Welcome to the College

Congratulations on joining Imperial College London, the only university in the UK to focus exclusively on science, medicine, engineering and business.

From Fleming’s discovery of Penicillin to Gabor’s invention of holography, Imperial has been changing the world for well over 100 years. You’re now part of this prestigious community of discovery and we hope you will take this opportunity to make your own unique contribution.

We’re committed to providing you with the very best academic resources to enrich your experience. We also provide a dedicated support network and a range of specialist support services to make sure you have access to the appropriate help, whether that’s further training in an academic skill like note taking or simply having someone to talk to.

You’ll have access to an innovative range of professional development courses within our Graduate School throughout your time here, as well as opportunities to meet students from across the College at academic and social events – see page 6 for more information.

We actively encourage you to seek out help when you need it and try to maintain a healthy work-life balance. Our choice of over 375 clubs, societies and projects is one of the largest of any UK university, making it easy to do something different with your downtime. You also have free access to gym (following a one-off orientation fee of £40 in 2017-18) and swimming facilities across our campuses.

As one of the best universities in the world, we are committed to inspiring the next generation of scientists, engineers, clinicians and business leaders by continuing to share the wonder of what we do through public engagement events. Postgraduate students, alongside our academics and undergraduate students, make a significant contribution to events such as our annual Imperial Festival and our term-time Imperial Fringe events – if you’re interested in getting involved then there will be opportunities for you to do so.
Our Principles

In 2012 the College and Imperial College Union agreed ‘Our Principles’ a series of commitments made between students and the College. The Principles are reviewed annually by the Quality Assurance and Enhancement Committee and changes recommended for Senate approval.

**Imperial will provide through its staff:**
- A world class education embedded in a research environment
- Advice, guidance and support
- The opportunity for students to contribute to the evaluation and development of programmes and services

**Imperial will provide students with:**
- Clear programme information and assessment criteria
- Clear and fair academic regulations, policies and procedures
- Details of full programme costs and financial support
- An appropriate and inclusive framework for study, learning and research

**Imperial students should:**
- Take responsibility for managing their own learning
- Engage with the College to review and enhance provision
- Respect, and contribute to, the Imperial community

**The Imperial College Students’ Union will:**
- Support all students through the provision of independent academic and welfare assistance
- Encourage student participation in all aspects of the College
- Provide a range of clubs, societies, student-led projects and social activities throughout the year
- Represent the interests of students at local, national and international level
Welcome from the Graduate School

Professor Sue Gibson, Director of the Graduate School

The Graduate School has several roles but our main functions are to provide a broad, effective and innovative range of professional skills development courses and to facilitate interdisciplinary interactions by providing opportunity for students to meet at academic and social events. Whether you wish to pursue a career in academia, industry or something else, professional skills development training will improve your personal impact and will help you to become a productive and successful researcher. Professional skills courses for Master’s students are called “Masterclasses” and they cover a range of themes, for example, presentation skills, academic writing and leadership skills (http://www.imperial.ac.uk/study/pg/graduate-school/professional-skills/masters). All Masterclasses are free of charge to Imperial Master’s students and I would encourage you to take as many as you can to supplement your academic training. The Graduate School works closely with the Graduate Students’ Union (GSU) and is keen to respond to student needs so if there is an area of skills training, or an activity that you would like us to offer, but which is not currently provided, please do get in touch (graduate.school@imperial.ac.uk).

The Graduate School also runs a number of exciting social events throughout the year which are an opportunity to broaden your knowledge as well as to meet other students and have fun. Particular highlights include the Ig Nobel Awards Tour Show, the Chemistry Show and the Master’s 360 competition. You should regularly check the Graduate School’s website and e-Newsletters to keep up to date with all the events and training courses available to you. Finally, I hope that you enjoy your studies here at Imperial, and I wish you well.

Dr Janet De Wilde, Head of Postgraduate Professional Development

I would like to welcome you to the Graduate School programme for postgraduate professional development. Our team of tutors come from a wide variety of experiences and we understand just how important it is to develop professional skills whilst undertaking postgraduate studies and research. Not only will this development improve success during your time at Imperial College, but it will also prepare you for your future careers. We are continually working to develop the courses we offer and over this year you will see a range of new courses including face-to-face workshops, interactive webinars and online self-paced courses.

I encourage you to explore and engage with the diverse range of opportunities on offer from graduate school and I wish you well in your studies.
The Graduate School

You automatically become a member of the Graduate School when you register as a postgraduate student at Imperial.

The Graduate School has been set up to support all postgraduate students at the College through:

- Training and development courses
- Networking activities, social and academic events to encourage cross-disciplinary interactions
- Forums to represent the views of postgraduate students throughout the College

‘Masterclass’ professional skills courses

You can see the full range of free professional skills courses for postgraduate students on the Graduate School website:

🌐 [www.imperial.ac.uk/study/pg/graduate-school/professional-skills/masters](http://www.imperial.ac.uk/study/pg/graduate-school/professional-skills/masters)

All courses can be booked online.

Contact us

📍 Level 3, Sherfield Building, South Kensington Campus
📞 020 7594 1383
✉️ graduate.school@imperial.ac.uk
🌐 [www.imperial.ac.uk/graduate-school](http://www.imperial.ac.uk/graduate-school)

Imperial Success Guide

The Imperial Success Guide is an online resource with advice and tips on the transition to Master’s level study. More than just a study guide, it is packed with advice created especially for Imperial Master’s students, including information on support, health and well-being and ideas to help you make the most of London.

🌐 [www.imperial.ac.uk/success-guide](http://www.imperial.ac.uk/success-guide)
Welcome from the Graduate Students’ Union (GSU)

I am delighted to be able to welcome you to Imperial College and to introduce you to the Graduate Students’ Union (GSU). The GSU ultimately serves to represent you as a postgraduate student and to ensure you have the most fulfilling and enjoyable time possible at Imperial.

The GSU is a university-wide representative body for postgraduate students with a committee comprised of democratically elected postgraduate students. The GSU works to support students on welfare fronts, represent students on educational matters by working with you to voice your concerns to College/departments, whilst also hosting recreational events throughout the year.

Imperial College London is undoubtedly a world-class institution with unique strengths in both teaching and research. Having been an Imperial student for 5 years myself I can fully appreciate that the university is nothing more than the people that comprise it – you’re among some of the brightest minds in the world and Imperial welcomes your contributions and enthusiasm in every sense! I encourage you to make the most of being a valued member of the Imperial community.

I hope you have a fantastic time here at Imperial and manage to take advantage of the richness of opportunity that awaits you. If you have any questions at this stage, then please do get in touch.

Luke McCrone, GSU President 2017/18

✉️ gsu.president@imperial.ac.uk
📺 www.imperialgsu.com
1. Introduction to the Department

Welcome from the Head of Department

I trust you have had a great summer, whether you were gaining work experience or taking a well-earned rest, and I hope that you are now ready to study again with renewed vigour!

You will be working alongside some of the brightest and most motivated students from around the world, taught by an exceptional group of internationally-leading experts. A strength of our Department, and the College as a whole, is its national and cultural diversity (well over 50 nationalities are represented in our Department alone) and we don’t intend to allow Brexit, or any other outside influence, to change that.

London is a wonderful place to be a student. Please take full advantage of your once-in-a-lifetime opportunity and find a good balance between studying hard to fulfil your potential, and enjoying the company of your fellow students and life in London.

Good luck for the coming year!

Professor Nick Buenfeld

Welcome from the Programme Director

We very much hope that all our MSc students will enjoy the year they spend at Imperial College. Part of that enjoyment will come from an awareness of all that the College has to offer, as well as more directly from the courses themselves.

This handbook attempts to set out background information on the College and the many and various facilities the College provides, as well as some information on the MSc courses themselves. We hope that it will prove to be useful; if you have any suggestions that might improve it, please let me know.

Dr Stavroula Kontoe
## Academic and administrative staff

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Role</th>
<th>Office</th>
<th>Phone</th>
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<tbody>
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**English language requirement**

See the Admissions website for details:

[www.imperial.ac.uk/study/pg/apply/requirements/english](http://www.imperial.ac.uk/study/pg/apply/requirements/english)

For information on English language support available while you’re here, see the Wellbeing and Advice section.
Attendance and absence

You must inform your Cluster Administrator if you are absent from the College for more than three days during term. If the absence is due to illness you must produce a medical certificate after seven days. If you miss an examination through illness you must produce a medical certificate immediately.

Summer Term: Formal teaching may have finished for the year, but while you are working on your project and writing your dissertation, you are still subject to the attendance conditions of your degree, up to the expiry of your student registration at the end of September 2018. The exceptions to this are:

- Short breaks (approved by your supervisor and notified to your Cluster Administrator by email).
- Completion of all the academic requirements of your degree.
- Approved Study leave (e.g. Fieldwork) [specific form to be completed].

Recording of External Study Leave

For those of you spending periods of time abroad which form part of your research project (e.g. Fieldwork), such absences must be covered by the Postgraduate Taught (MSc): Recording of External Study Leave Form (see Appendix A). This form must be completed and submitted, via your Cluster Administrator, in advance of the requested absence. A record will be held in Starfish and you must register your return from Study Leave in person to your Cluster Administrator in order that your record may be updated for audit purposes. The Registry will be informed of all student non-attendances, as the College is obliged to report the non-attendance of students on Tier 4 visas to the Home Office. Read through Appendix A – Monitoring Attendance of Students, for information on the procedures in the Department of Civil and Environmental Engineering.

Key dates 2017-18

Term dates
Autumn term: 30 September – 15 December 2017
Spring term: 06 January – 23 March 2018
Summer term: 28 April – end of course

Closure dates
Christmas/New year: 23 December 2017 – 01 January 2018
Easter holiday: 29 March – 03 April 2018
Early May bank holiday: 07 May 2018
Spring bank holiday: 28 May 2018
Summer bank holiday: 27 August 2018

Programme dates
Written examinations: End of April / beginning of May 2018
Project hand-in: 31 August 2018
Board of Examiners meeting: 28 September 2018 (TBC)
End of course: 30 September 2018

Key events
Postgraduate Awards Ceremonies: 01 May 2019 (TBC)
Imperial Festival and Alumni Festival: 28-29 April 2018
2. Programme information

Imperial Mobile app

Don't forget to download the free Imperial Mobile app for access to College information and services, including College emails and a library catalogue search tool.

www.imperial.ac.uk/imperialmobile

Programme overview

Established in 1950 the MSc course cluster in Soil Mechanics remains the flagship in its subject. The staff profile, present and Emeritus (including four Rankine Lecturers), and first class facilities make the course internationally renowned. Alumni from the course hold senior positions around the world and their work and engagement in the profession ensures the high reputation of these qualifications from Imperial College. Our close links with the Imperial College Earth Science and Engineering Department as well as our Environmental and Water Resource Engineering research section ensures that our MSc students are exposed to the latest developments in all aspects of Geotechnics.

