Programme Information			
Programme Title		Programme Code	HECoS Code
Geotechnical Engineering with Data Science		H2U3M H2U3O	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MSc – H2U3M	1 Calendar Year (12 months)	Full-Time	Annually in October	90	180
MSc – H2U3O	2 Calendar Years (24 months)	Part-Time	Annually in October	90	180
PG Diploma	N/A	N/A	N/A	60	120
PG Certificate	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		Engineering	
FHEQ Level		Level 7	
EHEA Level		2nd Cycle	
External Accreditor(s) (if applicable)			
External Accreditor 1:	Joint Board of Moderators (JBM)		
Accreditation received:	Pending	Accreditation renewal:	Pending
External Accreditor 2:	Institution of Civil Engineers (ICE)		
Accreditation received:	Pending	Accreditation renewal:	Pending
External Accreditor 3:	The Institution of Structural Engineers (IStructE)		
Accreditation received:	Pending	Accreditation renewal:	Pending

External Accreditor 4:	Institute of Highway Engineers (IHIE)		
Accreditation received:	Pending	Accreditation renewal:	Pending
External Accreditor 5:	The Chartered Institute of Highways & Transportation (CIHT)		
Accreditation received:	Pending	Accreditation renewal:	Pending
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 Ken Vinck	
Student cohorts covered by specification		2025-26 entry	
Date of introduction of programme		October 23	
Date of programme specification/revision		November 23	

Programme Overview

Established in 1950 the MSc Geotechnical Engineering cluster of programmes remains the flagship in its subject. These programmes will provide you a solid technical basis in the key areas of Geotechnical Engineering through a coherent, coordinated and balanced degree programme which integrates core engineering science and recent research findings with practical applications.

The Geotechnical Engineering MSc programmes share approximately 80% of the curriculum, while the remaining 20% allow specialisation in the areas of advanced Soil Mechanics, Geotechnical Earthquake Engineering, Geoenvironmental Engineering, Geological Engineering and Data Science. Distinctive features of this programme include strong links with industry, emphasis on fieldwork, laboratory testing using state-of-the-art facilities and numerical analysis using bespoke and commercial software, and teaching by leading experts in the field of Geotechnics.

By following the Geotechnical Engineering with Data Science MSc programme you will attend two terms of lectures, tutorials, laboratory classes and fieldwork and you will undertake your research dissertation in the third term, all based at the South Kensington Campus (apart from fieldwork). The laboratory classes will offer you a first-hand experience of experimental soil mechanics in our modern, purpose-built teaching laboratories. You will participate in three field trips; one weekend in each of the Autumn and Spring terms to investigate the engineering geology and geotechnical issues in two distinct areas of the UK, followed by a one-week study tour at the beginning of the Summer term visiting several geotechnical and geological projects in Southern Europe. The dissertation is undertaken at Imperial and in some cases in collaboration with industry. 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 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, over a period of two years. The part-time option is offered only on a term-release basis over two-years, as detailed at the programme's webpage.

The Data Science (DS) stream provides a unique opportunity for our Geotechnical Engineering students taking this option to specialise in areas that have become critical to meeting industry and business needs in the geotechnical, energy and decarbonization sectors. Data science is central to the design and operation of modern resilient and sustainable geotechnical structures. Distinctive features of this option are to provide a concise and comprehensive introduction to key scientific methods of statistical analysis and data modelling from both a theoretical and applied viewpoint, and skills to apply emerging machine learning methods to solve complex geotechnical engineering applications and aid decision-making in stakeholder environments. The Design Project offers the experience of

working in a team on a client-based project drawing on knowledge from the core modules delivered in statistical modelling, data engineering, and machine learning, and their application in a real-world scenario.

Graduates from the Geotechnical Engineering with Data Science MSc programme gain employment in a wide range of organisations, including international consultancies, contractors, governmental bodies and academia. Our MSc graduates have an excellent record due to our strong engagement with industry. We operate an [Industrial Bursary scheme](), currently supported by 15 international companies, which provides scholarship awards to the best applicants for our MSc programme every year. The participating companies hold recruiting events, deliver lectures in the spring term and recruit a number of our MSc graduates every year.

