The University Of Sheffield.

Programme Specification

A statement of the knowledge, understanding and skills that underpin a taught programme of study leading to an award from
The University of Sheffield

Programme Details

1. Programme title	General Engineering with an Industrial Placement Year
2. Programme code	GEEU25, GEEU27, GEEU29, GEEU31, GEEU33, GEEU35, GEEU37, GEEU39, GEEU41, GEEU43, GEEU45
3. QAA FHEQ level	6
4. Faculty	Engineering
5. Department	Engineering Interdisciplinary Programmes
6. Other departments providing credit bearing modules for the programme	Automatic Control and Systems Engineering Civil and Structural Engineering Chemical and Biological Engineering Computer Science Electrical and Electronic Engineering Management School Materials Science and Engineering School of Mathematics Mechanical Engineering
7. Accrediting Professional or Statutory Body	This programme is seeking accreditation by numerous professional engineering institutions as appropriate for the different exit routes. Details will be added after the accreditation visit in 2021.
8. Date of production/revision	5 January 2022, March 2023

Awards	Type of award	Duration
9. Final award	BEng	4 years
10. Intermediate awards		

Programme Codes

11. JACS code(s) *Select between one and three codes from the HESA website.*	H100		
12. HECoS code(s) *Select between one and three codes from the HECoS vocabulary.*	100184		

Programme Delivery

13. Mode of study	Full-time
14. Mode of delivery	Lectures, tutorials, labs.

15. Background to the programme and subject area

BEng General Engineering with an Industrial Placement Year at Sheffield is distinctive in that not only do students study all the main engineering disciplines for two years: mechanical, electrical, systems and control, materials, chemical, civil and computing, but also they do this to sufficient depth and breadth such that in their final years they can choose to join students in any of the seven partner engineering departments in the Faculty and specialise. As such the graduates have substantial multi-disciplinary skills which are valued in the modern workplace. Moreover, to reinforce this, the programme has a significant focus on multi-disciplinary problem solving.

Throughout the degree, there are opportunities to participate in industrial seminars and visits, and to undertake research into real-life problems. All our students also take The University of Sheffield's week long activities "Global Engineering Challenge", and “Engineering You’re Hired” where teams of students work to solve engineering problems in developing countries and develop the transferable and business acumen skills needed for employment.

16. Programme aims

BEng General Engineering with an Industrial Placement Year aims to:	
A1	Provide teaching that is informed and invigorated by the research and scholarship of staff and embeds the benefits of student-centred learning.
A2	Provide a broad knowledge and understanding of engineering, together with a more detailed and critical understanding in selected areas of study drawn from departments across the Faculty.
A3	Develop in students independence of thought, intellectual curiosity, ethical awareness and the business skills necessary for a professional in engineering or a related field.
A4	Develop in students a diverse range of subject-specific and generic skills appropriate to graduate employment both within and outside engineering.
A5	Enable students to maximise their potential and imparting in them a commitment to life-long learning.
A6	Satisfy the academic and practical requirements towards the award of Chartered Engineer status by meeting the latest accreditation requirements of the Engineering Council UK-SPEC (UK Standard for Professional Engineering Competence).
A7	Develop a systematic and creative approach to solving complex problems including deciding on and evaluating appropriate methodologies and taking account of a wide range factors and uncertainty.

17. Programme learning outcomes

Knowledge and understanding

On successful completion of the programme, students will be able to demonstrate knowledge and understanding of:

		Links to Aim(s)
K1	Scientific principles and methodologies that underpin engineering.	1, 2, 4, 7
K2	Mathematics, both discrete and continuous, and statistical methods relevant to engineering and computing.	1, 2, 4

K3	Analytical and design methods used in engineering.	1, 2, 4, 7
K4	Risk issues, including health & safety, environmental and commercial risk, and risk assessment and management techniques.	1, 3, 5, 6
K5	The commercial, economic, social, legal and environmental context of engineering.	1, 3, 6
K6	Management techniques and the application of these in engineering.	2, 3, 4, 6
K7	Professional codes of conduct, how ethical dilemmas can arise and the need for professional and ethical conduct in engineering.	1, 3, 4, 6
K8	Specialist knowledge relevant to the subdiscipline followed in Year 3.	1, 2, 4, 7