The aims of our extensive suite of MSc programme titles are to:

- Attract very able engineers, scientists and related professionals from around the world by offering in-depth courses that focus on particular specialist areas and develop and extend students’ knowledge, professional skills and research experience.
- Meet the expectations of industry and academia, preparing graduates for professional or research careers in the UK and overseas, developing curricula that evolve to match the subjects’ changing requirements.
- Advance understanding of the underlying engineering science and practical techniques that underpin civil and environmental engineering.
- Provide teaching and learning that is informed by research and practice at the forefront of academic or professional disciplines.
- Provide an opportunity for students to show originality in the application of knowledge, and an understanding of how the boundaries of that knowledge are advanced through research.
- Develop students’ ability to deal with complex issues both systematically and creatively, demonstrating originality in tackling and solving problems.
- Engender the qualities needed for employment in circumstances requiring sound judgement, personal responsibility and initiative, in complex and unpredictable professional environments.
- Meet the career needs of students seeking specialist employment in civil and environmental engineering, addressing the skill needs of their potential employers.
- Provide students with a solid technical basis in the key areas of the engineering profession through delivery of a coherent, coordinated and balanced degree programme, integrating core engineering science with practical application.
- Enable students to acquire a mature appreciation of the context in which engineering projects are developed within the industry.
- Develop our students’ excellence in oral and written communication, and poster presentations.
- Provide students with sufficient material to explore the subject, to carry out self-organised study, and to think about the issues and challenges of the material, in preparation for professional practice.

**Programme structure**

The full time programme is taken over 12 months, with a single entry point per year at the beginning of October.

Part time options are:

- Term release (taken part time on a term-by-term basis, over two years): http://www.imperial.ac.uk/civil-engineering/prospective-students/postgraduate-taught-admissions/geotechnics-cluster/term-release/

**Competency statements**

http://www.imperial.ac.uk/media/imperial-college/faculty-of-engineering/civil/public/msc/Competency-Standards.pdf

**Accreditation**

Details of our accreditation are to be found at:

http://www.imperial.ac.uk/civil-engineering/prospective-students/postgraduate-taught-admissions/

**Programme delivery**

Modules will be delivered through a series of lectures, although teaching methods will vary between individual modules. Other teaching methods employed may include tutorials, group discussions, group work, progress tests, computer laboratory sessions, practical work, and others depending on the member of academic staff responsible. Some lectures will be delivered by visiting academics or industry professionals, where appropriate.

**Submission of Coursework**

Coursework submissions may be online or in paper copy, depending on the preference of the setter.

**Coursework Cover Sheets**

Coursework coversheets for group and individual work can be found in the General Office. Each one contains a plagiarism declaration on the front which must be signed. An example of the coursework cover sheets used for individual and group work can be found in Appendix E.
Submitting Coursework

MSc coursework will be set with a due date and time, and specific submission information will be made available to students.

Receiving Marked Coursework

Lecturers should return coursework within three weeks of it being handed in (four, if this period includes a College vacation). If there is a delay you should consult your MSc Cluster Administrator.

Returned Marked Coursework

You are required to submit all your marked coursework to your MSc Cluster Administrator, unless instructed otherwise, by the end of the academic session for inspection by the External Examiners.

Penalties for late submission

Submissions made within 24 hours after the deadline has passed will have the mark capped at 50%. Submissions made more than 24 hours after the deadline has passed will receive a mark of zero.

Development of professional skills

Professional skills development will be delivered throughout the curriculum in various forms, including teamwork, problem-solving, applying concepts to real-world situations, and formal presentations.

Module descriptors

A full list of all MSc Geotechnics module descriptors can be found on the following link: http://www3.imperial.ac.uk/civilengineering/prospectivestudents/postgraduatetaughtadmissions/soilmechanicssyllabus

Employability statement

Planning for your future is an important aspect of postgraduate study. At Imperial you'll be well-supported by our Careers Service, who are on hand to help in a variety of ways.

http://www.imperial.ac.uk/careers

Imperial is one of the UK universities most targeted by graduate recruiters who also play an active role in our career development programme.

This provides access to hundreds of potential employers in a range of settings including industry sector forums, employer presentations, careers fairs, mock interviews and our one to one ‘recruiter-in-residence’ sessions.
A large number of employers also advertise their opportunities each year through JobsLive — our online careers platform, which Imperial students can access from the first day of term.

**Work opportunities**

The Department encourages you to take early advantage of the careers education, information and guidance available from the following sources:

- College Careers Advisory Service (Level 5, Sherfield Building), with which you can book careers appointments, quick interview sessions, skills workshops, mock interviews, and much more.

[http://www.imperial.ac.uk/careers/](http://www.imperial.ac.uk/careers/)

- The transferable skills training programme run by the Graduate School.

[http://www3.imperial.ac.uk/graduateschools/](http://www3.imperial.ac.uk/graduateschools/)

- Careers presentations and careers fairs, which occur throughout the autumn and spring terms. Details are circulated to all students closer to the dates.

- Details of jobs will be posted on the careers sections of the website. New posts are notified to us throughout the year, so check online regularly:

[http://www.imperial.ac.uk/careers](http://www.imperial.ac.uk/careers)

- Additionally you can contact the Departmental Careers Advisor for further guidance and information:

  Dr Peter Stafford
  Room 321
  020 7594 7916
  p.stafford@imperial.ac.uk

**Timetable**

Your timetable will be delivered direct to your Imperial College Outlook calendar.

**Attendance during project work**

Students are required to be in attendance during the dissertation period, unless they have been given specific permission to be absent from College.

Unauthorized absences will be notified to the College, and may trigger the withdrawal of registration, and/or for overseas students, curtailment of the Tier 4 student Visa.
**Field trips**

Emphasis on fieldwork forms a substantial component of the coursework of the programme, and comprises three field trips, of which two take place in the UK and one overseas:

The first will take place in October and will consist of visits to sites in the Kent area of South East England, with the group being based overnight in Folkestone.

The second field course will take place near Bristol in the late spring term (including Cheddar Gorge) with an overnight stay in Weston-Super-Mare.

The third field course will last for a full week and will take place after the main examinations in May. The entire class will be travelling to Greece and visiting many sites of interest in connection with geomorphology, geology and geotechnical engineering.

The member of staff responsible for the Geotechnics field trips is: Dr Richard Ghail

The MSc course requires all students to attend three field courses.

All students should bring safety boots with metal toe protection and waterproof clothing. We will supply hard hats and high-vis vests.

**Research Dissertation**

The Dissertation is the main element of coursework submitted for the MSc. Students are asked to agree a topic in conjunction with their personal tutors.

Dissertation work may consist, for example, of a laboratory study, a computer project, a literature review, a case history or a parametric study. The work normally continues through from May until the deadline at the end of August, although a report could be handed in earlier if it was complete. All students should make sure that they leave sufficient time to write up their work and prepare their reports to a high standard. ACADEMIC SUPERVISION CANNOT BE RELIED UPON FROM MID-JULY ONWARDS. STUDENTS SHOULD AVOID TAKING VACATIONS BETWEEN THE FIELD TRIP AND THIS PERIOD TO ENSURE THAT THEY ARE SELF-SUFFICIENT WHEN STAFF ARE AWAY.

The Dissertation should demonstrate the student’s mastery of the specialist topic and their ability to both review existing information critically, and add to knowledge through their own research of re-interpretation of data. A literature review that is a straightforward summary of published material would not be passable and so they should contain critical analyses and discussion of the existing literature, as well as recommendations for future research needs.

Students may wish to consider possible choices of dissertation topics during the first two terms of the course, but it is usually unwise to devote too much time to dissertation work before completing the examinations.

**ARRANGEMENTS FOR THE SUBMISSION OF DISSERTATIONS**

TWO COPIES (spiral bound) of your dissertations are required – one of them must include a copy of your Dissertation on a USB stick. The USB stick should also include any data that your supervisor may have requested. An executive summary must be given at the start which informs readers of the subject, the contents and the main points of the Dissertation, identifying clearly any original work undertaken by the candidate. The length of the executive
summary should not exceed two pages and the main points should be set out under clear ‘bullet points’. All figures should be clear with a decent scale. Proper referencing is essential. Extensive test data, etc. should be put in one or more appendices. **These are to be submitted to Sue Feller on Friday 31 August 2018.**

The Section is keen to encourage industrial involvement with Dissertation work, but students must remember the need to agree the topic with their Tutor, and must maintain regular contact with them during this period. It follows that, unless in exceptional circumstances (when you should contact your Tutor), you will need to attend College on a regular basis and that you will need to continue to live within convenient travelling distance of the College.

**December test**

All students must sit an informal test which is taken towards the end of the first term. The purpose of the test is to give students a chance to experience the form and style of an examination at Imperial College and to gauge how well they are coping with the course. This is the principal means of feedback on progress as it is normally later in the spring term before students receive feedback on their coursework. The test papers are marked in the same way as the final exams, but the scores obtained do not count towards your degree. Students review their results and progress with their personal tutors in mid-January.

**Reading Lists**

The College has introduced a new interactive system, Reading Lists, for students to view their reading lists, and create their own virtual library collections. Each of your modules on Blackboard Learn will include a direct link to the core and supplementary recommended texts on Reading Lists. You can also view where in the Central Library your recommended texts are available, and how many copies are available, as well as commenting and collaborating with other students. [http://www.imperial.ac.uk/admin-services/library/learning-support/reading-lists/](http://www.imperial.ac.uk/admin-services/library/learning-support/reading-lists/)

**Programme specification**

Once available, the revised programme specification will be located here: [http://www.imperial.ac.uk/staff/tools-and-reference/quality-assurance-enhancement/programme-information/programme-specifications/](http://www.imperial.ac.uk/staff/tools-and-reference/quality-assurance-enhancement/programme-information/programme-specifications/)

**Transferring between courses**

Students wishing to transfer between courses should first contact the member of staff below, who will advise you as to whether or not this may be possible. Please note that for MSc students, transfers must be requested by the end of the first cycle of lectures, and may be restricted for those students under Tier 4 Visa restrictions.

- **Sue Feller**
- Room 529
- s.feller@imperial.ac.uk
3. Assessment

College Policy

Imperial College awards Postgraduate Taught Course Degrees according to “Advanced Courses Marking Scheme Policy”, where Master’s students are required to pass every element of their course (examinations, coursework and dissertation) with an aggregate mark of at least 50%.