The programme is structured in three parts. A schematic of the Geotechnical Engineering programme is set out in Figure 1 to show the modification of the core Geotechnical Engineering programme to accommodate the four modules of the new stream, and to show the relationship between the 5 programmes being offered. 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 in geotechnical engineering and in topics of importance in data science (specifically statistical modelling and machine learning) and in the Spring Term the programme content is more applied and shows how your core knowledge can be used to address geotechnical engineering challenges and solve a range of complex geotechnical engineering problems. As part of CIVE70029 Current Developments in Geotechnical Engineering, you will be exposed to real life case studies involving unique engineering solutions in a series of talks directly delivered by Industry. This module is designed to give you a taste of how you will be putting your new skills and knowledge to good use and to give you a head start in professional networking, and it is not assessed, so that you can enjoy the delivery and make the most out of your interaction with Industry experts, stress-free. Assessment in all other modules is by examination and coursework of the content taught during these terms. Examinations take place at the beginning of the Spring Term and at the beginning of the Summer Term. During the Summer Term of the programme, you will work on your individual research project over a period of 15 weeks, with submission normally at the end of August.
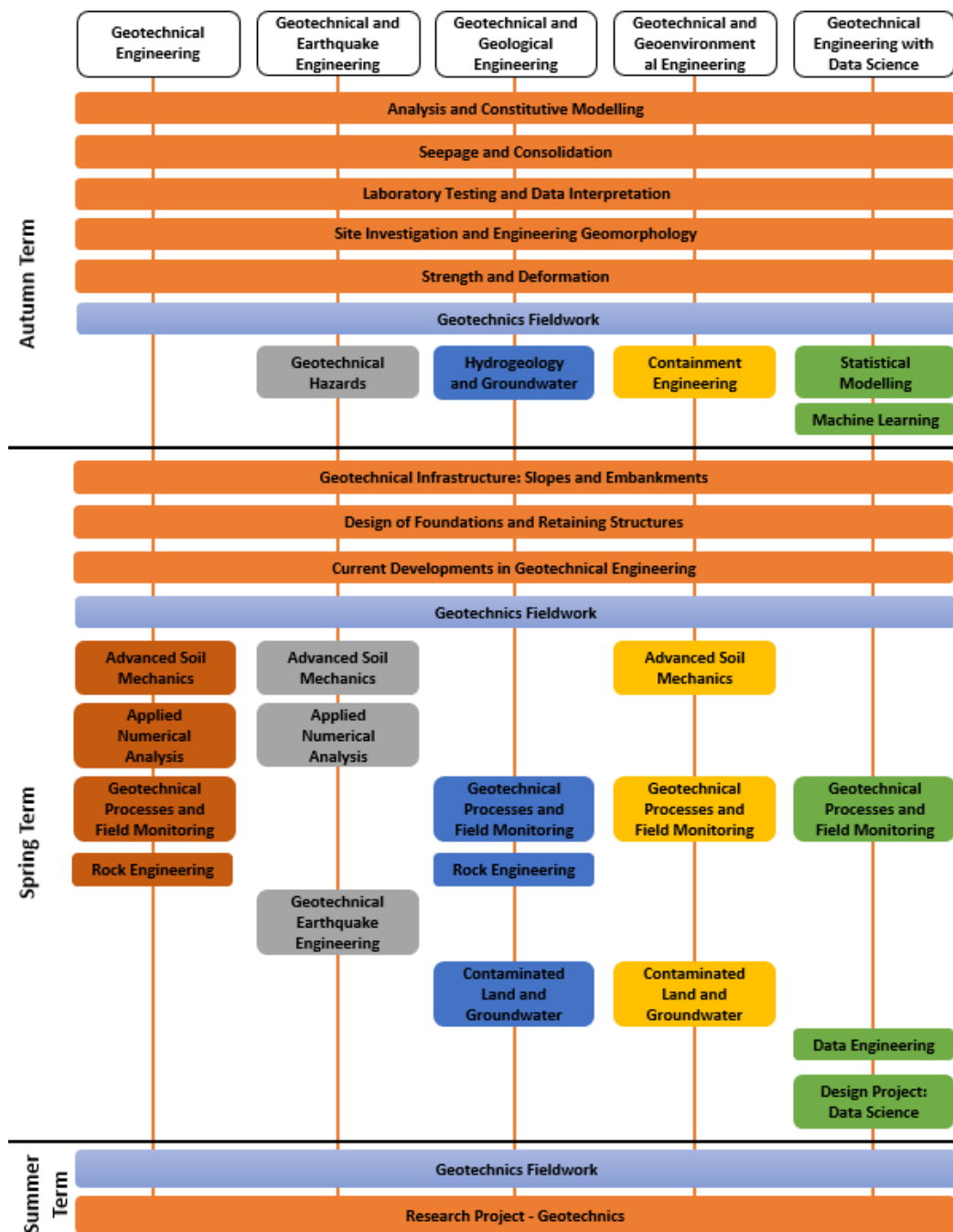
Figure 1: Schematic of the Geotechnical Engineering Programmes

