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**Programme Specification**

**Title of Course: BEng (Hons) Civil and Infrastructure Engineering**

**Date Specification Produced: July 2017**

**Date Specification Last Revised: August 2019**

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.

*Examples of completed programme specifications can be found on the* [*KU Programme Specification Archive*](http://www.kingston.ac.uk/programme-specifications/)

**SECTION 1: GENERAL INFORMATION**

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| **Title:** | BEng (Hons) Civil and Infrastructure Engineering |
| **Awarding Institution:** | Kingston University |
| **Teaching Institution:** | Kingston University |
| **Location:** | Penrhyn Road Campus, Kingston |
| **Programme Accredited by:** | Programme is accredited by the Joint Board of Moderators (JBM); comprising the Institution of Civil Engineers, the Institution of Structural Engineers, the Chartered Institution of Highways and Transportation, and the Institute of Highway Engineers. |

**SECTION2: THE PROGRAMME**

1. **Programme Introduction**

In common with all engineering degrees at Kingston students will take a common set of four (30 credit) modules at level 4 and share a common module in each of levels 5 and 6. This allows all students to experience various engineering disciplines before deciding on an area of specialisation. Students choose their particular engineering pathway at the end of teaching block one of the first year. Although students may have a firm idea of which branch of engineering they would like to study when they start exposure to a variety of branches in the first teaching block allows students to make a more informed choice. In addition, this structure provides valuable experience of working in interdisciplinary teams, an essential employability skill. Shared modules at level 5 and 6 give further opportunities for interaction across engineering disciplines and associated group work on real world problems. A feature of the learning and teaching strategy is a focus on active learning sessions at the expense of traditional didactic lectures for example in EG4010, CE5012 and CE6012 at levels 4, 5 and 6 respectively.

The BEng (Hons) Civil and Infrastructure Engineering course is designed for undergraduate students who wish to study civil and infrastructure engineering to degree level and aspire to achieve the professional status of Incorporated Engineer (IEng) with the possibility of studying a further year for an accredited Master degree to become qualified for the Chartered status (CEng).

The course is intended to equip graduates with the knowledge, comprehension, intellectual ability and subject competences to become professional civil engineers or to follow careers in related professional areas. Employability is a key element and hence the emphasis on communication and interpersonal skills that enhance employment prospects. Professional practice 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 through all other modules at levels 5 and 6, especially in EG5014 Project Engineering and Management, EG6023 Business Management and Group Project and CE6014 Individual project. Students are fully supported by KU Talent that 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. KU Talent also provides classes on Professional Communication, Time and Self-Management and Identifying and Articulating Skills. The School’s Industrial Advisory Board members and other invited industry experts also support students’ employability via mentoring by them, presenting their work to them, placements, applying for vacancies, etc. Employment opportunities are stressed at every level of the course and students are actively encouraged to undertake a work placement between levels 5 and 6. Recent placements and graduate destinations include most major construction projects in London: High Speed 1, St Pancras Station, Heathrow Airport (e.g. terminals 5 and 2), Wembley Stadium, major sewage treatment works improvements, the Olympic Park and Crossrail.

The course has an ethos of ‘learning through doing’ to ensure practical skills are developed. A key feature is the substantial amount of time students spend doing practical work in our specialist well-equipped laboratories, which include concrete, hydraulics, materials, soils, and structures labs. Three residential field courses also examine real-life scenarios in-depth; one in **engineering surveying** (surveying and setting out of a road using modern equipment currently held at Sussex University) at the conclusion of level 4 and two associated with geotechnical and water engineering challenges at level 5 (currently to the **Lake District** where geological features and built infrastructure are examined in order to deepen understanding of how the natural ground and geological processes affect construction in civil engineering) and level 6 (currently to the **Isle of Wight** where coastal engineering and coastal processes are studied, as well as sustainable methods for managing these processes).

The course embraces recent developments in education and industry and the curriculum and teaching benefits from the research interests of the academic staff. The design of the course 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 Joint Board of Moderators (JBM) Guidelines for Accredited BEng (Hons) Degree Programmes.

The programme is designed to cover the JBM core subjects of structures, materials and geotechnics in full. Further topics include hydraulic and water engineering, engineering surveying, highways and transport infrastructure. Learning threads through the programme modules include design, sustainability, risk and health & safety. There is also a professional practice theme covering topics such as project, construction, quality and business management. The programme provides both breadth and depth with the aim to develop the ability to identify, define and solve problems from first principles.

During the entire duration of the course students are supported by a Personal Tutor Scheme (PTS) in which they are allocated a member of staff on their first day at university. Through one-to-one meetings, the staff member will assist and encourage students in their academic learning for duration of their degree.

Technology enhanced learning such as videos, discussion forums and e-learning will be used together with the best traditional methods to provide a “blended learning” experience. In particular learning is supported by Kingston University’s excellent e-learning environments: VLE system which can be easily accessed both on and off campus. Electronic submission and feedback is widely used on the programme to enable students to submit work and receive feedback from off campus

The BEng (Hons) is offered as a three-year full-time degree course or a four-year sandwich course with an industrial placement taken before the final year. A part-time option is also available where students with appropriate employment take level 5 and level 6 over a four-year period.

1. **Aims of the Course**

The general aims of the programme are:

* To equip graduates with engineering science, design, management, business and interpersonal skills required to become a professional Civil Engineer, as well as to enable graduates to follow careers in other professional disciplines where clear, logical, numerate skills in combination with the ability to solve problems, communicate solutions and work in teams are valued.

More specific aims of the programme are:

* To produce graduates with the required breadth and depth of theoretical and practical knowledge of established technologies and methods in Civil Engineering;
* To enable graduates to develop analytical and problem-solving skills and to evaluate evidence and assumptions to reach sound judgements and communicate these effectively;
* To prepare graduates with a creative approach to the solution of civil engineering challenges and the requisite technical skills to realise these solutions with responsibility for project management;
* To equip graduates with the research skills required for postgraduate study and employability skills required for work in the engineering/construction fields;
* To furnish graduates with a firm grasp of Engineering Design, Sustainability and ‘Risk & Health and Safety’ principles.
* To provide graduates who have the reflective skills to recognise the need to continually develop themselves in order to exercise their Professional judgement.

