Programme Information		
Programme Title	Programme Code	HECoS Code
Advanced Materials for Sustainable Infrastructure	H2G1 H2G124	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits *	
				ECTS	CATS
MSc H2G1	1 Calendar year [12 months]	Full-time	Annually in October	90	180
MSc H2G124	2 Calendar years [24 months]	Part-time	Annually in October	90	180
PG Diploma – H2G1D	N/A	N/A	N/A	60	120
PG Certificate – H2G1C	N/A	N/A	N/A	30	60
The PG Certificate and 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 Accreditor(s) (if applicable)			
External Accreditor 1:	Joint Board of Moderators (JBM)		
Accreditation received:	2019	Accreditation renewal:	2026
External Accreditor 2:	Institution of Civil Engineers (ICE)		
Accreditation received:	2019	Accreditation renewal:	2026

External Accreditor 3:	The Institution of Structural Engineers (IStructE)		
Accreditation received:	2019	Accreditation renewal:	2026
External Accreditor 4:	Institute of Highway Engineers (IHIE)		
Accreditation received:	2019	Accreditation renewal:	2026
External Accreditor 5:	The Chartered Institute of Highways & Transportation (CIHT)		
Accreditation received:	2019	Accreditation renewal:	2026
External Accreditor 6:	Permanent Way Institution (PWI)		
Accreditation received:	2019	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	Dr Hong S. Wong
Student cohorts covered by specification	2025-26 entry
Date of introduction of programme	October 22
Date of programme specification/revision	August 23

Programme Overview

The MSc in Advanced Materials for Sustainable Infrastructure aims to train future leaders in the role of materials in resilient and sustainable built infrastructure. Civil infrastructure is critical to the development of most countries, with the UK Government alone investing over £60bn/year in new infrastructure. Huge volumes of materials are used to construct the buildings, bridges, roads, railways, airports, sea defences, power stations and other vital infrastructure that we need. This programme was introduced in October 2019 to meet industry demand and address skills-shortages. It has been formed because of the growing importance and profile of construction materials in society. They are critical to all aspects of engineering and in particular to the delivery of sustainable infrastructure. Aimed at engineers and scientists, the MSc will provide you with a deep understanding of the fundamental behaviour, characteristics and application of civil engineering materials, and the ability to develop sustainable designs for construction.

The full-time programme is taken over 12 months, with a single entry point per year in October. Your studies will begin with six compulsory modules that are taught in the Autumn term (October-December), followed by six compulsory modules in the Spring term (January-March) and a major research project in the Summer term (May-September) culminating in a written research paper. Autumn term modules are examined in early January and Spring term modules are examined in late April/early May. Each module offers a variety of skills development and the programme is structured to help you excel whatever your background. We have designed these modules to be complementary and teach a wide range of the skills required by modern engineers. The assessment will support the development of these skills and additional workshops will be held for transferable skills training. The first term focuses on the fundamentals, building a good foundation, introducing key concepts and standardising the knowledge base of students. The second term develops and enhances the material taught in the autumn by focussing on application and addressing engineering challenges. Specialisation is allowed via the individual research project in the final term where you can really apply the knowledge that you have gained. It may be

possible for projects to be carried out partly or wholly at an external organisation and requests will be considered on a case by case basis.

The part-time option is taken over two years, on a term-release basis. In year one, you will attend the entire Autumn term, take the examinations in early January and thereby complete the first half of the taught component of the programme. In year two, you will attend the entire Spring term, take the examinations in late April/early May and complete the second half of the taught component of the programme. You will also complete the major research project in the Summer term.

You will be taught by leading academic staff who are experts in their field driving the latest advances in infrastructure materials, who are also committed teachers and communicators. You will benefit from interacting with visiting lecturers from industry, helping you place taught material into a practical context. Laboratory classes throughout the programme will offer you a first-hand experience of a range of advanced materials characterisation techniques in our purpose built research and teaching laboratories. There will be many opportunities for you to work independently, as well as part of a team. These experiences will enhance your communication, leadership and interpersonal skills as well as your technical competence, time and project management skills.

