-solving skills of the students.

The **AE6200 Individual Project** module combines the technical and academic facets of the programme and provides students with an opportunity to complete a capstone project applying the knowledge and skills learnt during the course to achieve agreed deliverables. It enables students to develop their research, problem-solving, communication and planning skills. The project requires significant amount of independent study and self-management which encourages students to be lifelong learners through CPD. The key requirement of the individual project is that students should be able to demonstrate the ability to interpret and apply the engineering analysis to solve engineering problems or improve an existing design. .

**Inclusive Teaching Practice**

Staff Student Consultative Committees and Boards of Study provide opportunities for the student to make suggestion on how to develop a more inclusive curriculum by taking into account the specific circumstances of the student body. The variety of teaching activities also takes account of the student’s different learning preferences and experiences and there is a careful balance of individual and group-based activities.

Marking criteria are provided for all assessments as part of the assessment booklet at the beginning of the year for each module and care is taken to ensure that the language used is clear**.** Assessment and marking criteria for all substantial assessments are discussed in class so all students have an opportunity to interrogate the criteria.

In the programme as a whole, the following components are used in the assessment of the various modules:

* Practical exercises: to assess students’ understanding and technical competence
* Individual and group-based case project work: to assess ability to understand requirements, to provide solutions to realistic problems and to interact and work effectively with others as a contributing member of a team. The outcomes can be:
* Written reports, where the ability to communicate the relevant concepts, methods, results and conclusions effectively will be assessed.
* Oral presentations, where the ability to summarise accurately and communicate clearly the key points from the work in a brief presentation will be assessed.
* Video, which may replicate features of oral presentations but allows advance preparation away from the audience (which may suit some students better).
* Multiple choice or short answer questions: to assess competence in basic techniques and understanding of concepts.
* Long answer structured questions in coursework assignments: to assess ability to apply learned techniques to solve simple to medium problems and which may include a limited investigative component
* Long answer structured questions in end-of-module examinations: to assess overall breadth of knowledge and technical competence to provide concise and accurate solutions within restricted time
* Project: The individual project module represents an opportunity for students to draw together different aspects of their learning on the course and to apply the techniques learned in an extended study. As such the assessment here will place a greater emphasis on ability to plan work, manage time effectively, and research background information, culminating in a written report and interview.
* Individual and group practical laboratory reports

**Employability/Placement**

Initially students are guided towards learning about employability skills and career pathways, but as they move through the course they are expected to become more independent and take ownership of their career development by engaging with classes provided by KU Talent, including; Professional Communication, Time and Self-Management and Identifying and Articulating Skills. There are also opportunities to perfect skills required to gain employment such as; CV writing, Psychometric Test and Using LinkedIn. A student’s development and career options are discussed in personal tutor meetings and guidance given as appropriate. This is in liaison with the KU Talent team, the University’s Careers Service.

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

Student support recognises that the student experience is unique to each student. A key part of our approach to an inclusive curriculum is that we acknowledge and where possible accommodate their individual circumstances. The personal tutor scheme is central to the efforts to provide a personalised learning experience. (See PT section of programme specification) At level 4 and 5 a core set of problems for each engineering module are issued to students. These cover the whole curriculum for a particular level. Students are required to work through these formative assessment problems as they cover the relevant curriculum. This allows students to test their learning and measure their progress. Discussion of progress on these problem sets will be a key part of the personal tutor scheme. Students are required to upload their progress on these activities onto the **Learning Log** created on the University VLE system. The Learning Log will be available to the relevant personal tutors for further discussion during one-to-one meetings. There will be milestones for students to meet at every level, and it will be one of the personal tutor’s roles to monitor the students’ progress and give appropriate advice*.*  Where difficulties are encountered PTs will be able to help or direct students to available support including peer mentoring schemes, PAL, Maths aid and on-line resources etc.

Students are supported by:

* **A Module Leader** for each module
* **A Course Leader** to help students understand their programme structure and provide academic support
* **A Personal Tutor** (PT) to provide academic and personal support
* There is a **Student Support and Engagement Team** to help students with any problem that is affecting their studies.
* A dedicated Undergraduate Course Administrator
* **An induction programme** and study skills sessions at the start of each academic year
* **SEC Academic Success Centre (SASC)** is a one-to-one drop-in Study Skills session for students every weekday. Help is available on a range of academic skills from writing reports, note-taking, to exam revision, referencing, programming and mathematical skills.
* **VLE** – a versatile on-line interactive intranet and learning environment accessible both on-site and remotely
* **Course Representative scheme**
* **Talent 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 Engineering**

The following provides the aims and structure of the Personal Tutor Scheme (PTS) for the School of 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 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
* If they change discipline at the end of TB1 a change of PT is likely to occur to allow comprehensive support through the programme.

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.

This needs to reference specific modules linked to the PTs and activities expected of students

**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 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

In addition to a core set of problems for each module students are also given a list of engagement activities that they are encouraged to take advantage of at level 4. PT will discuss progress on problem sets and engagement with certain activities with tutees throughout the year.The Learning Log will be available to the relevant personal tutors for further discussion during one-to-one meetings. There will be milestones for students to meet at every level, and personal tutor’s will monitor the students’ progress and give appropriate advice.

The module **EG4010 Engineering Design and Professional** Practice is closely linked to the Personal tutor scheme as it introduces key academic and employability skills. In addition it focuses on reflective practice on feedback and their progress with academic and employability skills. It is expected that these are topics of conversation personal tutor meetings.

**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

Throughout the year, students are expected to reflect on their acquisition of skills and preparation for and industrial placement and employment with their personal tutors. This activity is integrated into **EG5014** and constitutes 10% of the module assessment.