1. **Intended Learning Outcomes**

The 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 Engineering (2015) and the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (2008), and relate to the typical student.

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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 civil engineering subjects of materials, structures and geotechnics to apply existing and emerging technology | B1 | Apply fundamental theoretical scientific and mathematical principles that underpin engineering and specifically civil engineering | C1 | Use safely laboratory and workshop equipment for experimental investigation and evaluate data to produce practically valuable results |
| A2 | Demonstrate knowledge and understanding of hydraulics, surveying, water, highway, transportation and environmental engineering | B2 | Use mathematics as a tool for solving complex problems, communicating results, concepts and ideas | C2 | Undertake fieldwork and analyse the data obtained for use in planning and design |
| A3 | Demonstrate knowledge and appreciation of broader technical and non-technical engineering subjects | B3 | Think creatively and imaginatively to solve design problems and *manage* continuous improvement through quality management | C3 | Use a range of complex technical equipment and instruments, gaining a basic understanding of the underlying technology |
| A4 | Relate management and business applications to civil engineering | B4 | Manage projects, people, resources and time taking account of legal and statutory requirements, risk, safety, quality and reliability | C4 | Use computer technology to assist with information retrieval, management and communication |
| A5 | Demonstrate understanding of the importance of Risk and 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 regulation and procedure in practical engineering situations |
| A6 | Relate all their studies to a knowledge and holistic understanding of sustainability and environmental assessment | B6 | Recognise the importance of professional bodies and develop the professional conduct expected of Professional Engineers | C6 | 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). |

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 |  |  |  |

1. **Entry Requirements**

The minimum entry qualifications for the programme are:

From A levels: 112 UCAS Tariff points to include A2 mathematics at Grade C

BTEC: Distinction, Merit, Merit (DMM) from an engineering-related BTEC Extended Diploma including Merit for Mathematics and Further Mathematics

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.

Entry to the part-time route is at level 4 with entry requirements as above and direct entry to level 5, requiring appropriate employment, employer approval and academic qualifications deemed equivalent to BEng level 4 (normally HNC/D).

Students who have alternative or non-standard qualifications or have experience that needs to be credited on an ‘RPCL’ and ‘RPEL’ basis are considered on an individual basis.

1. **Course Structure**

This programme is offered in full-time/sandwich and part-time modes, and leads to the award of BEng (Hons) Civil and Infrastructure Engineering. Intake to all modes of study is normally in September.

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

Part-time students with direct entry to level 5 complete level 5 in two years (stages 1 and 2) and level 6 in a further two years (stages 3 and 4). At each stage the part-time students take two 30-credit modules, with the timetable organised so that they are able to complete their degree essentially with weekly one-day release from their employment.

**E1. Professional and Statutory Regulatory Bodies**

The course is accredited by the JBM.

**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; placements are not guaranteed. All students on the course receive support from the placement specialists (KU Talent Preparation Officers) within the Kingston University Talent team in securing a position and while in the workplace. KU Talent also organises employers’ events for student recruitment.

An Industrial Placement comprises a period of at least 36 weeks with an approved employer. Students are required to produce quarterly reports on their placement and are supported throughout the period by their personal tutor, who will visit them at their place of work on at least one occasion. The personal tutor will discuss progress with the student and employer and will recommend any improvements to the learning opportunities, if appropriate. 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.

**E3. Outline Programme Structure**

Each level is made up of four core modules each worth 30 credit points. Typically 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 the 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** | |
| Engineering Design and Professional Practice | EG4010\* | 30 | 4 | 1&2 | |
| Structural mechanics and Engineering Materials | CE4013\* | 30 | 4 | 1&2 | |
| Engineering Mathematics and Computing Applications | EG4012\* | 30 | 4 | 1&2 | |
| Fluid and Soil Mechanics | CE4011\* | 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 Civil and Infrastructure Engineering. | | | | |

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| **Level 5** (all core) | | | | | | | | | |
| **Compulsory modules** | | **Module code** | | **Credit**  **Value** | | **Level** | | **Teaching Block** | | |
| Geotechnical Engineering 1 and Hydraulics | | CE5011 | | 30 | | 5 | | 1&2 | | |
| Engineering Surveying | | CE5012 | | 30 | | 5 | | 1&2 | | |
| Structural Engineering 1 and Construction Materials | | CE5013 | | 30 | | 5 | | 1&2 | | |
| Engineering Project Management | | EG5014\* | | 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 Civil and Infrastructure Engineering.  **A level average of at least 65% at level 5is required for transfer to Level 6 of the 4yr MEng Civil and Infrastructure Engineering programme.** | | | | | | | | | |
| Level 6 (all core) | | | | | | | | | |
| **Compulsory modules** | **Module code** | | **Credit**  **Value** | | **Level** | | **Teaching Block** | | |
| Structural Engineering 2 and Geotechnical Engineering 2 | CE6011 | | 30 | | 6 | | 1&2 | | |
| Sustainable Infrastructure and Environment | CE6012 | | 30 | | 6 | | 1&2 | | |
| Individual Project | CE6014 | | 30 | | 6 | | 1&2 | | |
| Business Management and Group Project | EG6023\* | | 30 | | 6 | | 1&2 | | |
| Completion of Level 6 requires passes in all modules to give 120 credits and qualify for BEng (Hons) Civil and Infrastructure Engineering  \*EG modules are common with Mechanical and Aerospace Engineering disciplines  For Access and Exit Points see Course Diagrams in Appendix B (pp34-35) | | | | | | | | |

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

The BEng course in Civil and Infrastructure Engineering 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 and globally aware 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 (Mathematics and IT in **EG4012 Engineering Mathematics and Computing)**, practical skills (**CE4013** **Structural mechanics and Engineering Materials** and, **CE4011** **Fluid and Soil Mechanics**) and, the initial development of key employability skills (**EG4010** **Engineering Design and Professional Practice**). 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. 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 the group and individual project modules **EG6023 Business Management Group Project and, CE6014** **Individual Project**

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.

