

Programme Information		
Programme Title	Programme Code	HECoS Code
Concrete Structures	H2A2 H2A224 H2A236	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MSc – H2A2	1 Calendar Year (12 months)	Full-Time	Annually in October	90	180
MSc – H2A224	2 Calendar Years (24 months)	Part-Time	Annually in October	90	180
MSc – H2A236	3 Calendar Years (36 months)	Part-Time	Annually in October	90	180
PG Certificate	N/A	N/A	N/A	30	60
PG Diploma	N/A	N/A	N/A	60	120

The PG Certificate/PG Diploma are exit awards and are not available for entry. You must apply to and join the MSc. .

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Engineering
Teaching Institution	Imperial College London	Department	Civil and Environmental Engineering
Associateship	Diploma of Imperial College (DIC)	Main Location(s) of Study	South Kensington Campus

External Reference			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Master's Degrees in Engineering		
FHEQ Level	Level 7		
EHEA Level	2nd Cycle		
External Accrator(s) (if applicable)			
External Accrator 1:	Joint Board of Moderators (JBM)		
Accreditation received:	2015	Accreditation renewal:	2026
External Accrator 2:	The Institution of Structural Engineers (IStructE)		

Accreditation received:	2002	Accreditation renewal:	2026
External Accreditor 3:	Institution of Civil Engineers (ICE)		
Accreditation received:	2002	Accreditation renewal:	2026
External Accreditor 4:	Institute of Highway Engineers (IHIE)		
Accreditation received:	2016	Accreditation renewal:	2026
External Accreditor 5:	The Chartered Institute of Highways & Transportation (CIHT)		
Accreditation received:	2016	Accreditation renewal:	2026
External Accreditor 6:	The Permanent Way Institution (PWI)		
Accreditation received:	2021	Accreditation renewal:	2026
Collaborative Provision			
Collaborative partner	Collaboration type	Agreement effective date	Agreement expiry date
N/A	N/A	N/A	N/A
Specification Details			
Programme Lead	Prof Peter J Stafford		
Student cohorts covered by specification	2023-24 entry		
Date of introduction of programme	1946		
Date of programme specification/revision	August 23		

Programme Overview	
<p>The MSc in Concrete Structures programmes are recommended for those who wish either to establish or consolidate their career as a design engineer specialising in concrete structures. These programmes provide advanced training in the design, analysis and assessment of concrete structures including bridges and buildings. These programmes are career-oriented and cover both the theoretical background and practical design considerations. The programmes are suitable for both practicing engineers with several years' experience and recent graduates.</p> <p>The programmes are structured in three parts. The taught component of the programme is delivered in two parts, during the Autumn and Spring terms. In the Autumn term you will acquire core knowledge in the topics of fundamental importance and in the Spring term the programme content is more applied with both core and additional elective choices and shows how your core knowledge can be used to address earthquake engineering challenges and problems. Assessment is by examination and coursework of the content taught during these terms. All teaching takes place at the South Kensington campus. Examinations take place at the beginning of the Spring term and at the beginning of the Summer term. Chosen during the spring term, during the third part of the programme, you will undertake a group conceptual design project (two weeks) and your individual 'design project' (either a detailed design project, or a research dissertation) and you will work on this over a period of 13 weeks, with submission normally at the end of August. The design project is undertaken at College and in some cases in collaboration with industry. The full-time programme is taken over 12 months, with a single entry point per year at the beginning of October. The programme may be taken part-time, either over a period of two or three years.</p> <p>Throughout the programme there are many opportunities for you to work on your own as well as part of a team in group work; experiences which test your communication, leadership and interpersonal skills as well as your</p>	

technical competence, time and project management skills. The programmes are accredited by the Joint Board of Moderators (JBM).

The Concrete Structures programmes benefit from teaching and project supervision delivered by research-leading academics of long-standing, with backgrounds in structural engineering, as well as more general civil engineering. The diversity of background amongst the staff is reflected in the extensive and diverse portfolio of research and the experience many have had in leading roles in national and international research activity, providing advice and guidance to UK and overseas governments and international agencies, and industry.

Graduates from our MSc programmes are equipped to pursue careers in structural engineering design and analysis in industry, the public sector and non-governmental organisations, or engage in PhD research in academic institutions in the UK and abroad. Many of our graduates are head-hunted through our alumni network.

