



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

1	Programme Title	Structural Engineering
2	Programme Code	CIVT07
3	JACS Code	H210
4	Level of Study	Postgraduate
5a	Final Qualification	Master of Science in Engineering (MSc)
5b	QAA FHEQ Level	Masters
6	Intermediate Qualification(s)	Postgraduate Certificate (PGCert), Postgraduate Diploma (PGDip)
7	Teaching Institution (if not Sheffield)	Not applicable
8	Faculty	Engineering
9	Department	Civil and Structural Engineering
10	Other Department(s) involved in teaching the programme	None
11	Mode(s) of Attendance	Full-time
12	Duration of the Programme	1 year
13	Accrediting Professional or Statutory Body	Joint Board of Moderators (JBM) of the Institution of Civil Engineers (ICE), Institution of Structural Engineers (IStructE), Chartered Institution of Highways & Transportation (CIHT) and Institute of Highway Engineers (IHE), Permanent Way Institution (PWI) http://www.jbm.org.uk/
14	Date of production/revision	March 2015, February 2018, February 2020, November 2023

15. Background to the programme and subject area

Structural Engineering is primarily concerned with the design and construction of buildings and engineering structures that must safely resist the forces they will experience over the design life-span. The work of a Structural Engineer requires that attention also be given to the efficient use of materials, safety and speed of construction, aesthetics, long-term durability and maintenance. World-wide concerns over environmental impact meant that Structural Engineers also need to take into consideration sustainability issues in their design and chosen materials. Buildings and structures must also be capable of withstanding accidental damage, earthquakes, fire and explosions. Rapid developments in analysis, design and construction practice require that Structural Engineers be conversant with a wide range of analysis and design techniques and develop skills that are not routinely available at undergraduate level.

The postgraduate programme in Structural Engineering affords new civil engineering graduates and professional engineers the opportunity to advance their knowledge and skills in specialised areas of Structural Engineering. Although the programmes are ideally suited for those already holding a civil engineering degree, others with an appropriate first degree will also benefit if they wish to diversify into Structural Engineering. All programmes incorporate the study of modules at the forefront of Structural Engineering. Depending on the programme chosen, students will be able to study advanced modules in, for example, Fire Engineering, Computational Structural Analysis, Structural Dynamics, Sustainable Concrete Technology, Blast and Impact and Earthquake Engineering, all of which are taught by academics who are active researchers and leaders in their fields. In the last Research Excellence Framework, 100% of our research was assessed as being 'recognised internationally' with 85% as being 'world leading' or 'internationally excellent'.

Further information about the programmes may be found on the internet at <http://www.shef.ac.uk/civil/pg>

16. Programme aims

The aims of the programmes are to:

1. provide access to Masters' degree programmes to graduates or professionals from a variety of backgrounds.
2. help fulfilment of student potential and engender a commitment to self-improvement and development of personal transferable skills.
3. provide graduate engineers with general, personal, professional and analytical skills, design experience and an advanced understanding of a specialist branch of structural engineering.
4. provide teaching that is informed and invigorated by the research and scholarship of the staff.
5. prepare students for technical leadership in a professional career.
6. compare and contrast the concepts, design and application of technology in the UK, Europe and overseas.
7. enable students to obtain greater knowledge and deeper understanding of one of the following:
 - structural engineering.
 - design and construction of steel structures, including behaviour in fire.
 - design, construction, durability and repair of sustainable concrete structures.
 - earthquake and structural dynamics, and blast and impact effects on structures.

17. Programme learning outcomes

Knowledge and understanding: On successful completion of each programme, MSc and Diploma students will have knowledge and understanding of:

K1	fundamental principles and practice of advanced engineering science relevant to structural engineering.
K2	advanced analytical methods used in structural engineering.
K3	advanced understanding of approaches to design using the latest UK and European codes.
K4	specialist knowledge of modern and innovative construction materials and methods.

In addition to K1-K4, on successful completion of each programme, MSc students will have knowledge and understanding of:

K5	research methods and techniques.
K6	a research topic related to the specific degree programme.