**Integrated first year and interdisciplinary collaboration**

All engineering students at Kingston University take a common set of two (30 credit) modules. This allows all students to experience various engineering disciplines before deciding on an area of specialisation. 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 engineering) exposure to other disciplines 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 Project Engineering and Management** where students are taught about group project management in Teaching Block one and then will spend much of teaching block two 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 **EG6023 Business Management and Group Project** 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. Examples of interactive sessions can be found in all CE modules at all levels where students are offered a highly interactive enquiry-based environment to solve realistic civil engineering problems. 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** **Engineering Design and Professional Practice** and developed further in **EG5014** **Project Engineering and Management and EG6023** **Business Management and Group Project**. 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. At level 5* ***CE5012*** ***Engineering Surveying*** *has a more substantial Flipped classroom approach with extensive notes, video recorded lectures and other appropriate means and using formal class time for students to undertake collaborative and interactive activities relevant to that material. This is repeated at level 6 module* ***CE6012*** ***Sustainable Infrastructure and Environment****.*

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 improved 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 personal tutoring scheme, field work, industrial visits, extra-curricular seminars, research internships, course representative system, student ambassador work, peer mentoring and outreach opportunities.

*An example of social / academic interaction between students and staff is the* ***KU Civil Engineering Society*** *for our students – under development. KUCES would be dedicated to enhancing both the learning, and social, experiences of KU Civil Engineers outside of the classroom, but would be equally open to all students from other disciplines that may hold an interest in our area of study. Members should leave KU with great memories and continue membership as alumni, and also feel as though they have gained some experience in the profession. Site visits, possible trips abroad, attending special lectures and seminars, participating in departmental meetings such as the Industrial Advisory Board, or even society social and sports events, would enrich student experience. Networking via social media (communicating with existing groups) and a dedicated website would play a pivotal role in KUCES successful development and, enthusiastic academics and students are required to champion this exciting initiative.*

**Developments 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 (**CE4011 Fluid and Soil Mechanics**) 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 CE4013**. At level 5 students will be required to produce a substantial written group report and present their individual findings in **EG5014** and in all other modules i.e. **CE5011, CE5012 and CE5013** 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 **CE4013** to the Support for Academic Success Centre for feedback and to discuss this with their personal tutor. Employability skills continue to be enhanced at level 6 with modules **CE6011 and CE6012** that also include lab reports, presentations and group discussions. In the Individual Project module **CE6014** 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.

Civil and Infrastructure Engineering students at Kingston are taught by qualified engineers with substantial personal experience of industry gained either prior to joining the University or through continuing consultancy practice. Industrial consultancy has a similar beneficial effect to research and scholarship, which together inform the teaching at all levels. The beneficial effects diffuse throughout the courses, ranging from the laboratories into such areas as the choice of locations and sites for visits and field courses, selection of case records for study and areas for project work as well as informing syllabus content, course design, as well as update of the content of individual lectures. The School has recently accepted an invitation by the Institution of Civil Engineers to join the newly developed portal for recording and assessing the students’ **Initial Professional Development**. This will help students’ employability as they will be able to satisfy the ICE attributes through their studies and achieve their professional qualification soon after graduation.

A formal arrangement exists with a selection of engineers in full-time practice who generously give their time to support the department through the work of the **Industrial Advisory Board**. This Board meets with senior School staff three times per year to discuss policy and course structure in the department. Some deliverables of the IAB include guest lectures (structures, H&S, sustainability, professional practice), course design (e.g. embedding JBM threads, relevance of skills to employability), research (co-supervision, subjects, KTPs), student placements and JBM visits. Industrial Members have been chosen to reflect both the various courses offered by the Department and the types of organisations for which many of our graduates end up working. We have, therefore, industrial members who are representative of both consultancy organisations – representing both international, and locally based companies, and contracting organisations – representing both major and smaller contractors. In addition, these industrial members have a range of professional qualifications including membership of Professional Engineering Institution. Our students take full advantage by being in continuous contact with the IAB members via mentoring by them, presenting their work to them, placements, applying for vacancies, IAB award, etc. including the yearly award for the best student by the Institution of Civil Engineers.

**Information Technology skills** are developed through a variety of mechanisms, including library and internet searches, use of the KU virtual learning environment (Canvas) and specific training in Windows based packages, but also some other proprietary packages. This includes some packages developed in-house at Kingston, for example, in Surveying and Geotechnics. Specific skills, such as graph drawing in excel, are taught as part of their laboratory report write up. The applications of MAPLE and MATLAB are taught and assessed at level 4, as is use of AutoCAD and Building Information Modelling (BIM). Within the Sustainable Infrastructure module AutoTrack is utilised as part of the coursework. Structural design and analysis software SuperSTRESS, commercial software used widely in practice, is taught in a number of modules from level 5 onwards and is also used within the final year Group Design, as well as some of the final year individual projects. Some project and risk management tools are used by students at Level 5 (MS Project, EG5014), and at Level 6 (Primavera Risk and MS Project, EG6023). Also at level 6, students use proprietary (Concrete Centre / Steel Construction Institute) Structural Design Spreadsheets and Software. Kingston also offers a wide range of IT training and support facilities, to suit to the varying needs of individual students. Thus students will be taught how to use IT 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. Students are also encouraged to engage with local branches of Professional Engineering Institutions as they have to attend technical meetings and are assessed by reporting back as part of the Group Project.

**Hands-on Practical work**

A hand on practical experience in workshops and laboratories is 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 as well as field trips 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 skills of measuring, interpreting and recording experimental data and how to apply these in a laboratory environment and present the results with **CE4013** (intro to structures and materials) and **CE4011** (intro to fluids and soils). Complying with Health & Safety requirements when in the lab is paramount. At level 5 the focus is on further testing and measurement of a variety of parameters in support of more level 5 concepts delivered in lectures with **CE5011** (Hydraulics and Geotechnics) and **CE5013** (Structures and Materials). 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 **CE6014** the individual project module.