The programme is delivered in a world-leading Civil and Environmental Engineering Department and the training and research you undertake will be at the forefront of developments in this area. You will have access to academic and support staff within the Materials Section, the wider Department and Imperial College London. You will also benefit from having access to state-of-the-art facilities including the new Advanced Infrastructure Materials Laboratory, to perform and observe experimental investigations, enabling you to cement principles introduced in the taught part of the programme. Distinctive features of the programme include emphasis on materials characterisation using state-of-the facilities and numerical analyses, strong links with industry and teaching by leading experts in construction materials. The programme covers cutting-edge techniques and key skills that will prepare you for the future. It exposes you to analytical, numerical and laboratory-based approaches to problem solving and equips you with the skills and training for the broader application of the knowledge you acquire. In addition to the training, it introduces you to a network of staff and fellow students, building lifelong global connections.

This MSc will produce the materials experts desperately needed by industry, in the UK and around the world. Potential employers of our graduates include materials manufacturers and suppliers; engineering consultants and contractors designing and supervising new infrastructure projects or upgrading existing infrastructure; owners of built assets; test houses involved in testing materials and surveying structures; companies involved in designing and installing monitoring systems on infrastructure; businesses and Government bodies worldwide. You will also be prepared for a career in research, making you attractive to Government research laboratories concerned with the built environment and universities with Civil Engineering Departments, for those wishing to pursue PhD studies.

Learning Outcomes

On successful completion of the Postgraduate MSc degree in Advanced Materials for Sustainable Infrastructure, you will be able to:

1. Evaluate and apply the principles of sustainability to a range of issues relating to the built environment.
2. Assess the properties required of a material, and select appropriate materials for different civil engineering applications.
3. Recommend appropriate test methods and monitoring techniques to characterise infrastructure materials and interpret the data obtained.
4. Relate the properties and behaviour of infrastructure materials to their chemical composition, processing and microstructure.
5. Appraise the latest advances and summarise the underpinning science, for a wide range of infrastructure materials.
6. Evaluate problems affecting infrastructure materials and devise means of avoiding them.
7. Plan a durability survey to assess the condition of a civil engineering structure and, where necessary, decide on the most appropriate method(s) for its repair.
8. Document the principles, applications and limitations of numerical models as applied to infrastructure materials and devise a physical model to simulate an aspect of material behaviour

9. Appraise problems and specify solutions using a multidisciplinary approach, applying professional judgments to balance costs, benefits, safety and social and environmental impact
10. Plan and produce an independent piece of original research within a defined timeframe that demonstrates unique contribution to knowledge in an area of infrastructure materials.
11. Interpret and synthesise information from a range of 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 a written output that presents in a coherent manner the aims, objectives, relevant literature, methodology, results, discussion and conclusions of the research, concisely written in the style of a journal publication. Communicate the outcomes of the project effectively in an oral presentation and defend the research under critical questioning.

On completion of the Postgraduate Diploma (PG Dip), you will be able to fulfil either the learning outcomes 1-9 (corresponding to the Autumn and Spring term modules) or the learning outcomes 1-4 (corresponding to the Autumn term modules) and 10-12 (corresponding to the Research project).

On completion of the Postgraduate Certificate (PG Cert), you will be able to fulfil either the learning outcomes 1-4 (corresponding to the Autumn term modules) or the learning outcomes 10-12 (corresponding to the Research project).

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial degree programme. The Graduate Attributes are available at: www.imperial.ac.uk/about/education/our-graduates/

Entry Requirements	
Academic Requirement	Normally a 2:1 UK Bachelor's degree with honours in an engineering or science-based discipline (or a comparable qualification recognised by the university). For further information on entry requirements, please go to PG: www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/accepted-qualifications/
Non-academic Requirements	Applicants who do not meet the academic requirements above, but who have substantial relevant industrial and professional experience may be admitted following successful submission as a Special Case according to the Special Cases Policy for Admission: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/admissions/
English Language Requirement	Standard requirement (PG) Please check for other Accepted English Qualifications
Admissions Test/Interview	Shortlisted applicants may be invited for an interview in each application cycle with the Course Director and/or other members of staff. The interview will be held either face-to-face or using an online meeting application. The applicant may be asked to discuss the motivation for applying to this programme, career aspirations and/or research experience. No additional assessments are required.