Skills and other attributes: On successful completion of each programme, MSc and Diploma students will be able to:

S1	conceptualise and solve structural engineering problems.
S2	write computer programs to perform analysis of structural engineering problems and make appropriate use of software for analysis and design.
S3	critically review information, synthesise information, interpret data and learn independently.
S4	exercise independent thought and judgement.
S5	work individually and collaboratively.

In addition to S1-S5, on successful completion of each programme, MSc students will be able to:

S6	plan and perform research to investigate a technical problem.
S7	carry out an extended item of individual investigative technical work.
S8	present and orally defend individual investigative technical work.

Students awarded a Postgraduate Certificate will have achieved many of the learning outcomes K1-K4 and S1-S5 but not all, depending on the modules in which they have been awarded credits.

18. Teaching, learning and assessment

Development of the programme learning outcomes is promoted through the following teaching and learning methods:

Lectures – used to transmit information, explain theories and concepts, and illustrate methods of analysis or design. For most lecture programmes, tutorial sheets are provided to enable students to develop their understanding during private study.

Practical classes - students undertake laboratory work, computing and use of software to gain practical skills.

Coursework assignments - generally require students to seek additional information and work on their own, or sometimes in small groups, to develop understanding of subject matter.

Tutorials and example classes - run for the whole class to help students with their understanding and to resolve problems as they work through tutorial sheets.

Design classes - students work to solve design problems related to real engineering situations in order to learn design methods and to practise associated analytical techniques.

Group design projects - teams, typically of 4 or 5 students, tackle a realistic engineering design brief by working through conceptual and detailed design stages. These projects develop a wide range of skills, including team-working and communication skills.

Dissertation – a major research study carried out over the summer. It is supervised by a member of the academic staff but allows the student ample scope to display initiative, originality and creativity.

Opportunities to demonstrate achievement of the programme learning outcomes are provided through the following assessment methods:

Written examinations – typically of 2 or 3 hours duration.

Coursework submissions - these include design studies, laboratory reports, computational assignments and research reports.

Class tests - tests conducted in a lecture theatre or workroom during the main teaching periods to assess progress, as an alternative to more formal assessment methods. Students sometimes submit pre-prepared work on tutorial sheets for assessment.

Oral presentations and interviews – students make individual presentations of their structural group design. The audience includes academic staff and fellow students. An individual interview with two academic staff is held as part of the assessment of the Dissertation.

Group design project reports – written reports assembled by teams of students with shared authorship.

Individual project reports – these include intermediate and final written reports for the Dissertation and other written reports describing individual work on group design projects.

The main teaching, learning and assessment methods adopted for each learning outcome are shown below. In most cases a combination of methods is used.

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LEARNING OUTCOME (abbreviated - see Section 17 for full text)	TEACHING / LEARNING						ASSESSMENT					
	Lectures	Practical classes	Coursework assignments	Tutorials /examples classes	Design classes	Group design projects	Dissertation	Written examinations	Coursework submissions	Oral presentations / interviews	Group design project reports	Individual project reports
K1 Fundamental principles	•			•				•				
K2 Analytical methods	•			•				•				
K3 Design methods	•		•		•	•		•	•	•	•	
K4 Construction methods	•		•					•				
K5 Research methods							•			•		•
K6 Research topic							•			•		•
S1 Solve problems	•							•				
S2 Write/use software for analysis, use lab tests		•										•
S3 Independent learning			•				•		•	•		•
S4 Independent thought/judgement			•				•		•			•
S5 Individual/collaborative working			•			•	•		•		•	•
S6 Plan/perform research							•			•		•
S7 Original technical work							•			•		•
S8 Present and defend work orally							•			•		

19. Reference points

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

Framework for Higher Education Qualifications (2014)

www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf

Master's degree characteristics, Quality Assurance Agency for Higher Education, 2010.