Learning Outcomes

On completion of the MSc Concrete Structures degree programme, you will be able to:

1. Identify suitable theoretical, analytical, or numerical procedures and apply these to a given structural analysis problem
2. Apply appropriate structural analysis approaches and loading protocols to calculate the demands upon structural elements
3. Design and detail structural elements and connections to satisfy multi-objective design criteria
4. Identify appropriate clauses within Eurocode 2 and apply these to the design or assessment of reinforced concrete structures
5. Identify appropriate clauses within Eurocode 2 and apply these to the design or assessment of prestressed concrete structures
6. Describe fundamental properties of concrete materials and specify suitable material characteristics for a given application, whilst taking due consideration for mechanical, economic, and environmental performance
7. Justify the selection of reinforced or prestressed concrete as the optimal structural material for a given application
8. Defend proposals considered within a conceptual design phase and recommend, with justification, an optimal solution
9. Effectively communicate individual and collective views to both team members and an audience within a conceptual design project
10. Conduct a piece of independent research, set out in a project brief, within a defined timeframe and within available resources
11. Interpret state-of-the-art technical and scientific publications related to a research topic and demonstrate a critical attitude towards the results of others as well as your own.
12. Produce, as a written output, either a detailed design project or a research dissertation.

On completion of the Postgraduate Certificate (PG Cert) you will be able to fulfil either the learning outcomes 1-5 (corresponding primarily to the Autumn term modules) or 9-12 (corresponding to the Summer project).

On completion of the Postgraduate Diploma (PG Dip) you will be able to fulfil either the learning outcomes 1-8 (corresponding to the Autumn and Spring term modules) or 1-5 (corresponding primarily to the Autumn term modules) and 9-12 (corresponding to the Summer project).

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: www.imperial.ac.uk/students/academic-support/graduate-attributes

Entry Requirements

Academic Requirement

Normally a minimum requirement is at least a 2:1 UK Bachelor's Degree with Honours in Civil Engineering (or a comparable qualification recognised by the College); other branches of Engineering, Natural

	<p>Sciences, Earth Sciences or other numerate discipline are also considered on an individual basis.</p> <p>Additionally, an A-level in Mathematics at grade B is required.</p> <p>Relevant industrial/professional experience may also be considered.</p> <p>For further information on entry requirements, please go to: www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/</p>
Non-academic Requirements	<p>Relevant industrial/professional experience may also be considered. Special cases, based on relevant experience, may be considered in some circumstances. Such candidates may be invited for interview as part of their application.</p>
English Language Requirement	<p>Standard requirement (PG) Please check for other Accepted English Qualifications</p>
Admissions Test/Interview	<p>Applicants may be invited to interview with one or more members of staff.</p>

The programme's competency standards documents can be found at:
www.imperial.ac.uk/civil-engineering/prospective-students/postgraduate-taught-admissions/competence-standards/

Learning & Teaching Approach

Learning and Teaching Delivery Methods

You will be exposed to a range of teaching methods across the taught modules delivered over the Autumn and Spring terms, with the majority of the contact hours following a traditional lecture, with a follow up tutorial format. Computer laboratory sessions will be held as appropriate. You will also have the opportunity to attend research seminars hosted by the Advanced Structural Engineering 'cluster or section' within the department. Group activities (both formally assessed, and informally conducted) benefit from the diverse international educational and cultural backgrounds of your peers and teaching staff.

Students will experience different learning and teaching delivery methods, many of which will draw from those cited in the College's Educational Development Unit's teaching toolkit, but will most likely include:

- **Lectures:** are typically delivered to the entire class ranging from 2-3h in length as timetabled. Lectures will be delivered as traditional style lectures, flipped classroom, or online learning supported through pre-recorded lectures. Most lectures involve student engagement with questions posed to the class and, in others, a lecturer may include breaks to allow for small-group exercises or discussions to reinforce learning of the recently covered material.
- **Tutorials:** these sessions will involve problem-solving exercises as individuals or as groups, which will allow you to apply the knowledge from the lectures. In many of these tutorial sessions there will be support from the department's group of trained graduate teaching assistants (GTAs) – this will involve you either being assigned a GTA as you work in groups or you may be expected to ask questions of a team of GTAs. Aside from these more formal sessions, you may be set tutorial exercises to aid your learning, and to test your knowledge, which you can work through in your independent study time.
- **Online Quizzes:** these will be deployed in some modules where you will have the opportunity of testing your knowledge through short online exercises and quizzes. These exercises are used as part of formative learning and assessment, where some will be for credit and other just for practice; for you to test your understanding of concepts taught and your ability to build on and apply that knowledge.
- **Computer Sessions:** to train you in programming and the use of specialist software appropriate timetabled sessions will be run from our Computer room facilities. These sessions are often supported by a team of GTAs to assist you in your learning.
- **Group Exercises and Design Projects:** as graduates from these programmes, you will rarely work in isolation, but instead will most likely operate in multi-cultural, international teams and across disciplinary boundaries so the

importance of developing leadership and team-building skills cannot be underestimated. To develop and strengthen these skills throughout the programme there will be opportunities for you to work in groups on pieces of coursework and significantly in the Design Project module. These opportunities will help you hone your skills, as a team player of listening, cooperation, sharing, respect for, and empowerment of team members, and of exercising effective project and time-management. In your Design Project these skills may be further enhanced by working with industry.