Academics are committed to practical fieldwork, encouraging students to acquire fieldwork skills, including health and safety, group coordination and management. This programme includes three residential field excursions, one in engineering surveying (currently held at Sussex University) at the conclusion of level 4 and two associated with geotechnical and hydraulic engineering at level 5 (currently to the Lake District) and level 6 (currently to the Isle of Wight). Site visits are arranged for groups of students whenever possible and are important in understanding the practical application of their academic work, as well as an appreciation of the students’ employability prospects.

**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. At Kingston, research in the field of Civil and Infrastructure Engineering has in recent years been concentrated in the areas of (i) structures and materials (concrete and sustainable materials) and (ii) geotechnical and hydraulic engineering science. 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, advanced structural design, sustainable construction, composite materials, fire and blast resistance, earthquake engineering, geology and geotechnics, etc. Modules are mainly taught and managed by academic staff that are engaged in research in various areas and include their research findings in addition to well established principles, for example in module **CE6011** subject areas such as structures under complex loadings, Finite Elements, pre-stressed concrete, slope stabilisation, deep foundations, etc. are introduced.

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 to 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. All CE module assessments are related to real world problems. For example, in **CE5012** (surveying and setting out of a road), **CE5013** (design of elements in steel and concrete of framed buildings) and **CE6012** (hydrology report of infrastructure) 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. For example in **CE5011**, formative assessment is provided in the form of quick, regular and detailed feedback on laboratory reports facilitating improvement of these reports throughout the academic year. 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 assessment by examination from level 4&5 to level 6.** The use of a well-balanced range of assessment methods is key part to of our inclusive assessment strategy. Group and teamwork assessment is instrumental in developing and recognising this important employability skill. For example, students study fundamental principles of structural mechanics and then demonstrate their applications in different practical examples of analysing structures in group work presentations at Level 4, e.g. understanding the principle of statics and equilibrium leads to its application i.e. ability to use statics and equilibrium in analysing a roof truss. Similar examples follow at levels L5 & L6. This demonstrates progressive skills and competences development – thus preparing employment ready graduates

**Engineering Curriculum**

Level 5 of the core programme builds on the fundamental knowledge and skills in science and mathematics gained at Level 4. Post-level-4 mathematics is deliberately incorporated with the teaching of each engineering topic that it relates to, rather than as a stand-alone subject. In all years, the industrial application of knowledge and professional practice in a multidisciplinary context are included. Level 5 focuses on knowledge and understanding of the engineering principles underpinning civil engineering. Learning-by-doing is implemented through all modules via tutorials, lab sessions, field courses, real world course works, etc.

**CE5011** enables students to apply the principles of fluid mechanics and soils learned at level 4 (CE4011) in developing skills to carry out the analysis and design of engineering problems in hydraulics and geotechnics. Hydraulics includes natural river courses and the conveyance of water through pipelines, culverts and canals. Geotechnics concentrates on geology emphasizing the influence of subsurface conditions on civil engineering and construction; effective stress and shear strength of soil and their effect in designing geotechnical problems. Groundwater seepage and dewatering of groundworks are examined effectively linking hydraulics and geotechnics.

**CE5013** is a core module covering the subjects of structures and materials. It builds and expands essential concepts of Structural mechanics and Engineering Materials learned at level 4 (CE4013) into the structural analysis and design of elements in construction materials such as steel, concrete, masonry and timber. Modern codes of practice such as the Eurocodes are introduced and used throughout and students become familiar with the design process from conception to detailed design and drawings. Material behaviour under loading is carefully examined at lectures and hands-on sessions and further verified by testing specimens in the lab and producing reports.

**CE5012** is a core module offering a fundamental skill expected of any civil engineer. This module exposes students to the instrumentation and observation principle of modern engineering surveying and develops their theoretical understanding and relevant mathematical expertise as well as their practical skills. The operating principles of surveying equipment including GNSS / GPS are all covered in the lecture programme and supported by practical exercises and a residential field course.

**EG5014** 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. This module provides opportunities for developing the team-working and communication skills in group discussions and seminars.

Level 6 of the programme continues the themes of structures, materials and geotechnics and emphasises the development of self-management, independent learning, professional skills, and deep understanding of knowledge required in civil engineering. **Independent learning** is expected to increase at this level as students have acquired the skills required to achieve it via guidance and support (e.g. CASC) with resources as well as peer mentoring (e.g. level 4 students mentored by level 6 students) at earlier years.

**CE6011** is a core module in structures and geotechnics building on knowledge and skills attained at level 5 (CE5013). Students will learn how to analyse and design structural frames made of elements in steel and concrete which they learned at level 5. The design of advanced elements such as in pre-stressed concrete are introduced together with state-of-the-art computer-based analysis and design techniques such as Finite Elements for both structural and geotechnical problems. The geotechnics part of the module includes slope stability, deep foundations and elements of coastal engineering. Opportunities to link structures with geotechnics i.e. the soil and foundations supporting them are provided throughout.

**CE6012** is a core module in sustainable infrastructure and environment that follows elements learned at level 5 (the hydraulics part in CE5013 and the materials part in CE5011). Sustainable solutions to problems in water engineering and infrastructure such as water management and treatment or highway design are covered.

In **EG6023** Business Management and Group Project module students are taught about various key aspects of project planning and management before engaging in a group project based in the aerospace field and drawing on knowledge and experience gained previously. It will consist of substantial Project-Based Learning (PjBL) driven by the students with supervisor/facilitators encourage professionalism and leadership in a group activity support. 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. The module encourages professionalism and leadership in a collaborative group setting in which sustainability and ethicsare embeddedwithin the project context.