In order to be awarded a result of Merit, a candidate must obtain an aggregate mark of 60% or greater; a result of Distinction requires an aggregate mark of 70% or greater.

Where appropriate, a Board of Examiners may award a result of Merit where a candidate has achieved an aggregate mark of 60% or greater across the programme as a whole AND has obtained a mark of 60% or greater in each element with the exception of one element AND has obtained a mark of 50% or greater in this latter element.

Where appropriate, a Board of Examiners may award a result of Distinction where a candidate has achieved an aggregate mark of 70% or greater across the programme as a whole AND has obtained a mark of 70% or greater in each element with the exception of one element AND has obtained a mark of 60% or greater in this latter element.

Geotechnics Section Policy for Soil Mechanics Students

The Board of Examiners for the Geotechnics MSc cluster abide by the College Policy but assess the 3 (three) individual elements (Examination, Coursework and Dissertation) of the course according to the following mark scheme:

1. Candidates must pass all examination papers (or components), all coursework and the dissertation.
   a. There are 5 (five) examination papers (or components) in total. Each examination paper is considered as one component of the examination element of the course.
   b. There are 3 (three) coursework components in total, with their combined value being considered as the coursework element of the course:
      i. Laboratory Reports
      ii. Field Notebooks (a total of 3 (three) field trips)
      iii. All other coursework
   c. A Dissertation thesis on a research project carried out during the Summer Term of the course, which is considered as one element of the course.

2. Any individual element with a mark below 40% will be considered as a failure in that element.

3. The Board of Examiners considers 40% as the Pass mark, 60% as the Merit mark and 75% as the Distinction mark for each element. This scale is converted to the College scale in which 50% as the Pass mark, 60% as the Merit mark and 70% as the Distinction
mark for each element before being reported to the Registry. This set of adjusted marks is reflected in your online transcript.

Progression

All Students

Where a student is not attending or progressing to the satisfaction of the Course Director during the course, a note of warning may be sent to him/her, indicating that a failure to improve will result in a “six-week warning” being sent to them by the College Registry. This is the equivalent to notice of withdrawal. This may result in:

- (For Visa-dependent students) a report being sent to the UK-VI, and curtailment of the student Visa, and with this revoking the right to remain in the UK. (Full-time students only)
- (For sponsored students) a report being made to your sponsors.

Part-time Students

- Where a mark, returned on the College scale, is below 40% in an individual component the student is permitted to re-take that component (normally an examination paper) at the next available opportunity (normally in the subsequent year).
- Where the overall element performance is below 50%, the student is permitted to re-enter for the elements of assessment in question, but not to attend or to progress to a subsequent year.

Part-time students are normally permitted to progress to a subsequent year, provided that their average performance is in excess of 50%.

Assessment criteria

Criteria for Award of Pass

A Pass would normally be awarded when all the following criteria are met:

- The examination mark is 50% or higher
- The dissertation mark is 50% or higher
- The coursework mark is 50% or higher

Criteria for Award of Merit

A Merit would normally be awarded when all the following criteria are met:

- The examination mark is 60% or higher
- The dissertation mark is 60% or higher
- The coursework mark is 60% or higher
Criteria for Award of Distinction

A Distinction would normally be awarded when all the following criteria are met:

- The examination mark is 70% or higher
- The dissertation mark is 70% or higher
- The coursework mark is 70% or higher

<table>
<thead>
<tr>
<th>Mark</th>
<th>Grade</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>85+</td>
<td>A*</td>
<td>Outstanding - distinction standard</td>
</tr>
<tr>
<td>70-84</td>
<td>A</td>
<td>Distinction standard</td>
</tr>
<tr>
<td>60-69</td>
<td>B</td>
<td>Good</td>
</tr>
<tr>
<td>50-59</td>
<td>C</td>
<td>Adequate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The following are subject to discussion by the Board of Examiners</td>
</tr>
<tr>
<td>40-49</td>
<td>D</td>
<td>Unsatisfactory/borderline</td>
</tr>
<tr>
<td>30-39</td>
<td>E</td>
<td>Not satisfactory – may need to be retaken</td>
</tr>
<tr>
<td>0-29</td>
<td>F</td>
<td>Not satisfactory – may need to be retaken</td>
</tr>
</tbody>
</table>

The College's Academic and Examination Regulations:

http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Mitigating Circumstances Policy and Procedures:


College Policy on Exams and Religious Obligations:

4. Examinations

Examination guidance and regulations

Materials Permitted in Examinations

- Pencil cases which must be clear plastic.
- College identity cards (i.e. swipe card) which must be displayed on your desk.
- Pens, erasers and other drawing instruments as required.

Unless specified or designated “Open Book”, no additional materials may be introduced into examinations by candidates. If, in the opinion of the Board of Examiners, such materials are required, they will be provided or notified to all candidates and the standard examination rubric amended to state that they will be provided or allowed. Calculators will be provided by the Department. We are currently using Casio FX85GTplus. Dictionaries are not permitted.

No food is permitted in an examination room unless prior permission has been given due to medical need. No drinks are permitted except for water in clear plastic bottles.

Conduct of Examinations

- Be prepared.
- Take with you only the items listed above.
- Arrive 15 minutes before the exam is scheduled to begin.
- When you enter the examination room, do so in SILENCE.
- Switch off your phones (and other electronic devices) and place them in your bag.
- Leave your bags in the area indicated by the Invigilator or Supervising Academic.
- Find the desk with the examination card which has your candidate number (or name) on it, then sit down at this desk.
- **DO NOT turn over or open your examination paper until you are instructed to do so by the Invigilator.** However you may start to fill in the front of your answer book giving:
  1. Candidate number (CID).
  2. Degree (Subject).
  3. Title of Paper.
  4. Date.

- You **MAY NOT SPEAK** to anyone other than the Invigilator. If you do need to speak to the Invigilator, raise your hand. Speak in a quiet voice so as not to disturb the other candidates.
- Write in **black or blue** ink. Candidates are not permitted to use **red or green** ink, or to use any writing implement that is capable of producing red or green marks on the script. You should **not** write in pencil.
- If unsure of the meaning of a word or question in the examination, write down your interpretation of that word or question, and continue.
- The use of correction fluids (e.g. Snopake® and Tippex®) is explicitly not permitted.
- Candidates should indicate incorrect work by drawing a single diagonal line through the work concerned.
- At the end of the examination, stop writing when instructed to do so by the Invigilator or Supervising Academic.
• Ensure that your answer book and all supplementary papers carry your College Identifier Number (which is also your candidate number), and that all graph paper and supplementary answer books are securely tied together inside the back cover of the main answer book.

• Remain seated and silent. There may be candidates with additional time.

• When all examination materials have been collected by the examination team and you have been told you may leave, please do so in silence, collecting your belongings on the way out. You may not remove any examination material from the room.

Exam Technique

• Read the rubric carefully BEFORE answering any questions.

• Take some time to read through the questions and make a sensible decision as to which questions to tackle.

• Ask yourself:
  o Which questions can I answer fully?
  o Out of the questions I cannot answer fully, which ones can I answer the majority of?
  o Am I fulfilling the exam rubric?
  o Example: How much time should you spend answering each question? If there are five questions to complete in three hours, that is approximately 35 minutes per question.

• If you make a mistake just put a line through your work.
5. Plagiarism

1. Introduction to Plagiarism

You are reminded that all work submitted as part of the requirements for any examination (including coursework) of Imperial College must be expressed in your own words and incorporate your own ideas and judgements.

Plagiarism, that is the presentation of another person’s work, thoughts or words as though they were your own, must be avoided, with particular care in coursework, essays and reports written in your own time. Note that you are encouraged to read and criticise the work of others as much as possible. You are expected to incorporate this in your thinking and in your coursework and assessments, but you must acknowledge and label your sources.

Direct quotations from the published or unpublished work of others, from the internet, or from any other source must always be clearly identified as such. A full reference to their source must be provided in the proper form and quotation marks used. Remember that a series of short quotations from several different sources, if not clearly identified as such, constitutes plagiarism just as much as a single unacknowledged long quotation from a single source. Equally, if you summarise another person’s ideas or judgements, figures, diagrams or software, you must refer to that person in your text, and include the work referred to in your reference list or bibliography. Staff are able to give advice about the appropriate use and correct acknowledgement of other sources in your own work.

The direct and unacknowledged repetition of your own work which has already been submitted for assessment can constitute self-plagiarism. Where group work is submitted, this should be presented in a way approved by your Department. You should therefore consult your tutor or course director if you are in any doubt about what is permissible. You should be aware that you have a collective responsibility for the integrity of group work submitted for assessment.

The use of the work of another student, past or present, constitutes plagiarism. Where work is used without the consent of that student, this will normally be regarded as a major offence of plagiarism.

Failure to observe these rules may result in an allegation of cheating. Cases of suspected plagiarism will be dealt with under the College’s Exams, Assessments and Regulations, & Plagiarism, Academic Integrity & Exam Offences, a full copy of which can be found at the following: [http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/](http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/) and is likely to result in a penalty being taken against any student found guilty of plagiarism.

There have been in the past a few cases of plagiarism in this Department, where we operate a zero-tolerance policy, leading to penalties that range from voiding a coursework mark to expulsion from the course. In the majority of these cases, plagiarism was the result of poor practice and lack of awareness, so you are strongly advised to familiarise yourself with what constitutes plagiarism and to seek clarification if and when in doubt.
2. Ethics and Academic Integrity

There are at least two very good reasons why plagiarism should be allowed no place in the academic business of Imperial College, and why it must therefore be met by severe punishment whenever it is encountered.

At its most fundamental, plagiarism is seeking to deceive somebody – one’s teachers or examiners, for example – by presenting the ideas of another person as though the ideas were one’s own – whether with that person’s assistance, or by theft. Deception and intellectual theft are morally unacceptable in any well-ordered society. In a society of professionally licensed engineers, such conduct is even more reprehensible in that it undermines the ethical foundation on which professional practice is based.

There is also a question of academic integrity. Students who knowingly use plagiarism as a painless way of compiling the work needed for assessments, and teachers who knowingly allow students to do it, are both contributing to a blight that undermines the quality and integrity of the degree qualification.

Students under intense pressure to produce a design, a technical report, or a dissertation may feel tempted to resort to plagiarism. They must resist. The Imperial College degree is highly prized because it is respected far and wide as a true mark of achievement. To safeguard the integrity of its degrees, Imperial College staff must take action whenever plagiarism is suspected. As for students, they must expect that the penalty for a student who is guilty of this offence will normally be severe.