- Individual Design Project/Research Project: Imperial College is a world-leading research institution, and our Department is a world-leading Civil and Environmental Engineering research department. In the final part of your degree programme you will have the opportunity to work for a period of up to 13 weeks on an individual design or research project of your choice, supervised by one or more members of our academic staff (and sometimes linked with industry), who are leaders of international renown in their field of research. This will allow you to undertake in-depth research in areas of interest to you, be exposed to state-of-the-art knowledge and develop analytical and communication skills to effectively present your research findings and deliver a design or research output that makes a contribution to knowledge.

Independent learning is supported through the e-learning facilities (Blackboard Learn, VLE) as well as through online assignments and coursework. E-learning approaches are also adopted to conduct peer assessment, record lectures, and engage with interactive content using tools such as Mentimeter.

As part of the learning and teaching delivery you will be encouraged to be creative in the art of communication in both written and oral presentations, and during the programme you will be challenged to produce different types of output for assessment that rely on your communication skills. Some of the formats will be familiar to you, whilst others will be new, but each will add to a portfolio of skills that will benefit you as you graduate from the programmes. These different formats will include:

- Individual and group technical reports
- Slide-based presentations
- Oral presentations
- Programming code
- Summary reports
- Individual research dissertation or detailed design project (with detailed drawings)

Overall Workload

Your overall workload consists of face-to-face sessions and independent learning. While your actual contact hours may vary according to the optional modules you choose to study, the following gives an indication of how much time you will need to allocate to different activities at each level of the programme. At Imperial, each ECTS credit taken equates to an expected total study time of 25 hours. Therefore, the expected total study time is 2250 hours per year.

Typically, in the first two terms you will spend approximately 25% of your time on timetabled activities (lectures, tutorials, computer laboratories), amounting to around 400 hours. The remainder of your time (~75%) will be devoted to independent study and preparation for examinations. Over the Summer term, over the first two weeks you will be engaged in your group conceptual design projects. Thereafter you will 100% involved in independent study (but including regular interactions with you supervisor or project leader). For those undertaking a detailed design project as an alternative to a research project, the first few weeks of the Summer term will include timetabled sessions where multiple students engage with common elements of the design project.

Assessment Strategy

Assessment Methods

To complete the requirements of the degree, all assessments must be undertaken to the appropriate level and include the following:

- Individual and group coursework assignments
- Written examinations
- A research dissertation or detailed design project
- Group conceptual design project
- Group projects and presentations

The Department aims to use a range of summative and formative assessment methods to maximise student learning. Summative assessment refers to those forms of assessment set out above that will test your achievement of module objectives, allow you to demonstrate that you have met the intended learning outcomes of each module and contribute towards the programme-level intended learning outcomes. To support you to

identify areas of strengths and weaknesses to improve your learning, during the programme, we have a range of formative assessments such as problem-solving exercises (in-class and for self-study), tutorials, online quizzes, *etc.* The balance of the summative assessment across the programme is as follows:

Coursework	20%
Exams	80%

The above breakdown considers the exam/coursework split for the five core modules along with the average split over the elective modules available

Academic Feedback Policy

The following are the mechanisms in place for providing prompt feedback to students on their performance in coursework and examinations and processes for monitoring:

1. All coursework is summative as defined by the weighting attached to these assessments. Its primary function is to measure your learning and understanding of the module in question, while preparing you for the written examination to follow, or assessing skills that cannot be evaluated through a written examination. As a result, coursework submission deadlines tend to be clustered towards the end of the teaching term (when your comprehension and skillsets are most developed), with the feedback following the examination period. In this way, we try to ensure that you focus on learning the subject rather than simply looking at it from the perspective of marks achieved. Coursework is marked and annotated by academic staff, sometimes with the assistance of trained GTAs. Where possible, we aim to provide feedback to students within a three-week return schedule.
2. Academic staff may also provide verbal feedback in class or distribute written overviews.
3. Provisional feedback, in grade format, on examination/assessment performance is given to students, within eight weeks, by the Examinations Officer.

In addition to the above mechanisms, your overall performance across your taught modules will be discussed in one-to-one sessions with your personal (pastoral) tutor. These tutors do not provide subject specific academic guidance, but can help with your approach to study, time management, and examination preparation. They are also on-hand to discuss your examination performance once you obtain the marks from your Autumn term exams so that you are best-placed to approach your Spring term exams.

Re-sit Policy

The College's Policy on Re-sits is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Important notice: The Programme Specifications are the result of a large curriculum and pedagogy reform implemented by the Department and supported by the Learning and Teaching Strategy of Imperial College London. The modules, structure and assessments presented in this Programme Specification are correct at time of publication but might change as a result of student and staff feedback and the introduction of new or innovative approaches to teaching and learning. You will be consulted and notified in a timely manner of any changes to this document.