**CE6014** the 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 programme to achieve agreed deliverables. It enables students to develop their research skills using and applying information from the technical literature

The programme is designed to meet the requirements of the **three threads** as required by the Annexes of the JBM Guidelines; Annex B – Design, Annex C – Sustainability, Annex D – Health and Safety Risk Management as follows:

**Design (Annex B)** is a common thread throughout the whole of the programme integrating theory, analysis and design. The students start with conceptual design by using sketch books (issued during induction) and make/break model structures. As well as their developing their flair and imagination at level 4, they obtain technical skills at levels 5 and 6 (structural design of elements / frames using various materials) and integrate their knowledge with conceptual / detailed design both individually and in teams in the final year. The importance of interdisciplinary factors on the design process is emphasised throughout. Staff put worked examples or tutorial work ‘in context’, by describing typical case histories or scenarios into which the problem could fit. Any interdisciplinary factors, environmental and safety issues can thus be highlighted. Field visits are usually made to sites where staff leading the visits has been involved through practice, consultancy or research, so that briefings to students contain much practical experience.

The design process is introduced level 4 to give students the basic principles and tools to enable them to embark upon a design, giving them the confidence to 'have a go' for themselves. There is also a hands-on 'Design and Make' project at this level; such as the bridge building competition and a platform. This is further enhanced at level 5 where lectures on conceptual and detailed design are followed by tutorials and group work using various materials e.g. steel, concrete, timber and masonry. The culmination of the design work is materialised at level 6 where students work in small groups and individually and are required to take into account all aspects of the project, including financial, technical, planning, environmental, construction and safety. The Industrial Advisory Board and other industrial contacts assist in the preparation of the design brief, giving specialist expert lectures and seminars about design and in the provision of advice and constructive criticism to the student groups. In recent years themes are designed to encourage ingenuity, imagination and inventiveness, and also to develop students’ skills in critical evaluation of their own and others’ work.

Various aspects of communication skills are also assessed. These include report writing, engineering drawings (hand drawn sketches and CAD), records of group meetings and especially oral presentation of the final scheme design to peers and academic staff. The students are required to submit an individual assignment on a set topic chosen by the teaching team. The topic is chosen with a view to challenging the students' powers of argument, evaluation and critical thinking.

Students are required to attend at least two professional body meetings - full details of various national/regional Institution meetings/lectures/seminars are provided to the students. Kingston is well placed for this activity and the Surrey Branch of the IStructE regularly uses Kingston University as a meeting venue. Students are required to write a report on one of the meetings attended. This activity reinforces and encourages student membership of Professional Engineering Institutions. Special attention is drawn to meetings which have direct relevance to the design topic.

**Sustainability (Annex C)** is a thread that runs through all modules of the undergraduate programmes from induction to the final project, group design and final examinations; sustainability may be considered thoroughly embedded in the student’s degree studies. There are a number of sustainability-driven modules (e.g. CE4011, CE5011 and CE6012) where sustainable development and environmental concerns are explicit, but sustainability is also included in all core modules on structures, materials, geotechnics, hydraulics and construction. Students are made aware of the implications of climate change, the low-carbon agenda, environmental, economic and social issues and their increasing influence on construction; students are encouraged to think in broader terms than merely finding a technical design solution. The programmes were designed so that sustainability is pervasive in the curriculum.

**Health and Safety Risk Management (Annex D)** forms a key theme running from day 1 of the induction week to the end of the courses. It is emphasised in relation to laboratory work, site visits and residential field courses, as well as forming a specific part of management teaching. Considerations of health and safety form part of the key planning of any design and all students become familiar with the Construction Design and Management (CDM) Regulations and Risk Assessments for Safety. It is recognised that health and safety risk is part of construction risk management, and learning outcomes relating to risk and safety are included in several modules throughout the programme. To emphasise the importance of risk management, students gain experience of carrying out a Risk Assessment, which is assessed, at level 4 during the first teaching block in the labs. The theme of construction risk continues at level 5 with EG5014 and level 6 with EG6023. The content is reviewed and updated regularly and the department continues to actively seek new ways to present this subject.

**Inclusive Teaching Practice**

The university is strongly committed to the Inclusive Curriculum. Students will be encouraged to see themselves as belonging to a professional community. A set of employability criteria will be identified using insight from employers and the Employability Team. Skills will be identified that employers think are needed from graduates using alumni or the Professional Engineering Institutions. This involves the support from DARE (Development, Alumni Relations and Events department) to identify alumni who have graduated at least a year ago. Each module will be examined to determine the opportunity to embed employability into the curriculum. Academic staff and members of the employability team will identify appropriate provision in the Centre for Graduate Excellence and, where necessary, tailored opportunities to bridge any gaps. Personal Tutors will enhance student engagement with these opportunities. Learning and teaching staff will highlight opportunities within their sessions that enable students to acquire the employability skills. Students will develop a CPD record in VLE to draw upon in applications and interviews. Personal Tutors include employability criteria and reflective questions in first meeting and record on system.

Staff Student Consultative Committees and Boards of Study provide opportunities for 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, various **methods of teaching and learning** are used throughout, but not exclusively, as follows:

*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 the University’s virtual learning environment. The School’s academics are 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 design problems and in discussing lecture material. In many modules the tutorials and lectures will be integrated as described above.

*Design workshops*

Workshops may be staff-led or student-led where students participate in group design work emphasising the need for effective oral communication and planning. Design classes, case studies and workshops often integrate material from different academic areas and would include a practical real-world emphasis. Three dimensional model building also forms part of these sessions where students are expected to produce a physical model of their planned designs e.g. a bridge, a platform or building.

*Practical sessions*

Practical sessions in the laboratories are designed to enable students to acquire practical and analytical skills through the application of theory. Sessions are run throughout the course utilising the full range of laboratories: hydraulic, geotechnical, structural and materials. Each session includes some form of data collection, analysis, presentation and reporting. Practical work will generally be carried out in small groups where students are encouraged to cooperate and assist their fellow students. The outcome of the practical work is formative assessment or summative assessment based on individual or group reports depending on the nature of the activity. The overarching aim is that a student’s ability in carrying out practical work and producing technical reports will improve throughout the three years of study.

*Technology enhance learning (TEL)*

Computer aided practical sessions are also a fundamental part of the programme, enabling students to apply the design process through practical application and offering another form for communicating ideas. Throughout the three levels of study students are given computer based training in design and analysis of specific real world problems. TEL is also offered during the course through the use of video as a tool for presentation; clickers for immediate formative feedback; wiki/group discussion as an online platform for groups to provide and receive feedback from peers; smart pen and tablet to show step-by-step tutorial questions; computer software for structures and highway engineering.