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 experience a range of learning and teaching delivery methods. These will vary between individual modules depending on the member of academic staff responsible and there will be an appropriate balance of teaching methodologies to cover both the theoretical and practical aspects of the programme. Taught material and core knowledge will be delivered to you primarily through large class sessions by academic staff using multimode delivery, ranging from traditional lectures to more active learning sessions where you are required to self-study assigned materials in advance and build on that knowledge during the session.

Guided problem-solving sessions and tutorials will enable you to test your understanding of the taught material, ask specific questions and consolidate your knowledge, support your learning and prepare you for assessment. Practical elements will be achieved using laboratory sessions, computer sessions and site visits. Other teaching methods employed include discussions, workshops, group work in diverse teams, quizzes, experimental demonstrations, seminars, case studies and formal presentations. These are designed to encourage active learning, where you will explore possible options, consider constraints and develop your own knowledge supported by teaching staff and graduate teaching assistants. Some teaching will be delivered by visiting academics or industry professionals, where appropriate.

Class sizes vary by the module and typically range from 30-50 students for lectures and 2-10 students for group work and laboratory sessions. All module content and learning materials will be made available to you on Blackboard Learn (VLE). You will be expected to spend significant time working independently and with peers, reviewing teaching materials, video recordings, reference and e-learning materials, and solving problem sets. Professional skills such as technical report writing and presentation, are cultivated throughout the programme in various individual and group-based coursework.

Finally, the research project will enable you to acquire skills essential for independent research, and an opportunity to make a significant contribution to the field. You will undertake the research project under the direct supervision of academic staff member and in some cases in collaboration with industry. Some students may have the opportunity to undertake their research project on an industrial placement.

Overall Workload

Your overall workload consists of face-to-face sessions, some video assisted training and independent learning. While your actual contact hours may vary according to specific modules, 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 2,250 hours per year. The work pattern varies depending on the specific module. Typically, in the Autumn and Summer term, you will spend 25-30% of your time on lectures, tutorials, group work and practical (~400 hours) and the remaining 70-75% of your time on independent study (~1100 hours). The research project involves a suite of project induction lectures and research methods training (4%, 30 hours) with the remainder (96%, 720 hours) as independent study.

Assessment Strategy

Assessment Methods

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

- Individual and group coursework assignments
- Group projects and presentations
- Laboratory report summaries
- Written examinations
- Individual research project
- Viva voce

The programme uses a range of formative and summative assessment methods to maximise student learning. Formative assessments are provided to support you to identify areas of strengths and weaknesses to improve your learning during the programme. These are provided as a way for you to determine how well you understand the material, but do not contribute to the final mark. Formative assessment methods include problem-solving exercises (in-class or self-study), tutorials, online quizzes, in-class discussion/workshops, interim reports, etc. Summative assessment refers to those set out above that will test your achievement of module objectives,

allowing you to demonstrate that you have met the intended learning outcomes of each module and contribute towards the programme-level intended learning outcomes.

The taught component will be assessed by examination and coursework during these terms. The first examination session is in the first two weeks of the Spring term for modules taught in the preceding Autumn term. The second examination session takes place in the first two weeks of the Summer term for the modules taught in the preceding Spring term. In the third part of the programme, you will work on your individual research project over a period of 17 weeks, with submission normally at the end of August or early September. The output from the project is a research paper and an oral examination (viva voce) which involves the supervisor and second examiner drawn from the Board of Examiners.