Learning Outcomes

On completion of the MSc Geotechnical Engineering with Data Science Degree programme you will be able to:

1. Critically select parameters to characterise any given soil profile from a variety of laboratory and field investigation techniques, recognising the strengths and weaknesses of these techniques.
2. Record clear and concise data and descriptions in the field, to enable you to generate a 3D ground model
3. Critically engage and apply theoretical frameworks underpinning the hydro-mechanical behaviour of geomaterials subjected to a variety of loading conditions.
4. Use computational methods and statistical modelling techniques for interrogation of real-world data to aid decision-making in selection of optimal strategies for application in a stakeholder environment.
5. Apply machine learning models to solve complex geotechnical engineering applications.
6. Critically select from and apply a range of problem-solving strategies and tools to formulate design processes of complex geotechnical applications in a self-directed manner.
7. Appreciate the geotechnical issues for a range of engineering projects.

8. Develop the scope and an appropriate machine learning approach, from a design brief, to solve complex engineering design problems, working effectively as a group.
9. Conduct a piece of independent research, set out in a project brief, within a defined timeframe and within available resources, applying data science skills that demonstrate a contribution to knowledge in a research area of interest.
10. 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.
11. Produce, as a written output, a research dissertation which presents in a coherent manner the aims/research content, a literature review, research methodology, research results, discussion and conclusions.

On completion of the Postgraduate Certificate (PG Cert) you will be able to fulfil either the learning outcomes 1-5 (corresponding to the Autumn term modules) or 9-11 (corresponding to the Research 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 to the Autumn term modules) and 9-11 (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	Applicants are required to hold a 1st class UK Bachelor's Degree with Honours in Civil Engineering (or a comparable qualification recognised by the university); other branches of Engineering, Natural Sciences, Earth Sciences and other numerate disciplines are also considered on an individual basis. Students must have a background in Mathematics including algebra and multivariate calculus. Mathematics taught in typical STEM degrees would satisfy this requirement. For further information on entry requirements, please go to PG: www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/
Non-academic Requirements	Dispensation from the normal academic entry requirements may be granted for applicants with relevant industrial and professional experience.
English Language Requirement	Standard requirement (PG) Please check for other Accepted English Qualifications
Admissions Test/Interview	Applicants may be invited to interview with one or more members of staff.