*Field work and site visits*

Academics are committed to practical fieldwork, encouraging students to acquire fieldwork skills, including health and safety, group coordination and management. This programme includes three residential field excursions, one in engineering surveying (currently held at Sussex University) at the conclusion of level 4 and two associated with geotechnical and hydraulic engineering at level 5 (currently to the Lake District) and level 6 (currently to the Isle of Wight). Site visits are arranged for groups of students whenever possible and are important in understanding the practical application of their academic work, as well as an appreciation of the students’ employability prospects.

*Group work*

Good team-working skills are an essential skill for graduates aspiring to work in the construction industry; hence, teamwork plays an important role in the academic development of a Civil 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. In general group membership is selected by the students and group activities are student-led with staff monitoring progress. Where group work is assessed summatively a peer assessment form is submitted indicating the contribution of each member. This exercise of peer assessment is well recognised as an essential employability skill.

*Individual project*

A fundamental element of level 6 is the individual capstone project allowing students to integrate material from their course 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 oral and written presentation. The expertise of the academic team members and their research activities are commonly utilised by students during this final year project.

**Assessment**

The programme is designed to develop the students’ academic and technical knowledge and understanding, their academic and professional skills, and their personal qualities, and ultimately prepare them for employment. The assessment strategy has been designed in the same way: to develop the students rather than simply assess them to make sure they satisfy learning outcomes. The assessment is designed to be authentic, engaging and transparent that contributes to helping students to learn and develop effective attributes. The assessment tasks focus on the real world-engineering activities that enhance students’ employability.

Assessment and feedback are regarded as integral parts of learning and teaching strategy and incorporated in all modules. 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 ample formative opportunities that allow students to improve their performance, following feedback, in preparation for summative assessment. For example, a number of modules utilise a portfolio of work where typically short pieces of work are required, but final grades selected from the best. The development of skills is threaded through the programme and assessed both formatively and summatively. A wide range of assessment methods is used to ensure that students with diverse backgrounds are not disadvantaged for example individual coursework and project themes are selected to fit individual backgrounds. The methods of assessment have been selected so as to be most appropriate for the nature of the subject area, teaching style and learning outcomes in each module and priority is given to authentic assessments based on real world engineering challenges

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 programme 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
* Posters: The group project is presented in posters to and assessed by academic staff as well as members of the industrial advisory board.
* Model building: in the first year, where students make a structure with little wooden sticks and tape e.g. a small bridge and load it to breaking point.
* Short in-class tests and on-line assessments: throughout a number of modules.

At the beginning of each academic year deadlines for submission and feedback are planned carefully and a full **assessment timeline calendar** is constructed to ensure that there is no summative assessment bunching and thus student workloads are managed. In addition, this calendar offers a synchronised and coherent delivery of the programme that is clearly understood by staff and students who can appreciate the integrated nature of their learning emanating from various module assessments.

**Employability/Placement**

Initially students are guided towards learning about employability skills and career pathways, but as they move through the programme 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 PTS section of programme specification below) 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, 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 support
* **Faculty Student Support and Engagement Officers** provide additional pastoral and practical advice and support, especially to students encountering difficulties
* A dedicated **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.
* **Virtual Learning Environment** – a versatile on-line interactive intranet and learning environment accessible both at the university and remotely. Canvas, the University’s virtual learning environment, is used extensively in all modules as a communication tool and means of dissemination of learning and reference materials, formative worksheets, assignments, links, videos and lecturer-annotated slides. In this way it acts as a dynamic study guide in each module and going further it provides a structured learning space to support students for independent study, facilitate discussion, and in addition, for formative and summative tests and surveys.
* A **Staff Student Consultative Committee with student Course Representatives** for each level
* **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.
* **Union of Kingston Students**
* **An Academic Team** that seeks to maintain an open door policy in the spirit of supporting students.

**Personal Tutor Scheme (PTS) and Work Place Mentoring Scheme (WPMS) 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 is embedded within the modular provision of the BEng Programme.

**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 teaching block one a change of PT is likely to occur to allow comprehensive support through the programme.

**Assessment**

The PTS is embedded in core curriculum modules at each level of undergraduate study:

Level 4 – EG4010 Engineering Design and Professional Practice

Level 5 – EG5014 Project Engineering and Management

Level 6 – EG6023 Business Management and Group Project

There are specific aims and outcomes for each level that will be assessed, as the PTS is a progressive and cumulative scheme building on the skills developed in previous levels. Formative assessment will be provided in the form of regular feedback during meetings when the student will be able to put forward draft assignments for evaluation. The summative assessment will comprise 30 credits at each level.

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

**Embedded Module: EG4010 Engineering Design and Professional Practice**

|  |  |
| --- | --- |
| **Learning Outcome:** | **Assessment** |
| To assist students in making the transition to Higher Education and to generate a sense of belonging to the School of Engineering | Formative (one to one meetings) |
| To help students’ to develop good academic habits and to gain the confidence to operate successfully in a university context | Formative and Summative  (one-to-one meetings, plus three concise exercises covering email etiquette, report writing and graphic analysis) |
| To prepare students to make the most of feedback throughout their course | Formative (one-to-one 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

**Embedded Module: EG5014 Project Engineering and Management**

|  |  |
| --- | --- |
| **Learning Outcome:** | **Assessment** |
| To help students comprehend and plan for the academic demands of level 5 and to support increasing independence | Formative (one-to-one meetings) |
| To encourage students to look forward, to take up opportunities to develop wider skills and to take responsibility for their personal development | Formative and Summative  (one-to-one meetings and preparation of a dissertation proposal for level 6) |
| To foster students’ ability to build on, and respond proactively to the feedback they have received | Formative (one-to-one meetings) |
| To assist students in reflecting on the skills that they are developing and consider how they relate to employability | Formative and Summative  (one-to-one meetings and preparation of a Curriculum Vitae) |

**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

**Embedded Module: ~~C~~EG6023** Business Management and Group Project

|  |  |
| --- | --- |
| **Outcome:** | **Assessment** |
| To support students with the planning necessary to maximise success in their final undergraduate year | Formative (one to one meetings) |
| 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 | Formative and Summative  (one to one meetings, along with the preparation and oral presentation of their Individual Project) |
| 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 | Formative (one to one meetings) |

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

Quality is also assured by the requirement for professional body (JBM) 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 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 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 produce quarterly reports on their placement and are supported throughout the period by their personal tutor, who will visit them at their place of work on at least one occasion. The personal tutor will discuss progress with the student and employer and will recommend any improvements to the learning opportunities, if appropriate. Students fulfilling the requirements for an Industrial Placement will be awarded a BEng (Hons) Sandwich Degree on the completion of level 6.