The weighted balance of summative assessment across the programme is as follows:

Coursework / practical	52%
Exams	48%

Academic Feedback Policy

Formative and summative feedback will be provided for every module in a variety of formats, in timely and actionable manner. Formative feedback will be delivered verbally on a one-to-one basis and/or group level during in in-class short exercises, tutorials, discussions and practical activities during laboratory sessions. Teaching staff will be available for discussions and questions both after lectures, online and during office hours, and will provide individual feedback as appropriate. Written feedback will be provided on submitted tutorial sheets and coursework interim reports. There will be opportunities for peer feedback in workshops, group discussions and coursework presentations. Your tutors will provide general feedback on academic performance during regular scheduled meetings.

You will also receive verbal and written feedback on summative assessments via bespoke mark sheets or annotated coursework sheets on presentations, lab sheets and submitted final reports for coursework projects. Summative feedback on coursework will normally be provided within 15 working days from the date of submission.

For exams, you will be provided with feedback on performance in grade format by your personal tutor. This feedback is interim and subject to ratification (approval) by the Board of Examiners of the MSc cluster in Advanced Materials for Sustainable Infrastructure. Grades for exams taken will be returned normally within 8 weeks of the last examination. The Chair of the Board and Course Director will schedule individual meetings with students who have borderline performance or failed modules.

In the research project, you will receive individual oral feedback on progress on a regular basis throughout the project from your project supervisor during supervision meetings. Structured feedback will be provided on your interim report as mid-project checkpoint and at the end of the oral examination. The final numerical marks for all modules will be provided by Registry after the Board of Examiners' meeting at the end of the academic year.

Imperial's Policy on Academic Feedback and guidance on issuing provisional marks to students is available at:www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Re-sit Policy

Imperial's Policy on Re-sits is available at: https://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Mitigating Circumstances Policy

Imperial's Policy on Mitigating Circumstances is available at:
https://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Additional Programme Costs

This section should outline any additional costs relevant to this programme which are not included in students' tuition fees.

Description	Mandatory/Optional	Approximate cost
N/A	N/A	N/A

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 7 - FHEQ Level 7 **You will study all compulsory and core modules.**					
Code	Module Title	Core/Compulsory	Group	Term	ECTS Credits
CIVE70059	Sustainable Development	Compulsory	N/A	Autumn	5
CIVE70061	Materials Selection	Compulsory	N/A	Spring	5
CIVE70062	Mechanics of Materials	Compulsory	N/A	Autumn	5
CIVE70063	Characterisation of Materials	Compulsory	N/A	Autumn-Spring	5
CIVE70064	Cementitious Materials	Compulsory	N/A	Autumn	5
CIVE70065	Geomaterials	Compulsory	N/A	Autumn	5
CIVE70066	Concrete Materials	Compulsory	N/A	Spring-Summer	5
CIVE70067	Masonry, Timber and Glass	Compulsory	N/A	Spring-Summer	5
CIVE70068	Metals	Compulsory	N/A	Autumn	5
CIVE70069	Polymers and Polymer Composites	Compulsory	N/A	Spring-Summer	5
CIVE70070	Assessment, Monitoring & Repair of Structures	Compulsory	N/A	Spring-Summer	5
CIVE70071	Numerical Modelling of Materials	Compulsory	N/A	Spring-Summer	5
CIVE70072	Research Project - Materials	Core	N/A	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.

Progression and Classification

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

1. and no more than 10 credits as a Compensated Pass;

Award of a Masters Degree
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.

Classification of Postgraduate Taught Awards

The university 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 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.

Progression of Part-Time Students
Part-time students are normally permitted to progress to a subsequent year, provided they achieved an overall weightage average of 50.00% in their first year.

Programme Specific Regulations

As an accredited programme, students are subject to the standards set 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 from the department.
The Module Handbook is available at: www.imperial.ac.uk/civil-engineering/prospective-students/postgraduate-taught-admissions/msc-advanced-materials-sustainable-infrastructure/
Imperial's entry requirements for postgraduate programmes can be found at: www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/accepted-qualifications/
Imperial's Quality & Enhancement Framework is available at: www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance
Imperial's Academic and Examination Regulations can be found at: www.imperial.ac.uk/about/governance/academic-governance/regulations
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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.