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 variety of teaching methods, ranging from traditional lectures and tutorials, to laboratory practicals, computer sessions, field trips, site visits and a design project. The teaching strategy capitalises on the multidisciplinary background and the varied educational experiences of the cohort (in civil engineering, engineering geology, geophysics, earth sciences etc) encouraging group work and group presentations in international and diverse teams. Independent learning is supported through the e-learning facilities (Blackboard Learn, VLE) as well as through online assignments and coursework. In your Design Project you will further enhance your leadership and

team building skills through the experience of working with industry clients. You will carry out an individual research project under the direct supervision of an academic staff member or alternatively you may be permitted an industry placement for the dissertation element of the degree.

Overall Workload

Your overall workload consists of face-to-face sessions and independent learning. While your actual contact hours may vary according to the specialisation 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 25%-30% of your time on lectures, seminars and similar (around 400 hours) and the remaining 70%-75% of your time on independent study, while the dissertation period involves 100% of your time as independent study.

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
- Group projects and presentations
- Field trip notes and presentations
- Written examinations, which take place in January for the Autumn term modules and in late April/May for the Spring term modules.
- E-Examination
- A research dissertation

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), online quizzes, etc. The balance of the summative assessment across the programme is as follows:

Coursework/practicals	42%
Exams	58%

Academic Feedback Policy

Feedback will be provided in a variety of forms, mapping onto the wide range of formative and summative assessment methods employed in the various modules. During practicals and formative assessments, it will be verbally delivered on a one to one and/or group basis. Written feedback will be provided shortly after summative exercises via bespoke mark sheets or annotated coursework sheets and group feedback will be provided in lectures. There are several opportunities for peer-feedback in workshops, group discussions and group presentations, while personal tutors encourage their tutees embrace self-reflection.

Graduate Teaching Assistants (GTAs), specifically trained in the marking of coursework and minor project elements, are employed to ensure return of marked work within the three-week specification.

Provisional feedback, in grade format, on examination/assessment performance is given to students, within eight weeks of the examinations (in March and July), by their personal tutor. The Chair of the Board and Course Director schedule individual meetings with those students who have borderline performance or fail modules.

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: 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: 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
Field trips (travel fares, meals and visa if required)	Mandatory	£400 per annum

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 all compulsory and core modules.

Code	Module Title	Core/ Compulsory	Group	Term	Credits
CIVE70022	Seepage and Consolidation	Compulsory		Autumn	5
CIVE70021	Strength and Deformation	Compulsory		Autumn	5
CIVE70027	Analysis and Constitutive Modelling	Compulsory		Autumn	5
CIVE70026	Laboratory Testing and Data Interpretation	Compulsory		Autumn	5
CIVE70116	Statistical Modelling	Compulsory		Autumn	5
CIVE70111	Machine Learning	Compulsory		Autumn	5
CIVE70122	Data Engineering	Compulsory		Spring	5
CIVE70034	Design of Foundations and Retaining Structures	Compulsory		Spring	5
CIVE70036	Geotechnical infrastructure: Slopes and Embankments	Compulsory		Spring	5
CIVE70035	Geotechnical Processes and Field monitoring	Compulsory		Spring	5
CIVE70089	Design Project: Data Science - Geotechnics	Core		Spring	5
CIVE70025	Geotechnical Fieldwork	Compulsory		Autumn-Summer	5
CIVE70029	Current Developments in Geotechnical Engineering	Compulsory		Spring	N/A
CIVE70038	Research Project	Core		Summer	30
				Credit Total	90

Part-Time Study: Term Release
The Geotechnical Engineering with Data Science programme may be taken part-time, on a term-by-term basis only, as follows: www.imperial.ac.uk/civil-engineering/prospective-students/postgraduate-taught-admissions/msc-geotechnical-engineering/

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[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 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.
   1.   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.

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

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 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.

Progression of Part-Time Students

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

Programme Specific Regulations

As an accredited programme (pending TBC), 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 at: https://www.imperial.ac.uk/civil-engineering/prospective-students/handbooks/
The Module Handbook is available at: https://www.imperial.ac.uk/civil-engineering/prospective-students/postgraduate-taught-admissions/msc-geotechnical-engineering/
Imperial's entry requirements for postgraduate programmes can be found at: www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/
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.