3. Definition of Plagiarism

Plagiarism is the presentation of another person’s thoughts, words, images or diagrams as though they were your own – for example when you copy someone else’s work or use their ideas in your coursework, thesis, report etc, and then do not acknowledge that you have done this.

Definition:

‘The wrongful appropriation or purloining, and publication as one’s own, of the ideas, or the expression of the idea (literary, artistic, musical, mechanical, etc.) of another.’


Other forms of plagiarism include self-plagiarism, which involves using your own prior work without acknowledging its reuse; and collusion, which involves sharing or copying (individual) coursework.

Plagiarism, whether intentional or unintentional, is considered a cheating offence and must be avoided, with particular care on coursework, essays, reports and projects written in your own time, and also in open and closed book written examinations.
Plagiarism is classified as either Minor or Major in nature, this is normally determined by the weight, or marks value, attached to the work submitted. However, the following would also be classified as major:

- Two cases of Minor plagiarism by the same individual
- Copying the work of another student without their knowledge
- Dissertation/Major Project
- Where the student does not admit that plagiarism has occurred, and that the plagiarism offence is upheld on appeal.

You are not permitted to act in collusion with another student or person, nor are you permitted to request or arrange for another individual to submit your coursework for you.

You must NEVER:

- Share your coursework, either electronically or in paper copy. If copying of material occurs as a result of such sharing, both parties are considered to have actively taken part in plagiarism.
- Give your coursework, whether electronically or in paper copy, to someone else to submit. If copying of material occurs as a result of such activity, both parties are considered to have actively taken part in plagiarism.

4. Collaboration (joint & group work) and Collusion

Students can struggle to understand the difference between collaboration and collusion.

Collaboration: Unlike collusion (where the work of another student is intentionally used with that student’s consent) which equates to deception, collaboration is encouraged as a professional skill much needed in engineering work. Collaboration involves mutual effort and joint work, to the benefit of all the parties involved, and where appropriate it should always be acknowledged, via footnotes for example. Students required to submit individual pieces must be clear on the distinction between the two.

Discussing coursework exercise submission with colleagues is fine: – what does the teacher expect from the work, what different approaches might there be, how much detail would be needed, how structured should the report be? In exploring with a colleague a range of approaches, or how to obtain specific solutions, one finds a positive help in learning something new. However, if the work is required to be an individual submission, then a line must be drawn where joint work is left behind and the individual work which is submitted for assessment should take over.

The results or calculations that form the basis of the report should be obtained by the individual student who is submitting the report as his/her own work, unless there is a clear expectation that others would be involved – as in the results of a survey – but then the contribution of the others should be made clear (for example, as footnotes in the report). The student is expected to write the report in his/her own words, to think of his/her own interpretations of the results and to make his/her own conclusions and recommendations.
Group work, for example group design projects, is work which is set by the teacher for joint working between two or more students and in which it is clearly understood that the teacher will give the assessment for the joint work undertaken. This provides valuable working experiences and learning opportunities, but these high-minded intentions can be severely undermined if any member of the group should not contribute in equal measure with his/her colleagues.

A student should always assume that coursework is individual work, unless it is clear that group assessment is planned by the teacher. If in doubt, seek the teacher’s advice about what working practices are acceptable. Do not hand over your work, under any circumstances, to another student.

**Collusion:** Where the work of another student is used with that student’s consent.

### 5. Referencing

The recommended method of referencing is the Harvard style (author-date). All students have free access to RefWorks, an online reference management software package. More information is at the library website:

http://www.imperial.ac.uk/admin-services/library/learning-support/reference-management/

and library staff will provide training (contact details in section 6).

### 6. Advisory Services

**Academic Staff**

Your main source of information, and the College’s main source for the recognition of plagiarism, is the academic staff. Please be aware that you can approach them for advice and information if you are unsure or require clarification.

**The Library**

You can contact your librarian for advice, either in person or by emailing:

**Liaison Librarian:** Nicole Urquhart, n.urquhart@imperial.ac.uk

**Department Librarian:** Callum Munro c.munro@imperial.ac.uk

If you do have a query about a reference layout, include as much information as you have about the item you need help with.

The Central Library provides several sources of further information relating to referencing and plagiarism awareness:

- A guide to referencing and citing correctly, including how to use the Harvard style is available at http://www.imperial.ac.uk/admin-services/library/learning-support/reference-management/
Further information about plagiarism awareness within College, please see the library website at http://www.imperial.ac.uk/admin-services/library/learning-support/plagiarism-awareness/

In addition you can access the Library’s online Blackboard course, “Ensuring Integrity 1: Plagiarism Awareness” for Master’s students, using your College username and password. The course is available at http://bb.imperial.ac.uk and contains a section on plagiarism and how to avoid it.

Turnitin-UK

TurnitinUK is an online service hosted at www.submit.ac.uk that enables institutions and staff to carry out electronic comparison of students' work against electronic sources including other students' work. Once papers have been submitted to the system they become part of the database, and will be used for future checking.

IP / Data Protection

Some people have asked whether departments need to seek permission from students before submitting their work to a plagiarism detection system. The answer is no as the registration form, which is signed by students, states the following:

The College may submit your coursework to an external plagiarism detection service. By registering with the College, you are giving your consent for any of your work to be submitted to such a service'.

JISC Plagiarism Advice.org

www.plagiarismadvice.org/

Emphasis is on academic good practice from the lecturer's perspective, but the service can also provide help to students.

7. Submission of Individual Items of Coursework

Copying the work of others without acknowledgement of the source of the information is academic fraud, known as plagiarism. Wilfully copying is outright cheating, forgetting to list references and reference material is ineptitude. Neither form of plagiarism is acceptable and may well result in one or more parties, deemed to be involved, being awarded a mark of zero.

All coursework, project work and research submissions, including dissertation must contain the following statement, signed by the student.
Declaration: I confirm that this submission is my own work. In it, I give references and citations whenever I refer to, describe or quote from the published, or unpublished, work of others.

Signature:___________________

Failure to submit the signed declaration with all written works will result in their being unmarked, or returned with a mark of zero.

An exemplar of a Coursework Cover Sheet is given on the following page.

More information on the actions taken by the Department following cases of suspected plagiarism will be provided to you at the time that you are given your first coursework assignments.
6. Board of examiners

Board of Examiners

CHAIR

Professor Lidija Zdravkovic

EXAMINATIONS OFFICER

Dr Klementyna Gawecka

MEMBERS: All staff involved in the delivery, setting, and marking of assessment for the programmes.

External examiners

Abir Al-Tabbaa, University of Cambridge

Rafael Jimenez, Universidad Politecnica de Madrid

Helmut Schweiger, TU, Graz, Austria

It may happen that Master's level students to have some form of academic or social interaction with their external examiners at some point during or after their studies as well as during the assessment process itself.

It is inappropriate for you to submit complaints or representations direct to external examiners or to seek to influence your external examiners. Inappropriate communication towards an examiner would make you liable for disciplinary action.

External examiners reports digests can be found here:

www.imperial.ac.uk/staff/tools-and-reference/quality-assurance-enhancement/external-examining/information-for-staff
7. Location and facilities

Imperial has a number of campuses in London and the South East. All have excellent travel links and are easily accessible via public transport.

Your main location of study will be:

Department of Civil and Environmental Engineering
Skempton Building
South Kensington Campus
Imperial College London
London SW7 2AZ

The Skempton building can be accessed from 07.00-00.00 daily. The main entrance requires the use of your college ID card between the hours of 07.00-08.00 and 18.00-00.00. During weekends and vacation periods you will be required to use your college ID card each time you enter and exit the building.

Smoke-Free Policy

All Imperial campuses and properties are smoke-free. This means that smoking by staff and students is not permitted on or within 20 metres of College land. The policy covers all College properties, including student accommodation and sports grounds.

Facilities

PC laboratories

The Skempton Building houses three PC laboratories located in rooms 208, 314, and 317. These facilities are shared space with the Department of Aeronautics and the Department of Mechanical Engineering. They are open to all registered students of the aforementioned Departments from 08.00-22.30 daily, except when timetabled for classes. Further PC facilities are available in, and shared with, the City and Guilds Building, and the College’s Central Library.

A full list of the College rules regarding computer use are available at:

http://www.imperial.ac.uk/admin-services/ict/

Shared teaching space

The Faculty of Engineering is committed to utilising its facilities and teaching space, hence there are a number of shared teaching spaces between Departments/Buildings. Teaching space in the Skempton Building is often timetabled to accommodate lectures between the Civil and Environmental, Mechanical, and Aeronautical Engineering Departments.
<table>
<thead>
<tr>
<th>Room</th>
<th>Level</th>
<th>Capacity</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Room 002</td>
<td>0</td>
<td>20</td>
<td>Seminars – presentations</td>
</tr>
<tr>
<td>Teaching Room 060A</td>
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<td>30</td>
<td>Lectures – tutorials – examinations – presentations</td>
</tr>
<tr>
<td>Teaching Room 060B</td>
<td>0</td>
<td>30</td>
<td>Lectures – tutorials – examinations – presentations</td>
</tr>
<tr>
<td>Teaching Room 060C</td>
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<td>Combined: 96 Lectures – tutorials – examinations – presentations</td>
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<tr>
<td>Learning Centre 062</td>
<td>0</td>
<td>24</td>
<td>Exams – tutorials – study groups</td>
</tr>
<tr>
<td>Teaching Room 064A</td>
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<td>Teaching Room 163</td>
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<td>Lectures – tutorials – exams – presentations</td>
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<td>Lecture Theatre 164</td>
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<td>Teaching Room 165</td>
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<td>Lectures – tutorials – exams – presentations</td>
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<td>Lectures – presentations – seminars</td>
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<tr>
<td>Lecture Theatre 207</td>
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<td>50</td>
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<td>Munro Computing Lab 208</td>
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<td>70</td>
<td>Computing – lectures – tutorials</td>
</tr>
<tr>
<td>Reprographics Room 218</td>
<td>2</td>
<td>N/A</td>
<td>Printing and binding facilities</td>
</tr>
<tr>
<td>Laboratory Room 221</td>
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<td>N/A</td>
<td>Intelligent Infrastructure Transport Systems (IITS) Laboratory</td>
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<td>Teaching Room 224</td>
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<td>60</td>
<td>Lectures – tutorials – presentations – seminars – practicals</td>
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<td>Mezzanine Lab 240</td>
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<td>Workshops – lab practicals – design classes</td>
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<td>Teaching Room 315</td>
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<td>Laboratory Room 509</td>
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<td>Environmental Laboratory (Roger Perry)</td>
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<tr>
<td>Laboratory Room 528</td>
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<td>N/A</td>
<td>Geotechnics Laboratory</td>
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<tr>
<td>Teaching Room 601</td>
<td>6</td>
<td>40</td>
<td>Lectures – tutorials – meetings – exams – presentations</td>
</tr>
</tbody>
</table>
While the Department of Civil and Environmental Engineering is housed in the Skempton Building, teaching may also be delivered outside of Skempton, primarily in the City and Guilds Building.