Skills and other attributes On successful completion of the programme, students will be able to:		
S1	use engineering science, mathematics and information technology to analyse engineering problems.	1, 2, 4, 7
S2	demonstrate skills in the acquisition, use and critical evaluation of experimental and other subject-related information.	1, 2, 4, 7
S3	produce designs in a professional manner, both individually and in a collaborative team, taking account of technical, environmental, ethical and commercial considerations.	1, 2, 3, 4, 6
S4	display creativity and innovation in solving unfamiliar problems.	1, 2, 4, 7
S5	exercise independent thought and judgement.	1, 2, 3, 5, 7
S6	conduct a technical investigation.	1, 2, 4
S7	design and conduct experimental investigations, and analyse and report the results.	1, 3, 4, 5, 6
S8	prepare technical sketches and drawings, using hand or computer methods as appropriate.	1, 2, 4
S9	use appropriate computer aids for analysis and design in order to solve engineering problems.	1, 2, 4
S10	prepare technical reports and presentations, and convey essential information using a variety of media.	3, 4, 6
S11	communicate at a professional level, orally, in writing and through visual presentations.	3, 4, 6
S12	work in collaboration with others and manage both group projects and their own time effectively.	4, 6
S13	find information and learn independently.	1, 3, 4, 5, 6
S14	demonstrate that they have completed the practical engineering applications necessary towards becoming a Chartered Engineer in their chosen discipline.	1, 2, 3, 4, 5, 6, 7

18. Learning and teaching methods

Lectures are formal presentations to a class of students by a lecturer. The purpose of a lecture is to motivate interest in a subject, to convey the core concepts and information content succinctly and to point students towards further sources of information. Lectures are interactive and students are encouraged to ask questions at suitable points. Students are expected to take notes during lectures, adding detail to published course materials. The learning outcomes *K1-K3* are supported mainly through this mode although K4-8 are also covered.

The transition to self-motivated learning is encouraged through provision of teaching materials such as lecture handouts or copies of lecture slides, supplied via MOLE. Set course texts and background

materials are available through the University libraries, at bookshops and also via the Internet. Active learning is fostered and promoted through engagement in practical work, such as exercises, assignments and projects.

Computer laboratories are sessions supervised by teaching assistants (under the direction of the responsible lecturer) in which students work at a computer, to develop a specific practical skill, such as familiarisation, computer programming, or the use of a software engineering or mathematical modelling tool (notably learning outcome *S9 although aspects will cover S1-10, S12-13*).

Problem-solving classes are sessions conducted by a lecturer with a class of students, in which exercises are completed interactively and solutions are provided within the period. The purpose of such a class is to help students engage with, and assimilate the material presented in lectures and start to apply this knowledge. The learning outcomes *K1-K3,K8* are supported through this mode.

Exercises are short tasks, either writing computer programs or working out solutions to other kinds of set problem, which are typically reviewed at the end of the session (learning outcomes *S1-S8 and to some extent S9-13*).

Assignments are typically offered in stages over a number of weeks, involving the design and implementation of a software system to perform a given task, or the researching of a body of information leading to the writing of a discursive essay on a given topic. All learning outcomes are supported by this.

Laboratory Classes introduce experimental methods and provide opportunity for developing team-working and communication skills (e.g. S4-12).

Design Classes enable students to work on 'open-ended' and often ill-defined problems related to real engineering situations. They also provide good opportunities for developing team-working and communication skills as well as individual skills. All learning outcomes may be supported by this.

Individual Investigative Project: Is an individual research and/or industrial project at the frontiers of engineering. It is completed under the supervision of a member of academic staff and provides an excellent opportunity for a student to pull together every aspect of their development during the degree. All learning outcomes are supported by this.

Industrial Placement: will provide students the opportunity to develop their technical knowledge and understanding and wider skills in an industrial setting. Students will learn from a professional mentor and other employees. This is particularly relevant to S14, although all learning outcomes are supported by this.

19. Assessment and feedback methods

Written Examinations are typically 2 hours in duration; many modules use this as the only or major assessment method.

Coursework Assignments, Oral and Poster Presentations are widely used in design studies, computational exercises, laboratory reports, essays or other work designed to assess the understanding of the module. Assignments are mainly undertaken on an individual basis but are sometimes carried out in small groups. Some assignments use oral and poster presentations in order to assess the development of presentation and communication skills. Some modules use coursework assignments as the only or main method of assessment whilst others have this as a minor part with a written examination forming the major part of the overall assessment.