Programme Structure ¹					
Year 1 – FHEQ Level 7 You will study six modules from those in Group A, and six modules from those in Group B. You must complete the Research/Design Project in the Summer term. For the Autumn term (Group A), you take all three compulsory modules, and select 3/5 of the elective modules. For the Spring term (Group B), you take both compulsory modules, and choose 4/6 of the elective modules.					
Code	Module Title	Core/ Compulsory/ Elective	Group	Term	Credits
CIVE70095	Structural Analysis	Compulsory	A	Autumn	5
CIVE70102	Reinforced Concrete I	Compulsory	A	Autumn	5
CIVE70012	Prestressed Concrete	Compulsory	A	Autumn	5
CIVE70090	Finite Element Analysis	Elective	A	Autumn	5
CIVE70095	Structural Dynamics	Elective	A	Autumn	5
CIVE70092	Structural Stability	Elective	A	Autumn	5
CIVE70006	Design of Timber and Masonry Structures	Elective	A	Autumn	5
CIVE70064	Cementitious Materials	Elective	A	Autumn	5
CIVE70066	Concrete Materials	Compulsory	B	Spring-Summer	5
CIVE70101	Reinforced Concrete II	Compulsory	B	Spring	5
CIVE70010	Nonlinear Structural Analysis	Elective	B	Spring	5
CIVE70099	Seismic Design of Concrete Structures	Elective	B	Spring	5
CIVE70105	Design of Bridges	Elective	B	Spring	5
CIVE70093	Structural Reliability Theory	Elective	B	Spring	5
CIVE70014	Theory of Shells	Elective	B	Spring	5
CIVE70094	Structural Fire Engineering	Elective	B	Spring	5
CIVE70100	Research/Design Project – Structures [incorporating the Conceptual Group project]	Core	C	Summer	30
Credit Total					90

¹ **Core** modules are those which serve a fundamental role within the curriculum, and for which achievement of the credits for that module is essential for the achievement of the target award. Core modules must therefore be taken and passed in order to achieve that named award. **Compulsory** modules are those which are designated as necessary to be taken as part of the programme syllabus. Compulsory modules can be compensated. **Elective** modules are those which are in the same subject area as the field of study and are offered to students in order to offer an element of choice in the curriculum and from which students are able to select. Elective modules can be compensated.

Award and Classification for Postgraduate Students

Award of a Postgraduate Certificate (PG Cert)

To qualify for the award of a postgraduate certificate you must have a minimum of 30 credits at Level 7.

Award of a Postgraduate Diploma (PG Dip)

To qualify for the award of a postgraduate diploma you must have passed modules to the value of no fewer than 60 credits at Level 7 and no more than 10 credits as a Compensated Pass.

Award of a Masters Degree (MSc)

To qualify for the award of a postgraduate degree you must have:

1. accumulated credit to the value of no fewer than 90 credits at level 7;
2. and no more than 10* credits as a Compensated Pass;
3. met any specific requirements for an award as outlined in the approved programme specification for that award.

* The programme is JBM-accredited and no more than 10 credits as a Compensated Pass are permitted.

Classification of Postgraduate Taught Awards

The College sets the class of Degree that may be awarded as follows:

1. Distinction: 70.00% or above.
2. Merit: 60.00% or above but less than 70.00%.
3. Pass: 50.00% or above but less than 60.00%.

For a Masters, your classification will be determined through the weighted average mark in the designated 'taught' and 'research' aspects of the programme each meeting the threshold for the relevant classification band.

Your degree algorithm provides an appropriate and reliable summary of your performance against the programme learning outcomes. It reflects the design, delivery and structure of your programme without unduly over-emphasising particular aspects.

Programme Specific Regulations

As an accredited degree, students on this programme are subject to the standards set out by the UK Engineering Council in relation to compensation: a maximum of 10 ECTS credits can be compensated across the entire programme.

Supporting Information

The Programme Handbook is available at: www.imperial.ac.uk/civil-engineering/prospective-students/handbooks/

The Module Handbook is available at: www.imperial.ac.uk/civil-engineering/prospective-students/postgraduate-taught-admissions/advanced-structural-engineering-cluster/msc-concrete-structures

The College's entry requirements for postgraduate programmes can be found at: www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/

The College's Quality & Enhancement Framework is available at: www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance

The College's Academic and Examination Regulations can be found at: www.imperial.ac.uk/about/governance/academic-governance/regulations

Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine".
www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/

Imperial College London is regulated by the Office for Students (OfS)
www.officeforstudents.org.uk/advice-and-guidance/the-register/

This document provides a definitive record of the main features of the programme and the learning outcomes that you may reasonably be expected to achieve and demonstrate if you take full advantage of the learning opportunities provided. This programme specification is primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.