Within the Skempton Building, the teaching areas are to be found on levels 0, 1, 2, 3, and 6, with the exception of the teaching laboratories which are located on levels 0, 1, 2, and 5. [http://www.imperial.ac.uk/engineering/students/current/teaching-spaces/](http://www.imperial.ac.uk/engineering/students/current/teaching-spaces/)

**College ID cards**

For MSc students who have uploaded their photos and registered online, ID cards can be collected from the General Office, Skempton Building following confirmed attendance at the Day 2 Health and Safety induction. For those who have their photos taken on arrival, the ID card is normally available from the General Office in the Skempton Building within two days.

**ICT resources**

Find information on activating your College account, connecting to Wifi, using the Virtual Learning Environment (Blackboard Learn), and more ICT resources available for new students, visit:

- [http://www.imperial.ac.uk/admin-services/ict/new-to-imperial/students/](http://www.imperial.ac.uk/admin-services/ict/new-to-imperial/students/)

**Printing and binding**

There are five multi-function printers in the Skempton Building. The first is in room 317, two are located in the BOSS Space on level 2, and a further two in room 218 adjacent the BOSS Space. Binding facilities are also accessible in room 218.

Additionally the Service Point Print Shop is located in room 024 of the Sherfield Building. Service Point can be contacted by email at:

- imperial.college@servicepointuk.com

There are networked printers across the South Kensington Campus, which you can access with your College ID card. When you print a document it is sent to a common print queue, meaning that you can collect it from any touch card printer that your College ID card gives you access to, including the Central Library and Departments across the Campus.


**Lockers**

There are 312 lockers located on Level 3, Skempton, of which 156 have been allocated to MSc students. If you would like to be allocated a locker you need to complete the relevant form below. Lockers can only be allocated to full time students. Numbers are limited and allocated on receipt of the form:

- [https://skempton.wufoo.eu/forms/z1f2agyg1vq2fi2/](https://skempton.wufoo.eu/forms/z1f2agyg1vq2fi2/)
The Department's Postgraduate/General Office is located in room 118 in the ground floor of the Skempton Building, open Monday-Friday 08.00-17.30.

**Lost property**
If you think you have lost something within the Department your first port of call is the Reception. If it is not there you should check with the Security Office in Sherfield as it may have been handed in there. (If an item is handed in with ID, an email will be sent to the owner immediately to inform them).

All items found within the Department (e.g. keys/phones/bags) should be handed into the Reception. All items found outside the Department should be handed into the Security Office in the Sherfield Building in the South Kensington campus.

[http://www.imperial.ac.uk/estates-facilities/security/lost-and-found-property/](http://www.imperial.ac.uk/estates-facilities/security/lost-and-found-property/)

**Facilities management**
Showering facilities are available within the Department, and are located in the toilets on levels 0 and 3.

Bicycles are not permitted within the Department. This is College policy. The following link provides information on suitable bicycle storage within the South Kensington Campus:

[http://www3.imperial.ac.uk/estatesfacilities](http://www3.imperial.ac.uk/estatesfacilities)

**Room bookings**
Room bookings on weekdays during term-time may be requested via an online form, or in person at the Postgraduate/General Office. This form is to be used only for room booking requests in the Skempton Building.

[https://skempton.wufoo.eu/forms/ksiogd90gibuje/](https://skempton.wufoo.eu/forms/ksiogd90gibuje/)

Please note: **We do not make room bookings for Imperial College Union Societies.** These need to be made via the Student Union. Room booking requests outside of normal College hours should be made via the Conference Office: conferenceandevents@imperial.ac.uk

**Shuttle bus**
A free shuttle bus runs between our South Kensington, White City and Hammersmith Campuses on weekdays. Seats are available on a first-come, first-served basis. You need to show your College ID card to board. Download the timetable at:

[www.imperial.ac.uk/estates-facilities/travel/shuttle-bus](www.imperial.ac.uk/estates-facilities/travel/shuttle-bus)
Maps

Campus maps and travel directions are available at:

- www.imperial.ac.uk/visit/campuses

Accessibility

Information about the accessibility of our South Kensington Campus is available online through the DisabledGo access guides:

- www.disabledgo.com/organisations/imperial-college-london-2
8. Working while studying

If you are studying full time, the College recommends that you do not work part-time during term time. If this is unavoidable we advise you to work no more than 10–15 hours per week, which must be principally at weekends and not within normal College working hours.

Working in excess of these hours could impact adversely on your studies or health.

If you are here on a Tier 4 visa you are not permitted to work more than 20 hours a week during term time. Some sponsors may not permit you to take up work outside your studies and others may specify a limit.

If you are considering part-time work during term time you are strongly advised to discuss this issue with your supervisor/cluster administrator/course director. If you are on a Tier 4 visa you should also seek advice from the International Student Support team regarding visa limitations on employment.

Please refer to our policy on working while studying:

9. Health and safety

You are responsible for looking after your own health and safety and that of others affected by your College-related work and leisure activities. You must:

- Comply with all local and College policies, procedures and codes of practice and with the arrangements which the College has in place to control health and safety risks.
- Ensure that your activities do not present unnecessary or uncontrolled risks to yourself or to others.
- Attend appropriate induction and training.
- Report any accidents, unsafe circumstances or work-related ill health of which you become aware to the appropriate person.
- Not interfere with any equipment provided for Health and Safety.
- Inform your supervisor or the person in charge of the activity in cases where you are not confident that you are competent to carry out a work or leisure activity safely, rather than compromise your own safety or the safety of others.

The College’s Health and Safety Policy can be found at:


Your Departmental safety officer is:

- Dr Geoff Fowler
- Room 413, Skempton Building
- 020 7594 5973
- g.fowler@imperial.ac.uk

You are required to complete inductions and attend training sessions to safely complete this course. These include:

- Health and Safety induction, at which a checklist must be completed, signed by the student, and a relevant member of staff (Note: ID cards, available from the Postgraduate/General Office will only be given to those presenting the completed and signed Health and Safety checklist).

A copy of the Department Health and Safety Booklet can be found in Appendix F.

The College Safety Department

The Safety Department offers a range of specialist advice on all aspects of safety. This includes anything which you feel might affect you directly, or which may be associated with teaching, research or support service activities.
The College’s activities range from the use of hazardous materials (biological, chemical and radiological substances) to field work, heavy or awkward lifting, driving, and working alone or late.

All College activities are covered by general health and safety regulations, but higher risk activities will have additional requirements.

The Safety Department helps departments and individuals ensure effective safety management systems are in place throughout the College to comply with specific legal requirements.

Sometimes the management systems fail, and an accident or a near-miss incident arises; it is important that we learn lessons from such situations to prevent recurrence and the Safety Department can support such investigations. All accidents and incidents should be reported online at:

[www.imperial.ac.uk/safety](http://www.imperial.ac.uk/safety)

To report concerns or to ask for advice you should contact your programme director, academic supervisor or departmental safety officer in the first instance. You may also contact the Safety Department directly.

**Occupational Health requirements**

The College Occupational Health Service provides services to:

- protect health at work
- assess and advise on fitness for work
- ensure that health issues are effectively managed

The Service promotes and supports a culture where the physical and psychological health of staff, students and others involved in the College is respected, protected and improved whilst at work.

[www.imperial.ac.uk/occupational-health](http://www.imperial.ac.uk/occupational-health)

**Communications**

It is not possible to provide a service for incoming telephone messages except in the case of emergency. Please ensure that your family/next of kin are aware of the following contacts:

**Civil Engineering General (Postgraduate) Office**

- 00 44 (0) 207 594 5929 (Fionnuala Donovan)
- 00 44 (0) 207 594 5932 (Yamini Chikhlia)
- 00 44 (0) 207 594 5931 (Melanie Hargreaves)
Please ensure that your student-e-service contact details are up-to-date at all times, including your next-of-kin-contact information.

The Department is not able to provide a postal or fax service.

**Working alone and emergency contact numbers**

It is prohibited under College safety regulations for any person to work alone in a laboratory or workshop at any time. At least one other person must be within calling distance. All members of the College must know how to contact emergency services.

Please save the following number in your mobile/cell phone for use in all emergencies anywhere on the College’s South Kensington campus – including where an ambulance is felt to be needed, the call will go direct to the College Security Control Desk: **020-7589-1000**

If using an internal College phone, the number to call is **4444**.

Any activity involving tools or machinery is deemed to be "working in a laboratory or workshop"; purely office or computing activities are excluded.

(Full details are given at the front of the orange Safety Booklet – see student handbook).
10. College policies and procedures

Regulations for students

All registered students of the College are subject to the Regulations for Students, the College Academic and Examination Regulations and such other regulations that the College may approve from time to time.

www.imperial.ac.uk/about/governance/academic-governance/regulations
www.imperial.ac.uk/students/terms-and-conditions

Appeal and complaints procedures

We have rigorous regulations in place to ensure assessments are conducted with fairness and consistency. In the event that you believe that you have grounds for complaint about academic or administrative services, or wish to appeal the outcome of an assessment or final degree, we have laid out clear and consistent procedures through which complaints and appeals can be investigated and considered:

www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline

Academic integrity

You are expected to conduct all aspects of your academic life in a professional manner. A full explanation of academic integrity, including information on the College’s approach to plagiarism is available on the Student Records and Data website:


Intellectual property rights policy

For further guidance on the College’s Intellectual Property Rights Policy, please contact the Research Office:

www.imperial.ac.uk/research-and-innovation/research-office/ip

Use of IT facilities

View the Conditions of Use of IT Facilities:

http://www.imperial.ac.uk/admin-services/ict/self-service/computers-printing/staff-computers/conditions-of-use-for-it-facilities/
11. Well-being and advice

Student Space
The Student Space website is the central point for information on health and well-being.

- [www.imperial.ac.uk/student-space](http://www.imperial.ac.uk/student-space)

Director of Student Support
The Director of Student Support has overall responsibility for all matters relating to student support and well-being.

- [www.imperial.ac.uk/people/d.wright](http://www.imperial.ac.uk/people/d.wright)

Departmental support and tutors
In addition to your Personal Tutor, a system of academic and pastoral care is in place to make sure you have access to the appropriate support throughout your time here. This includes:

**Postgraduate Tutor**
In the event of an issue arising, within the Department there are a number of avenues for you to seek support. This will include your departmental Postgraduate Tutor, and other designated staff such as programme directors and senior administrative staff.