Class Tests and online tests are small tests conducted during the main teaching periods to assess progress and understanding; they supplement more formal examinations.

An Individual Investigative Project is assessed on the student's commitment and progress throughout the project, a written report and an oral presentation to staff.

Placement journal and report will be used to assess the performance of the student on the Year in Industry placement. These will assess the student's reflection on their work experience, understanding of the company and their contributions during the placement.

Self/Peer assessment is used in some modules to assess individual contributions during group work. Students peer assess each other using well defined methodologies. The lecturer will oversee this process and moderate peer assessment as appropriate.

PLA: The issue not covered in the above is PLA. The IPO takes the view that PLA will be managed initially by having year teams discussing and planning the assessment profile together. In the longer term there is interest in looking at how we can have cross modular assessments to reduce the overall assessment load and at the same time provide cross modular assessment of learning.

Feedback: is very individual to the assignment, the tutor and the student. It comes in a variety of forms from the most basic of annotations on student work but more often a formal feedback sheet with precise marking criteria and comments. Sometimes the feedback will be verbal as in a conversation with the module leader or personal tutor, sometimes it could be replies to discussions on MOLE and other times it could just be right and wrong as for example may occur on a MOLEquiz. Peer assessment and in-class tests are also opportunities for students to get feedback which is also formative. The most important feedback is that which is self generated by the students using the resources and tools provided and supported by self reflection.

20. Programme structure and student development

The degree structure is modular. At each level students study modules totalling 120 credits. Most modules are 15 credits but some specialist modules in Year 4 may be less, and the individual investigative project is 30 credits.

During the first two years, the syllabus is unique to this programme although some modules may also be taken with engineering students on other programmes in the Faculty of Engineering. In Year 1 all modules are core (compulsory). Students undertake 'Engineering Applications' which covers basic manufacturing processes and workshop tools, and is a requirement for accreditation, as well as a short course in engineering drawing and computer-aided design. Students also participate in a compulsory week-long 'Global Engineering Challenge'. Based on the Engineers without Borders Challenge (a national competition for engineering undergraduates), this gives all first-year engineering students at the University the opportunity to work together in teams to tackle a real-world problem with a global perspective. Formal credits are not awarded for participation in the Challenge Week; however, it is vital for developing the technical competence, understanding of global context and the professional skills that are the hallmark of an excellent engineer.

In Year 2, 120 credits are taken by all students. Students also take part in a compulsory week-long project called 'Engineering – You're Hired'. Working again with students from other engineering disciplines, this project enables them to put their skills in collaborative working into practice to solve a technical case-study. Formal credits are not awarded for participation in the project week; however, it enables students to develop and demonstrate many of the key general skills required by employers, including entrepreneurial problem solving, accomplished communication, and cultural agility.

At the end of year 2 students can transfer onto the MEng, should their performance meet the progression requirement for that programme.

At the end of Year 2 students can stay on the "general" programme or transfer onto Year 3 of one of the following programmes:

Energy and Sustainability

Aerospace Engineering

Medical Technologies

Chemical and Biological Engineering

Civil Engineering

Electrical & Electronic Engineering

Materials Science & Engineering

Mechanical Engineering

Software Engineering

Systems & Control Engineering

In Year 3 students will spend a Year in Industry.

In Year 4 a significant part of the year is spent on an individual investigative project, which allows students to specialise in their particular area of interest. The project is supervised by an academic member of staff from the engineering department appropriate to the research topic.

The weightings of each year towards the overall classification of the degree are:

Year 1	0
Year 2	33.3%
Year 3	0
Year 4	66.7%

Student Development:

Year 1: Students will consolidate their mathematical and scientific knowledge and be introduced to the fundamentals of engineering. They will undertake laboratory work and will learn to evaluate and interpret data, and present the results in a clear and reliable manner. They will also undertake design and problem-solving activities, both individually and in small groups, which require conceptual thinking, simple analysis, logical thought, judgment and the clear presentation of their ideas, and which will develop their awareness of the global dimension to many real-life engineering problems. They will develop their independent learning and team-working skills. Students will gain laboratory experience after which they will have knowledge of the use of basic materials processing and testing equipment, and of simple manufacturing methods. A short course in engineering drawing and computer-aided design will enable them to present and understand engineering manual and computer generated drawings prepared to industry standard conventions. Through Personal Tutorials students will develop professional skills, including professional conduct, the avoidance of unfair means, and how to prepare and deliver oral and written presentations.