Guidelines for an MSc Programme, Joint Board of Moderators of the Institution of Civil Engineers (ICE), Institution of Structural Engineers (IStructE), Chartered Institution of Highways & Transportation (CIHT) and Institute of Highway Engineers (IHE)

Subject Benchmark Statements

<https://www.qaa.ac.uk/the-quality-code/subject-benchmark-statements/subject-benchmark-statement-engineering>

University Vision and Strategic Plan

<https://www.sheffield.ac.uk/vision>

Education Strategy (2020-27)

<https://www.sheffield.ac.uk/vision/our-pillars/education>

20. Programme structure and regulations

The programme structure is modular and runs full-time for 12 months. Students study 60 credits per semester and, for an MSc, prepare a dissertation worth a further 60 credits. Apart from the dissertation, the programme comprises 15 credit modules taught in each semester. Examination assessment of all modules is carried out during the last three weeks of the semester concerned.

Students choose a dissertation topic and prepare for their dissertation work in the first semester, as part of a module containing a research skills preparation component. Over the summer, MSc students work full-time on a research topic and prepare a dissertation for submission in early September. All students prepare a research paper for presentation at an annual MSc Conference held in the middle of September.

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

21. Student development over the course of study

Autumn Semester modules are designed to first consolidate previous learning and build key skills, e.g. team work and student centred learning before progressing onto more advanced material later in the semester. Spring Semester modules are all at a more advanced level and reflect the specialised nature of the individual programmes.

Once the Autumn semester examination results are available, students are counselled on their performance and made aware of the implications of any shortfalls in performance.

22. Criteria for admission to the programme

Minimum 2:1 UK Honours degree (BEng, MEng, BSc) with a strong background in relevant subjects, or an equivalent international degree qualification in Civil/Structural Engineering or other appropriate engineering/science discipline. We will consider applicants offering appropriate professional qualifications and experience. In this case we require a strong background in areas covered in the chosen course.

Our standard English requirement is IELTS 6.5 (with no marks less than 6.0 in each component) or equivalent.

Detailed information, regarding admission to the various programmes is available at
<http://www.shef.ac.uk/civil/pg>

23. Additional information

Academic staff in the Department of Civil and Structural Engineering are organised into research groups that reflect their specific areas of research activity. The Structures Group is the largest research group in the Department and contains staff whose interests encompass both fundamentals and applications. Work at the fundamental level aims to enhance understanding of the behaviour of structures and materials under a variety of environmental conditions, loadings and accidental actions. At the applied level the group co-operates with industry in extending the limits of structural design, and in developing innovative forms of construction. Researchers make use of a variety of advanced analytical modelling and experimental methods. Masters' students are taught in a research-led environment and the programmes reflect the research strengths of staff in the Structures Group. Current research activities are summarised below:

- Steel-framed and composite structures - developing design methods for safer and more economic construction in steel, on the basis of an understanding of real structural behaviour at ambient temperatures and in fire conditions. The Structural Fire Engineering research group is concerned with the fire resistance behaviour of steel and composite structures. Understanding of structural action in fire has been progressed by analytical studies using numerical modelling software VULCAN, which has been used by leading specialist consultants to support advanced fire engineering design and fire protection strategies for major construction projects.
- Concrete and masonry materials and structures - studying the performance of cementitious, masonry and reinforcing materials, and associated construction techniques, leading to more efficient, durable and sustainable design of reinforced concrete and masonry structures. The Department is host to the Centre for Cement and Concrete, which is the largest concrete academic research centre in the UK. Its international-level experts specialise in cement chemistry, aggregate science, binder technology, concrete technology,

concrete durability, alternative concreting materials, structural performance and design, earthquake and nuclear reactor design and finite element analysis.

- Structural dynamics – covering blast and impact loading, and the vibration response of structures to human excitation. The Department has extensive experimental and analytical facilities, including the CEDUS (Civil Engineering Dynamics at the University of Sheffield) laboratories at Buxton.
- Computational mechanics- research involves developing a deeper understanding of the mechanical behaviour of materials and structures, so that they can be used optimally or manipulated according to specific needs; hence mechanics and design become intertwined.

Further details about the department, research groups, programmes offered and admission procedures can be found on the internet at <http://www.shef.ac.uk/civil>

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>.