**Faculty Senior Tutor**
There are a number of avenues within the College to seek help with academic or pastoral matters: [http://www.imperial.ac.uk/student-space/](http://www.imperial.ac.uk/student-space/). In the event that you would like to seek additional support or guidance, or that you wish to air your issues in confidence, the Faculty Senior Tutor, Dr Lorraine Craig, can be contacted by email l.craig@imperial.ac.uk in the first instance. Depending on the nature of your query, it may be passed onto other more relevant staff.

**Advice services**
The tutor system is complemented by a College-wide network of advice and support. This includes a number of specialist services.

**Careers Service**
The Careers Service has strong links to your Department and you will have a named Careers Consultant and Placement and Internship Adviser who will run both group sessions and individual meetings within your Department. You can arrange to meet with your linked Careers Consultant or Placement and Internship Adviser either in your Department or centrally on Level 5 Sherfield where the Careers Service is based.
Visit the Career Service’s website to:

- Book a careers appointment
- Find resources and advice on successful career planning

www.imperial.ac.uk/careers

**Counselling and Mental Health**

The Student Counselling and Mental Health Advice Service offers short-term counselling to all registered students. The service is free and confidential. Counsellors are available at the South Kensington, Hammersmith and Silwood Park Campuses.

www.imperial.ac.uk/counselling

**Financial support and tuition fees**

If you’ve got any questions about student financial support (loans, scholarships and research council studentships, US and Canadian loans) then contact the Student Financial Support team:

- **020 7594 9014**
- **student.funding@imperial.ac.uk**

If you suddenly find yourself in financial difficulties or experience an unexpected change in circumstances, you may be eligible to apply for emergency financial help through the Student Support Fund. The Fund offers a one-off payment of up to £2,000 to cover such emergencies as last minute accommodation and travel necessities, equipment and childcare. It does not have to be repaid.

- [http://www.imperial.ac.uk/students/fees-and-funding/financial-assistance/student-support-fund/](http://www.imperial.ac.uk/students/fees-and-funding/financial-assistance/student-support-fund/)

For tuition fees queries, contact the Tuition Fees team:

- **020 7594 8011**
- **tuition.fees@imperial.ac.uk**

**Imperial College Union (ICU) Advice Centre**

Imperial College Union runs the Advice Centre independently of the College with advisers on hand to provide free, confidential, independent advice on a wide range of welfare issues including housing, money and debt, employment and consumer rights, and personal safety.

www.imperialcollegeunion.org/advice
**Student Hub**

The Student Hub represents a single point of contact for all key administrative information and support. The Student Hub team can help you with enquiries about:

- Accommodation (including checking contracts for private accommodation)
- Admissions
- International student enquiries
- Research degrees
- Student financial support
- Student records
- Tuition fees

![Location Icon] Level 3, Sherfield Building, South Kensington Campus

![Phone Icon] 020 7594 9444

![Email Icon] student.hub@imperial.ac.uk

![Website Icon] www.imperial.ac.uk/student-hub

**Health services**

**NHS Health Centre and finding a doctor**

Even if you’re fit and healthy we recommend that you register with a local doctor (GP) as soon as you arrive in London. For help finding your nearest GP see the Student Space website:

![Website Icon] www.imperial.ac.uk/student-space/here-for-you/find-a-doctor

There is an NHS Health Centre on our South Kensington Campus which you may visit during clinic hours if you’re feeling unwell. Students living within the practice catchment area are encouraged to register with the Centre.

![Website Icon] www.imperialcollegehealthcentre.co.uk

**NHS Dentist (based in the Health Centre)**

Imperial College Dental Centre offers a full range of NHS and private treatment options.

![Website Icon] www.imperial.ac.uk/student-space/here-for-you/dentist

**Disability support**

**Disability Advisory Service**

The Disability Advisory Service provides confidential advice and support for all disabled students and students with specific learning difficulties.
If you think you may have dyslexia or another specific learning difficulty but have never been formally assessed, the Disability Advisory Service offers initial screening appointments.

- **Room 566**, Level 5, Sherfield Building, South Kensington Campus
- **020 7594 9755**
- **disabilities@imperial.ac.uk**
- **www.imperial.ac.uk/disability-advisory-service**

**Departmental Disability Officers**

Departmental Disability Officers are the first point of contact within your department. They can apply for additional exam arrangements on your behalf, and will facilitate support within your Department.

Your Departmental Disability Officer is

- **Mrs Louise Green**
- **Undergraduate Office, Room 401**
- **020 7594 6045**
- **l.green@imperial.ac.uk**

More information on Departmental Disability Officers is available at:

- **www.imperial.ac.uk/disability-advisory-service/support/ddos**

More information on procedures for the consideration of additional exam arrangements in respect of disability is available at:


If you have any issues regarding a disability that you would like to discuss with your Department, or if you believe you will require special examination arrangements due to a disability, please feel free to speak to Mrs Louise Green in Room 401, or email for an appointment.
Library and IT

Information and Communications Technologies (ICT)
If you’re having problems with technology (including computers, laptops and mobile devices), you can get help from ICT’s Service Desk.

020 7594 9000
www.imperial.ac.uk/ict/service-desk

Software shop
The Software shop offers a variety of general and subject specific software programs and packages for free or at a discounted price for Imperial students.
www.imperial.ac.uk/admin-services/ict/shop/software

Central library
The Central Library at South Kensington is open around the clock pretty much all year. Make sure you find out who your departmental librarian is as they’ll be able to help you find resources for your subject area. Also, don’t forget to check out the Library’s range of training workshops and our other campus libraries for access to specialist medicine and life sciences resources. Alongside these physical spaces and resources, the Library provides over 170,000 electronic books, journals and databases available both on and off campus and a free document delivery service to help you source books and articles from around the UK and the rest of the world:
www.imperial.ac.uk/library

Departmental library
The Civil Engineering Library is open exclusively to students and staff of the Department. Funded by the Department, the Library hosts a collection of around 15,000 books, 400 online and print journal titles, a large collection of reports from industry, and historical collections. It is open from 9.30 to 17.00 on weekdays (20.00 on Thursday) with opening extended to 21.00 during examination periods.

Our dedicated Librarian offers support with coursework in one-to-one or group format, including how to find the best information for your study. The Library engages with students via Twitter @CivEngLib.

Further information about the library and its services is available from the library staff and from the Departmental Library webpage:

Callum Munro
Departmental Library, Room 402
http://www.imperial.ac.uk/civil-engineering/about-us/library/
Institution of Civil Engineers Library (ICE)

The library located at the Institution of Civil Engineers (ICE) is home to the world’s largest dedicated collection of civil engineering materials. In addition to printed books and journals, the ICE library also offers access to a number of digital services, including e-books and advanced search tools, and a quiet place to work. All ICE members can borrow up to three items in person, or by post.

Institution of Civil Engineers Library
1 Great George Street, London, SW1P 3AA

020 7665 2251
library@ice.org.uk
https://www.ice.org.uk/disciplines-and-resources/ice-library-and-digital-resources

Religious support

The Chaplaincy Multi-Faith Centre has chaplains from many different religions, as well as prayer rooms and information on places of worship. In addition, it runs meditation classes and mindfulness workshops for stress management. There is a student-run Islamic prayer room on campus and separate areas available for male and female Muslims.

www.imperial.ac.uk/chaplaincy

Support for international students

English language support

The Centre for Academic English provides free in-sessional English courses for international students while they are studying. These include classes and workshops on academic language, social language, the four skills of reading, writing, listening and speaking, 1-1 consultations with a tutor to work on a piece of academic writing or an oral presentation, self-study resources in the VLE Blackboard, and the Conversation Project, which partners students with a native-speaker volunteer to practise social and conversational English.

www.imperial.ac.uk/academic-english

International Student Support team

Students from outside the UK make up around half of our student population, so our International student Support team offers year-round support to help our international students settle into Imperial life. This includes UK visa and immigration advice and trips to different places of interest.

www.imperial.ac.uk/study/international-students
12. Student records and data

The Student Records and Data team are responsible for the administration and maintenance of the student records for all students studying at the College. This includes enrolments, programme transfers, interruption of studies, withdrawals and processing of examination entry for research degree students. The team also use this information to fulfil reporting duties to the Student Loans Company, Transport for London and the UKVI, as well as other external bodies.

The team is currently responsible for the processing of student results and awards on the student record system as well as the production and distribution of academic transcripts and certificates of award.

Student Records and Data produce a variety of standard document requests for both current and previous students including council tax letters, standard statements of attendance and confirmation of degree letters.

Appeal administration also sits within the team, as does the responsibility for confirming qualifications via the Higher Education Degree Datacheck service.

**Student records and examinations**

📞 +44 (0)20 7594 7268  
✉️ records@imperial.ac.uk

**Degree certificates**

📞 +44 (0)20 7594 8037  
✉️ certificates@imperial.ac.uk
13. Work-life balance

The pace and intensity of postgraduate study at Imperial can be demanding so it’s important to find time for outside interests.

Civil Engineering Society (CivSoc)

The Civil Engineering Society is the departmental student society, of which all Undergraduate and Postgraduate students are automatically members. Run by an elected committee of students, CivSoc is one of the most active departmental societies in the College and organises regular events throughout the academic year. These include numerous lunchtime lectures given by industrial companies, site visits, social events and parties. The highlight of the CivSoc year is the extremely popular international trip in the spring, open to all students in the Department. Additionally, CivSoc writes and publishes the departmental student newspaper LIVIC.

All students are encouraged to participate in CivSoc-run activities. Announcements concerning upcoming events and society news are emailed to all members, displayed on the screen in the second floor Breakout Student Space, as well as being available on CivSoc’s website and social media pages.

Chair: Susie McAllister

Treasurer: Yimo Yan

Secretary: Max Castello

Industrial Liaison Officer: Cheng Kwang

Tour Officer: Hippolyte Mounier-Vehier

Events Officer: Christina Trigle

LIVIC Editor: Jian Chew

Marketing and Web Officer: Remi Pelletier

Alumni and Mums & Dads: Ottilie Shiyong Liu

Department Representative: Marthe Boulleau
Imperial College Union

The Union’s range of 375+ student-led clubs, societies and projects is one of the largest of any UK university, opening up lots of ways for you to enjoy your downtime.

www.imperialcollegeunion.org/about-us

Graduate Students’ Union

The Graduate Students’ Union is the postgraduate arm of Imperial College Union. The GSU works alongside the Imperial College Union President to ensure that the requirements of postgraduate students are catered for. It also organises a number of academic and social events during the year.

www.union.ic.ac.uk/presidents/gsu

Sport

Beginners and semi-professionals alike will receive a warm welcome in our sports clubs, which are subsidised by Imperial College Union to make it a little bit cheaper to keep doing a sport you love.