This programme has been designed to fulfil the core curriculum requirements (with further learning) for Chartered Engineer (CEng) status. Most graduates will aspire to careers in the engineering/construction industry and to becoming Chartered Engineers. Graduates develop careers in all branches of the Civil Engineering industry, in the UK and throughout the world; as contractors and consulting engineers, and within local authorities, water authorities, 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 this 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 Civil Engineering and related specialist areas or other fields before continuing their career in industry or research.

Professional practice is embedded into the curriculum and ensures that the curriculum is industry driven, the students are industry ready and academic staff are engaged in professional practice of their discipline. Professional practice 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 through all other modules at levels 5 and 6, especially in **EG5014** Project Engineering and Management, **EG6023** Business Management and Group Project and **CE6014** Individual project.

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

**Compensation**

Compensation is not permitted, to meet PSRB requirements, for the following modules:

CE6014 Individual Project

EG6023 Group Design Project

**Reassessment of Level 6 modules**

Reassessment of CE6014 or EG6023, will normally be by repeat only with a new project brief unless the student have 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.ice.org.uk/](http://www.ice.org.uk/)

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

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

[www.ciht.org.uk/](http://www.ciht.org.uk/)

Professional accreditation:

[www.jbm.org.uk/](http://www.jbm.org.uk/)

School Website:

www.sec.kingston.ac.uk/about-SEC/schools/civil-engineering/

**See Appendix A for:**

* **Learning Outcomes for Accreditation**: EC UK-SPEC: Engineering Council UK Standard for Professional Engineering Competence - Specific Learning Outcomes in Engineering

**Development of Programme Learning Outcomes in Modules**

This map identifies where the programme learning outcomes are summatively assessed across the modules for this programme. 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, personal and professional development as the programme progresses and a checklist for quality assurance purposes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module code** | | **Level 4** | | | | **Level 5** | | | | **Level 6** | | | |
| CE4013 | EG4012 | CE4011 | EG4014 | CE5011 | CE5012 | CE5013 | EG5014 | CE6011 | CE6012 | EG6014 |
| **Knowledge & Understanding** | A1 | S |  | S | S | S | S | S |  | S | F | S |
| A2 |  | S |  | SF | F |  |  |  | S | S | S |
| A3 |  |  |  | F |  |  |  | S | S | F | S |
| A4 | F |  |  | S | S | F | F | S | S | F | S |
| A5 | S |  | F | S | S |  | S | S | S |  | S |
| A6 | S |  |  | S | S | S |  | S | S | S | S |
| **Intellectual Skills** | B1 | S | S | S |  | S | S | S |  | S | F | F |
| B2 | S | S | S |  | S | F | S | F | S | F | F |
| B3 | F |  | F | F | F | F | S | F | S | S | S |
| B4 |  |  |  | F | F | F |  | S | F | S | F |
| B5 | F |  | F | F | F |  |  | F | F | S | S |
| B6 |  |  | S | F |  |  | FS | F | FS | F | F |
| **Practical Skills** | C1 | S |  | S | S | S | S | S |  | S | F | F |
| C2 |  |  |  | F | S | S |  |  | S |  | F |
| C3 | F |  | F | F | F | S | S |  | F | F | F |
| C4 | F | S | F | F | S | S | S | S | S | F | S |
| C5 | F |  | F | F | F | F | S | S | S | F | S |

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

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

**APPENDIX A**

**Mapping of Learning Outcomes for Accreditation by the Joint Board of Moderators (PSRB)**

**To comply with the Engineering Council’s Accreditation of Higher Education Programmes (AHEP 2014): UK Standard for Professional Engineering Competence (UKSPEC) - Specific Learning Outcomes in Engineering as incorporated in the Quality Assurance Agency Subject Benchmark Statement – Engineering (QAA 2015).**

**Output Standards for a Bachelors (Honours) Degree accredited as partially meeting the educational requirement for CEng**

**(Further Learning to Masters Level will be required)**

Graduates from accredited programmes must achieve the following six learning outcomes, defined by broad areas of learning. The weighting given to these different broad areas of learning will vary according to the nature and aims of each programme.

**Science and Mathematics**

Engineering is underpinned by science and mathematics, and other associated disciplines, as defined by the relevant professional engineering institution(s). Graduates will need the following knowledge, understanding and abilities:

SM1b Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies Knowledge and understanding of mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems;

SM2b Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems

SM3b Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.

**Engineering Analysis**

Engineering analysis involves the application of engineering concepts and tools to the solution of engineering problems. Graduates will need:

EA1b Understanding of engineering principles and the ability to apply them to analyse key engineering processes

EA2 Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques

EA3b Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action

EA4 Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.

**Design**

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

D1 Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics;

D2 Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards

D3b Work with information that may be incomplete or uncertain and quantify the effect of this on the design

D4 Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal

D5 Plan and manage the design process, including cost drivers, and evaluate outcomes

D6 Communicate their work to technical and non-technical audiences.

**Economic, legal, social, ethical and environmental context**

Engineering activity can have impacts on the environment, on commerce, on society and on individuals. Graduates therefore need the skills to manage their activities and to be aware of the various legal and ethical constraints under which they are expected to operate, including:

EL1 Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct;

EL2 Knowledge and understanding of the commercial, economic and social context of engineering processes;

EL3b Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives;

EL4 Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate;

EL5b Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues

EL6b Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, and of risk assessment and risk management techniques.