Year 2: Students will continue the core studies introduced in Year 1 and will develop a more extensive knowledge and understanding of the broad subject areas of engineering and also in the appropriate areas of mathematics. They will be applying these to more advanced laboratory work and to design activities. They will continue to develop their independent learning and communication skills and their ability to work in teams. Towards the end of Year 2 students will decide which specialist area of engineering they wish to pursue in Year 3.

Year 3 Year in industry: Students taking this option will spend a minimum of 38 weeks in an engineering company between years 2 and 4. They will develop a range of engineering and professional skills in a real company and apply their knowledge and understanding to solving real engineering problems. They will further develop their specialist knowledge and understanding in both technical and wider disciplines appropriate to the company. Students will develop self-reflection, independence, initiative and team working skills in an industrial environment. They will also further develop their communication skills.

Year 4: Students begin to study, in depth, their chosen area of specialisation. At this level they are exposed to engineering management techniques that can be used to enhance the application of their core engineering skills. By this stage they are expected to have become self-motivated, efficient and organised independent learners. Each student undertakes an individual investigative project through which they demonstrate the full range of personal, communication and academic skills they have developed during the degree. The taught modules continue to be appropriate to the student's chosen specialism by taking modules that are at the cutting edge of their discipline.

On successful completion of the programme: Students have obtained the necessary academic qualification and practical engineering applications experience towards becoming an Incorporated Engineer. Full Chartered Engineer status requires appropriate experience working as a graduate engineer and an appropriate master's qualification or equivalent CPD. Students will be well prepared for a career in their chosen field of engineering, or other engineering sectors, as well as a wide range of other graduate careers.

Detailed information about the structure of programmes, regulations concerning assessment and progression and descriptions of individual modules are published in the University Calendar available online at http://www.sheffield.ac.uk/calendar/.

21. Criteria for admission to the programme

Detailed information regarding admission to programmes is available here:
https://www.sheffield.ac.uk/meng-engineering/studywithus/applying

22. Reference points

The learning outcomes have been developed to reflect the following points of reference:

Subject Benchmark Statements
https://www.qaa.ac.uk/quality-code/subject-benchmark-statements

Framework for Higher Education Qualifications (2014)
https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf

University Vision
https://www.sheffield.ac.uk/vision

Learning and Teaching Strategy (2016-21)
https://www.sheffield.ac.uk/polopoly_fs/1.661828!/file/FinalStrategy.pdf

23. Additional information

BEng General Engineering with an Industrial Placement Year at Sheffield has an academic Director of Undergraduate Studies, who is responsible for overseeing the degree, and an administrator who deals with its day-to-day running. They are all available to provide general help and advice on all aspects of the degree and university life. Every student has a Personal Tutor who is an academic member of the staff in one of the engineering departments participating in the degree, and who acts as a professional mentor to guide, help and support the student. This includes advising on module choices, career decisions and providing references. Students see their Personal Tutor every week in the first semester and fortnightly in the second semester of year 1, at least three times a semester in Year 2 and at least once per semester in Year 4.

The University and the Faculty of Engineering place strong emphasis on ensuring graduates have all the attributes necessary for success in their chosen career. Students are assisted in their self-development and continuing professional development through activities embedded throughout the entire degree, including Personal Tutorials, the 'Global Engineering Challenge' and the 'Engineering – You're Hired' project, and via various taught modules. Students benefit from wide ranging individual support and guidance to assist them in securing industrial placements and jobs. This includes Careers events for final and penultimate year, which provide career inspiration and guidance, and enable our students to meet potential employers and to refine their CVs and understanding of how to succeed in the application process. This reinforces the careers support available throughout the degree from the University's Careers Service (http://www.shef.ac.uk/careers/students). This support continues after students have graduated. We maintain strong links with our graduates who provide input into our courses and provide practical help to students in preparing for employment.

This specification represents a concise statement about the main features of the programme and should be considered alongside other sources of information provided by the teaching department(s) and the University. In addition to programme specific information, further information about studying at The University of Sheffield can be accessed via our Student Services web site at http://www.shef.ac.uk/ssid.