Access to swimming facilities, including sauna, steam room and spa at Ethos sports centre, is completely free from your very first day. Gym facilities across all campuses are also free after you’ve completed a fitness orientation for a one-off charge of £40. Please note that there are reduced opening hours during vacation periods.

www.imperial.ac.uk/sport
14. Student feedback and representation

Feedback from students

The College and Union is committed to continually improving your education and wider experience and a key part of this is your feedback. Feedback is thoroughly discussed by your student representatives and staff.

Student representation

Student Representatives are recruited from every department to gather feedback from students to discuss with staff. More information about the role, and instructions on how to become an academic representative, are available on the Imperial College Union (ICU) website.

www.imperialcollegeunion.org/your-union/your-representatives/academic-representatives/overview

Due to the number and complexity of our MSc programme configuration, elections to the positions of Programme Student Representatives are managed within the Department. You will be advised of the processes, both on self-nomination for the positions, and the selections processes, during the cluster induction sessions. Typically we look for one representative from each of the core programmes and one or two from Business Management.

Staff-Student Committee

The Staff-Student Committee is designed to strengthen understanding and improve the flow of communication between staff and students and, through open dialogue, promote high standards of education and training, in a co-operative and constructive atmosphere. College good practice guidelines for staff-student committees are available here:

www.imperial.ac.uk/about/governance/academic-governance/academic-policy/student-feedback

There are three committees: Undergraduate, Master's and Research Students/Staff. They meet once each term, and their remit is as follows:

- To provide a forum for debate about important matters.
- To receive feedback from students.
- To initiate enquiries or investigations on matters of concern to students.
- To represent the interests and requirements of the student body.
- To air grievances.

The membership is drawn from the student body, with members being elected by their peers at the beginning of term, the Student Union, the Graduate Student Association and relevant Departmental Officers.

The Undergraduate SSLC is chaired by the Director of Undergraduate Studies and both the MSc and PhD are chaired by the Postgraduate Tutor, with the Departmental Postgraduate Representative acting as Deputy-Chair.
15. Student surveys

Your feedback is important to your Department, the College and Imperial College Union.

Whilst there are a variety of ways to give your feedback on your Imperial experience, the following College-wide surveys give you regular opportunities to make your voice heard:

- PG SOLE lecturer/module Survey
- Student Experience Survey (SES)
- Postgraduate Taught Experience Survey (PTES) – next due to run in spring 2018

The PG SOLE lecturer/module survey runs at the end of the autumn and spring terms. This survey is your chance to tell us about the modules you have attended and the lecturers who taught them.

For PG SOLE your lecturers will receive their individual numerical results and comments shortly after the survey closes. To make the most of your opportunity to give your feedback, please do not use offensive language or make personal, discriminatory or abusive remarks as these may cause offence and may be removed from the results. Whilst this survey is anonymous, please avoid self-identification by referring to personal or other identifying information in your free text comments.

The Student Experience Survey (SES) is another opportunity to leave your views on your experience. This survey will cover your induction, welfare, pastoral and support services experience.

The Postgraduate Taught Experience Survey (PTES) is the only national survey of Master’s level (MSc, MRes, MBA and MPH) students we take part in. This is the only way for us to compare how we are doing against the national average and to make changes that will improve our Master’s students’ experience in future. PTES covers topics such as motivations for taking the programme, depth of learning, organisation, dissertation and professional development. PTES last ran in spring term 2016 and will run again in spring 2018.

All these surveys are anonymous and the more students that take part the more representative the results so please take a few minutes to give your views.

The Union’s “You Said, We Did” campaign shows you some of the changes made as a result of survey feedback:

[www.imperialcollegeunion.org/you-said-we-did](http://www.imperialcollegeunion.org/you-said-we-did)

If you would like to know more about any of these surveys or see the results from previous surveys, please visit:

[www.imperial.ac.uk/students/academic-support/student-surveys/pg-student-surveys](http://www.imperial.ac.uk/students/academic-support/student-surveys/pg-student-surveys)

For further information on surveys, please contact the Registry's Surveys Team at:

[surveys.registrysupport@imperial.ac.uk](mailto:surveys.registrysupport@imperial.ac.uk)
16. And finally

Alumni services
When you graduate you will be part of a lifelong community of over 190,000 alumni, with access to a range of alumni benefits including:

- Discounts on further study at the College and at Imperial College Business School.
- Alumni email service.
- Networking events.
- Access to the Library and online resources.
- Access to the full range of careers support offered to current students for up to three years after you graduate.
- Access to our Alumni Visitor Centre at the South Kensington Campus, with free Wifi, complimentary drinks, newspapers and magazines, and daytime left luggage facility.

Visit the Alumni website to find out more about your new community, including case studies of other alumni and a directory of local alumni groups in countries across the world.

www.imperial.ac.uk/alumni

Opportunities for further study
After you have completed your Master's programme, you may choose to continue your studies on a PhD, CDT or other CPD programme at Imperial.

http://www.imperial.ac.uk/civil-engineering/prospective-students/postgraduate-research-admissions-phd-engd-mphil/

Explore the Departmental Alumni Profiles to find out what previous graduates have gone on to achieve:

http://www.imperial.ac.uk/civil-engineering/alumni/alumni-profiles/
17. Appendix A: Monitoring Attendance

Since the introduction of Tier 4 of the Points Based System in March 2009, the College has held a license permitting us to sponsor the visas of students from outside the European Union to enable them to attend our courses.

Sponsorship of students, under our Tier 4 Visa License, brings with it an obligation for us to inform the Home Office whenever we withdraw sponsorship from a student. This may be as a result of a student withdrawing or being expelled from their course, interrupting their studies, or not being in attendance. This is reflected in the College’s regulations and procedures to ensure the welfare and academic progress for all students. See Academic Regulation Paragraph 9.4 of the General Regulations for Students:


The College does not wish to discriminate in its treatment of students from outside the European Union, and so all procedures for monitoring attendance and reporting student activity apply equally to all students.

The procedure for compliance adopted for the Master of Science Programme within the Department of Civil and Environmental Engineering is to base the monitoring of attendance around a number of ‘check-points’, which are:

- Start-of-Session Induction.
- Confirmation of attendance at the Health and Safety Induction, which is a requirement of the College for issue of ID cards.
- Submission of selected items of coursework.
- Attendance at Field Trips/Site Visits.
- Examinations and Progress Tests.
- Randomly selected lectures/laboratories/tutorials.
- Scheduled meetings with Personal Tutors and/or Project Supervisors.

In order to make this process efficient, the following shall apply.

- The Cluster Administrator shall conduct the monitoring using a class list supplied by Imperial College Registry.
- There shall be one location (which will be notified to you by email) for the submission of randomly selected coursework related assessment items.
- Each student shall sign the class list at each check-point.
- The Cluster Administrator shall inform the relevant Senior Tutor and Course Director of any student who fails to interact with the College on three consecutive occasions.
- The student will be invited for interview, and a warning issued.
- If non-attendance continues, the Senior Tutor shall inform the Head of Department and the College Registry.
- The Imperial College Registry report directly to relevant authorities, including HEFCE, the UK-VI and sponsors.

The Department expects students to demonstrate their commitment to their degree programme by attending lectures and submitting coursework on time. If students cease to
engage properly with the course, e.g. by being absent without permission or adequate cause, this may be reported to the relevant authorities, and may result in being asked to leave the College. In the case of those attending with Student Visas, this could jeopardise the individual’s ability to stay in the UK.

Internships

Postgraduate students can only undertake work placements if they are an approved part of their course of study. Students who may wish to interrupt their studies to take an internship (in the UK or overseas) will have the sponsorship of their visa withdrawn and will need to apply for a new visa in order to return to their course at a later date.
# Department of Civil and Environmental Engineering

Postgraduate Taught (MSc): Recording of External Study Leave Form
(please see notes overleaf)

This form must be completed by the Student and Supervisor and returned to the Cluster Administrator for processing

<table>
<thead>
<tr>
<th>CID No:</th>
<th>Date of Initial Degree Registration:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student’s Surname:</td>
<td></td>
</tr>
<tr>
<td>Student’s Forename(s):</td>
<td></td>
</tr>
<tr>
<td>Supervisor(s) (print name(s)):</td>
<td></td>
</tr>
<tr>
<td>Research Topic</td>
<td></td>
</tr>
</tbody>
</table>

**Are you a Tier 4 Student?** If yes, please seek advice immediately from the Visa Compliance Team (see notes)  YES / NO

List any previous periods of external study leave:

**Details of External Study Leave**

<table>
<thead>
<tr>
<th>Details of remote location:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Departure date:</td>
<td>Return date:</td>
</tr>
<tr>
<td>Purpose and relevance of external study leave:</td>
<td>Eg. Site visits, field work, remote data gathering</td>
</tr>
<tr>
<td>Details of remote contact: (in case of emergency)</td>
<td></td>
</tr>
</tbody>
</table>

The following to be completed by the principal supervisor

I approve this period of study leave and confirm that I will maintain regular contact with the student named above

Signature of supervisor(s):  

Date:
Recording Study Leave.

This form should be used to cover any and all study time which is spent outside of the UK. for the following situations:

a. Field work and data collection.
b. Study Leave which is not subject to the Placement Learning Policy, such as extended field work. The College’s Off-Site Working procedures should be followed: [http://www.imperial.ac.uk/safety](http://www.imperial.ac.uk/safety)
c. For Tier 4 students the College is required by UKVI to report any time away from the College as a ‘change of study location’ within 10 days of this change taking place. This will not impact on a student’s visa status in the UK.

The form to be:

- completed by the student,
- authorised by the supervisor
- submitted to the Cluster Administrator (who will file a digital copy with the General Office, Skempton Building (cvpgo@ic.ac.uk))

The General Office will be responsible for any further notifications required.

For students with Tier 4 visas

The Visa Compliance Team may be contacted by email on visacompliance@imperial.ac.uk for advice.

Queries regarding this form should be addressed to Fionnuala in the General Office or by email to flo@ic.ac.uk.
Appendix B: Disabilities Statement

Information for students with disabilities, specific learning difficulties or long-term health issues

At Imperial College we recognise that studying at university can be a challenge, especially if you have a disability. We are keen that you have every opportunity to fulfil your potential and graduate with the degree you deserve. It is therefore important that you let us know about any disability, specific learning difficulty or health problem as soon as possible so that we can arrange expert advice and support to enable you to do this.