**Engineering Practice**

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

P1 Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc.);

P2b Knowledge of characteristics of particular materials, equipment, processes, or products;

P3 Ability to apply relevant practical and laboratory skills;

P4 Understanding of the use of technical literature and other information sources;

P5 Knowledge of relevant legal and contractual issues;

P6 Understanding of appropriate codes of practice and industry standards;

P7 Awareness of quality issues and their application to continuous improvement;

P8 Ability to work with technical uncertainty

P11b Understanding of, and the ability to work in, different roles within an engineering team.

**Additional General Skills**

Graduates must have developed transferable skills, additional to those set out in the other learning outcomes that will be of value in a wide range of situations, including the ability to:

G1 Ability to apply their skills in problem solving, communication, working with others, information retrieval, and the effective use of general IT facilities

G2 Plan self-learning and improve performance, as the foundation for lifelong learning/CPD

G3 Plan and carry out a personal programme of work, adjusting where appropriate

G4 Exercise initiative and personal responsibility, which may be as a team member or leader

This map identifies where the JBM Degree learning outcomes cross-reference to modules across the field.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module code** | | **Level 4** | | | | **Level 5** | | | | **Level 6** | | | |
| EG4010 | CE4013 | EG4012 | CE4011 | CE5011 | CE5012 | CE5013 | EG5014 | CE6011 | CE6012 | CE6014 | EG6023 |
| **Science and Mathematics** | SM1b |  | Y |  | Y | Y |  | Y |  | Y | Y | Y | Y |
| SM2b |  | Y | Y | Y | Y | Y | Y |  | Y | Y | Y | Y |
| SM3b | Y |  |  | Y |  |  | Y | Y |  |  |  | Y |
| **Engineering Analysis** | EA1b | Y | Y |  | Y | Y | Y | Y |  | Y | Y | Y | Y |
| EA2 | Y | Y | Y |  | Y | Y | Y | Y | Y | Y | Y | Y |
| EA3b |  |  | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| EA4b | Y |  |  |  | Y | Y |  |  | Y | Y | Y | Y |
| **Design** | D1 | Y |  |  |  |  |  |  | Y |  | Y |  | Y |
| D2 | Y |  |  |  | Y | Y | Y | Y | Y | Y | Y | Y |
| D3b | Y |  | Y |  | Y |  | Y | Y | Y | Y | Y | Y |
| D4 |  |  |  |  |  |  |  |  | Y | Y | Y | Y |
| D5 | Y |  |  |  |  |  |  |  |  |  |  | Y |
| D6 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| **Economic, Legal, Social, Ethical and Env’ Context** | EL1 | Y |  |  |  |  |  |  | Y |  |  | Y | Y |
| EL2 |  |  |  |  |  |  |  | Y |  |  | Y | Y |
| EL3b |  |  |  |  |  |  |  | Y |  |  |  | Y |
| EL4 | Y | Y |  |  | Y |  | Y |  | Y | Y |  | Y |
| EL5b | Y |  |  |  |  |  |  | Y |  | Y | Y | Y |
| EL6b | Y |  |  |  | Y | Y | Y | Y | Y | Y | Y | Y |
| **Engineering Practice** | P1 | Y | Y |  | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| P2b |  | Y |  | Y | Y | Y | Y |  | Y | Y | Y | Y |
| P3 | Y | Y |  | Y | Y | Y | Y |  | Y | Y |  | Y |
| P4 | Y | Y | Y | Y | Y |  | Y | Y | Y | Y | Y | Y |
| P5 |  |  |  |  |  |  |  | Y |  | Y |  | Y |
| P6 |  |  |  |  | Y | Y | Y |  | Y | Y | Y | Y |
| P7 |  |  |  |  |  | Y | Y | Y | Y | Y | Y | Y |
| P8 | Y |  | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| P11b | Y | Y |  | Y | Y | Y | Y | Y | Y | Y |  | Y |
| **Additional General Skills** | G1 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| G2 | Y |  |  |  |  |  |  | Y |  |  | Y | Y |
| G3b | Y |  | Y |  |  |  | Y | Y | Y |  | Y | Y |
| G4 | Y | Y |  | Y | Y | Y | Y | Y | Y | Y |  | Y |

**Technical Annex**

|  |  |
| --- | --- |
| **Final Award(s):** | BEng (Hons) Civil and Infrastructure Engineering |
| **Intermediate Award(s):** | Certificate of Higher Education in Civil and Infrastructure Engineering  Diploma of Higher Education in Civil and Infrastructure Engineering  Ordinary Degree in Civil and Infrastructure Engineering |
| **Minimum period of registration:** | FT – 3 years SW – 4 years PT – 4 to 6 years |
| **Maximum period of registration:** | FT – 6 years SW –8 years PT – 8 to12 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:** | Science, Engineering and Computing |
| **School:** | Natural and Built Environments |
| **Department:** | Civil Engineering |
| **JACS code:** | H200 |
|  |  |
| **UCAS Code:** | H210 (3 year full-time) H211 (4 year sandwich) |
| **Course Code:** | UFCIE1CIE20 - BEng Hons Civil & Infrastructure Engineering  UPCIE1CIE30 - BEng Hons Civil Engineering & Infrastructure Engineering  USCIE1CIE40 - BEng Hons Civil Engineering & Infrastructure Engineering with Placement  UFCIE1CIE50 - BEng Hons Civil Engineering & Infrastructure Engineering with Foundation |
| **Route Code:** | UFCIE1CIE20 - BEng Hons Civil & Infrastructure Engineering  UPCIE1CIE30 - BEng Hons Civil Engineering & Infrastructure Engineering  USCIE1CIE40 - BEng Hons Civil Engineering & Infrastructure Engineering with Placement  UFCIE1CIE50 - BEng Hons Civil Engineering & Infrastructure Engineering with Foundation |
|  |  |