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

**Aims and Learning Outcomes**

* To support students with the planning necessary to maximise success in their penultimate 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 subject level
* Student evaluation
* Moderation policies
1. **Employability Statement**

The BEng(Hons) Aviation Engineering focuses on the key technical and employability skills, and desired attributes required to be a competent aviation engineer. It aligns with the knowledge, skills and behaviours defined by the Royal Aeronautical Society in their accreditation requirements

With the rapid growth of air transport industry, there are strong demands for Incorporated Engineers within the Aviation sector. The BEng Aviation Engineering graduates are destined to work primarily with airworthiness, aviation management, systems integration, design, support and manufacturing. The employability skills will be developed through a range of aviation and general engineering modules in the programme described in Section F. The programme provides students with opportunities to take personal responsibility for their actions, managing projects and developing leadership in Project Based Learning (PjBL) activities such as formal group projects, hands-on mini-projects, enquiry based case studies, co-and extra-curriculum activities. The development of transferable skills such as communication, interpersonal, team-working skills, analytical and problem-solving skills is embedded within the programme. Students will be aware of the professionalism, code of conduct and the ethical standards required in self-directed PjBL activities.

The 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. Group work in conjunction with external organisations at level 4 will provide students with relevant experience to add to their CV when they are applying for placement in level 5. 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 levels 5 and 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 activities as well as organisational and business aspects of the company. 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 University tutor will discuss progress with the student and employer and will recommend any improvements to the learning opportunities.

Professional practice in is introduced in the first year in the module **EG4010**, in which the students are introduced to the employment opportunities in the specialist engineering field, this is followed by all other modules at levels 5, 6 and 7, especially in **EG5014 Engineering Project Management, AE5506 Operations Research and Aviation Safety** and **AE6020**  **Individual project.**

Students are given the opportunity to participate in the mock interviews conducted by a visiting professor who had many years of experience working in both the civilian and military aviation sectors. She offers interactive group and individual job interviews that are tailored to the skills and attributes required in the aviation industry. Instant feedback will be given to students on how to improve their interview and CV writing skills. Furthermore, she gives honorary guest lectures on developing employability skills for engineers and real-world case studies of problems and solutions encountered in the aviation environment. As a successfully female engineer with an impressive resume, she also acts as an inspirational role model for the female students.

1. **Approved Variants from the Undergraduate or Postgraduate Regulations**

The following proposed variants are subject to approval by the Regulation Framework Committee

**Compensation**

Compensation is not permitted at level 6

**Reassessment of Individual Projects**

Reassessment of AE6200 Individual Project, will normally be by repeat only with a new project brief unless the student has achieved a grade of FM in which case a retake in the form re-writing the dissertation will be allowed.

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](http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/Subject-benchmark-statement-Engineering-.aspx)

Professional bodies:

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

1. **Development of Field/Course Learning Outcomes in Modules**

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

Key:

**S** – Indicates where summative assessment occurs.

All modules will have elements of informal formative assessment associated with them.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Level 4** | **Level 5** | **Level 6** |
|   | **EG4010-** Engineering Design and Professional Practice | **EG4011**-Engineering Mechanics, Structures and Materials  | **EG4012**-Engineering Mathematics and Computing Applications | **EG4013**-Fluid Mechanics and Engineering Science | **AE5506** - Operations Research and aviation safety | **EG5014** - Engineering Project Management | **AE5101** - Aircraft Systems | **AE5122** Aerospace Engineering | **AE6204** - Aerospace Technology | **AE6201**- Aircraft Maintenance Operations | **AE6200** - Individual Project  | **AE6601** - Air Transport Economics |
|  **Knowledge and Understanding** |
| A1 |  | S | S | S | S |  | S |  | S |  |  |  |
| A2 |  |  |  | S |  |  |  |  |  | S |  |  |
| A3 |  |  |  | S |  | S |  | S |  | S |  | S |
| A4 |  | S | S |  | S | S |  | S |  | S |  | S |
| A5 |  | S |  |  | S | S |  | S |  |  | S | S |
|  **Intellectual Skills** |
| B1 |  | S | S | S | S |  | S |  | S | S | S | S |
| B2 |  | S | S |  | S |  |  |  |  | S | S | S |
| B3 |  |  |  | S | S | S |  | S |  | S | S | S |
| B4 | S | S |  |  |  | S |  |  |  |  |  |  |
| B5 | S |  |  |  | S | S |  |  |  |  |  |  |
|  **Practical Skills** |
| C1 | S |  | S |  | S |  | S |  |  | S |  |  |
| C2 | S | S | S | S |  |  |  |  | S | S |  |  |
| C3 | S |  |  |  | S |  |  |  |  | S | S | S |
| C4 | S |  |  | S | S | S | S | S |  |  | S | S |
| C5 | S | S |  |  |  |  | S | S |  |  | S | S |

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

**Technical Annex**

|  |  |
| --- | --- |
| **Final Award(s):** | BEng(Hons) Aviation Engineering |
| **Intermediate Award(s):** | Cert HE in Aviation EngineeringDip HE in Aviation EngineeringBEng Aviation Engineering |
|  |  |
| **Minimum period of registration:** | FT – 3 yearsPT – 6 years Sandwich – 4 years |
| **Maximum period of registration:** | FT – 6 yearsPT – 12 years Sandwich – 8 years |
| **FHEQ Level for the Final Award:** | Level 6 |
| **QAA Subject Benchmark:** | Engineering |
| **Modes of Delivery:** | Full-time, Sandwich |
| **Language of Delivery:** | English  |
| **Faculty:** | SEC |
| **School:** | Engineering |
| **Department:** | Aerospace and Aircraft Engineering |
| **JACS code:** | H400 |
| **UCAS Code:** | H400 (FT), H401 (SW) |
| **Course/Route Code:** | To be arranged |
|  |  |