Some people never think of themselves as having a disability, but students who have experienced any of the issues listed below have found that a little extra help and support has made all the difference to their study experience.

- Specific learning difficulties (such as dyslexia, dyspraxia, AD[H]D).
- Autistic spectrum disorder (such as Asperger’s).
- Deafness or hearing difficulties.
- Long term mental health difficulties (such as chronic anxiety, bipolar disorder, depression).
- Medical conditions (such as epilepsy, arthritis, diabetes, Crohn’s disease).
- Physical disabilities or mobility impairments.
- Visual difficulties.

Where to find help:

**Departmental Disability Liaison Officer**

Mrs Louise Green  
*l.green@imperial.ac.uk*  
Room 401  
020 7594 6045

Mrs Green is your first point of contact within your Department and is there to help you with arranging any support within the Department that you need. She is also the person who will apply for special examination arrangements on your behalf. You need to contact her without delay if you think that you may need extra time or other adjustments for your examinations.

**Disability Advisory Service**

The Disability Advisory Service works with individual students no matter what their disability or level of study to ensure that they have the support they need. Our advisors are committed to providing the best possible support for all students at Imperial College. They understand that each person’s disability can affect them in different ways and therefore the support offered is flexible and tailored to you. We can also help if you think that you may have an unrecognised study problem such as dyslexia. The Service is confidential and information about your support needs is only passed on to others within the College with your agreement and then only in order that you are fully supported. Our advisors never pass on information outside the College or to parents unless you ask them too.
Some of the sorts of things the Disability Advisors can help with are:

- Checking that your evidence of disability is appropriate and up-to-date.
- Arranging a diagnostic assessment for specific learning difficulties.
- Making recommendations for additional exam arrangements, for example extra time or rest breaks.
- Drawing up a “Suggested Reasonable Adjustment” document for you to share with your Department which outlines all of your support needs.
- Arranging and funding the support you need. This can include:
  - Note taking, study skills or mentoring support.
  - Purchasing disability related equipment (NOT computers).
  - Funding taxis for those who need help with transport.
- Help with arranging extra Library support and access to the Assistive Technology Suite
- Supporting applications, where appropriate, for continuing accommodation for your second or later years.

A disability is any long-term condition that has a substantial impact on your ability to study effectively, such as:

- A specific learning difficulty, e.g. dyslexia, dysgraphia.
- An enduring mental health condition, e.g. depression, OCD, generalised anxiety disorder.
- A visual, hearing or other sensory impairment.
- A long-term medical condition, e.g. IBS, ME, diabetes.
- A social/communication difficulty, e.g. autistic spectrum/Asperger’s syndrome.
- A mobility or dexterity issue.
Appendix C: Revision and Exam Stress

Stress

During revision and exam periods, anxiety and stress are very common problems for students – even for those who appear confident and calm. Don’t despair; you are not alone.

A small amount of anxiety can actually be beneficial, it can make you alert and focused, but too much anxiety means you will have trouble thinking clearly and this means you aren’t likely to do your best work.

What exactly is stress?

Stress is the body’s normal response to a challenge, threat or excitement. The consequence of stress depends largely on how you interpret the physical symptoms; it can help motivate you or it can paralyse you.

Take the following scenario:

- Joe: a student just before a critical exam
- Jane: an athlete just before a big competition
- Both Joe and Jane are aware of the same physical symptoms:
  - sweaty palms
  - racing heart
  - knot or butterflies in the pit of the stomach

Joe, the student, feels distressed by his symptoms and views them negatively, as if the symptoms are a sign of impending failure. Joe may have trouble sleeping and spend a lot of time worrying about his physical condition and the upcoming exam.

Jane, the athlete, interprets her symptoms as a sign that she can motivate herself to perform well. She views the symptoms as evidence that she is “psyching herself up” for the big competition.

The bottom line?

Stress can be a barrier to optimal performance or a motivating agent; it all depends on how you interpret, label and manage what you are experiencing.

The trick is to figure out what level of stress is motivating for you and what amount is paralysing and then work to keep it in the motivating zone.

Anxiety

Anxiety is very common and many people find ways of overcoming it or coping with it without seeking professional help. However, for some people anxiety can be harmful, it can affect your physical health, or your fears can take over your life and stop you doing the things you want to do. The good news is that there are things you can do to help.
Managing anxiety

1) Identify trigger factors
The first step in managing anxiety is to identify the specific situations that are making you stressed or anxious and when you are having trouble coping. One way to do this is to keep a diary of symptoms and what is happening when anxiety occurs. It is also helpful to identify any worrying thoughts as this can lead to finding ways to solve the specific problem that is of concern.

2) Thought management
Thought management exercises are useful when a person is troubled by ongoing or recurring distressing thoughts. There are a range of thought management techniques. For example, you can use distraction with pleasant thoughts. This can help take attention away from unpleasant thoughts. Alternatively, one can learn ‘mindfulness techniques’ to direct attention away from negative thinking and treat thoughts as just thoughts and not facts. The choice of thought management technique will depend on the type of anxiety problem. A psychologist can help you decide on thought management strategies that are likely to be most helpful.

3) Talk about it
Try a friend or relative who you trust and respect, and who is a good listener.

4) Learning to relax
People who feel anxious most of the time report that they have trouble relaxing. Knowing how to release muscle tension is an important anxiety treatment. Learning a relaxation technique and practising it regularly can help a person to maintain a manageable level of anxiety. You can learn these through groups, with professionals, but there are several books and self-help materials you can use to teach yourself. It’s a good idea to practice relaxation regularly, not just at times of crisis.


Managing revision stress

Take a look at the three categories outlined below and see which one best describes the type of student you are. Some students get stuck in one pattern – others may pass through each phase.

When you have identified what type of student you are or what phase you are currently in, click on the appropriate link below for tips on how to help yourself.

Which type of student are you?

1. The Self-Indulgent student

- denial of responsibility / or overconfident
- not lazy, but has low frustration tolerance
- escapist tendencies
- requires stimulus to raise anxiety (e.g. approaching deadline)
2. The Tense & Fearful student

- denial of potency – deskilling self unnecessarily
- self-critical, low self-esteem
- overwhelmed by the importance of the exam, pressure to succeed

3. The Perfectionist student

- denial of vulnerability, wanting total control
- critical of the "system", passive-aggressive
- sets impossible goals, so never feels “good enough” or “safe enough”
- obsessive, workaholic tendencies; or procrastination

Study and exam strategies

Organise

- Sort out your topics for revision. Base selection of topics on syllabus and examination requirements, on predictions derived from past papers and on guidelines suggested by tutors.
- Devise a routine of study periods that is realistic and productive, and includes rest intervals!
- Pay attention to diet, sleep and recreation – all are important factors in maintaining balance and keeping stress levels under control.
- Breakdown targets into manageable units. Ticking off completed units creates a sense of forward movement. A checklist for the day’s targets (making sure the targets are realistic and achievable) can also boost morale.
- Use your time wisely – deal with less demanding tasks in periods of the day when you are less alert or focused. If you find yourself struggling unproductively with a problem, take a break or switch to some other work.

Maximise your learning

- The more you actively interact with the subject matter, making it your own, and linking it to previous knowledge, the more meaningful and memorable it becomes.
- Follow the PQRST model:
  - **Preview** – skim the material to get an overall preview
  - **Questions** – formulate questions that highlight what you aim to derive from your reading
  - **Read Actively** – make appropriate notes of key ideas
  - **Summarise** – identify the main points using lists, key words, flow diagrams, etc. and connect them with knowledge from other sources
  - **Test** – test yourself by reciting and reviewing the summaries immediately after learning the material and again at later intervals
Tips

- Use flow diagrams, keywords or patterns linking ideas to make master summaries for revision purposes.
- Use cue cards! Index-sized “flash” cards are easy to carry around and are useful for learning information you find particularly hard to remember. You can put facts, figures, formulae on the cards and use colours, keywords, mnemonics and other memory aids to help you learn.
- Space your studying and give yourself time for the information to sink in. Study related topics together and take regular, short breaks at suitable “achievement points”.
- Compare notes with other students and get feedback and/or clarification from tutors.

General exam strategies

Conquering exams: strategies and skills

- **Practical preparation**: Check the time and venue of the exam and figure out how to get there in good time, and have the necessary equipment ready (e.g. pens, ID card, clear bottle of water etc.)
- **Emotional preparation**: Mentally rehearse how to tackle the exam as a whole and review your strategies for dealing with anxiety. Consider what might also help, for example, staying away from crowds gathering outside exam halls.
- **Memory considerations**: Systematically review your revision notes the night before or the morning of the exam, but don’t attempt to learn complex new material at this late stage. Capitalise on short-term memory by glancing at your “difficult” cue cards just before entering the exam hall, then try reproducing them immediately when you are allowed to start.

Exam skills

Read the exam paper carefully and underline key words and instructions.

Don’t panic – if you feel unable to answer any of the questions at this stage it is likely due to a surge in anxiety.

- Note how many questions you are required to answer and if any are compulsory.
- Tick the questions you intend to answer. Make a rough timetable, allocating equal time to equally weighted questions. Allow for about 15 minutes of “planning” and 10 minutes of “finishing off” time overall for a typical 3 hour exam.
- Avoid getting demoralised at the start. Answer the easiest question first and save the most difficult one for last. Attempt all the questions required – usually the first 50% of marks for any question are easier to obtain than the next 50%.
- Watch the wording of the questions. Answering a question that wasn’t asked means no marks, no matter how thoughtful your answer was!
• Jot down key ideas that emerge about any of the questions and use them for “planning” an answer. This might show the examiner what you had in mind in case you run out of time.

• Save the last 5-10 minutes for “finishing touches” e.g. crossing out unwanted script, ensuring that questions are clearly numbered, and that all answer books have your identification number.

**Sitting the exam**

**What if I get a mental block during an exam?**

• Give yourself a couple of minutes to try to remember or puzzle out the answer. If you are still blocked, move on to the next question. If ideas for dealing with the question pop up while working on another one, jot them down before you forget them.

• With mathematical questions it pays to stick with the problem a bit longer, say 10 minutes. Try thinking back to first principles or representing the problem diagrammatically or more concretely, or think laterally about related issues.

• Adjust your timetable and still attempt all the required questions.

**What if I panic during an exam?**

If you start panicking in the exam, and you find that the harder you try to work the worse you feel, practise “Stop the Wasp”:

• **STOP** – the self-defeating thoughts that are buzzing around like wasps. Tell yourself instead that you are going to survive this experience, come what may. Go through the following “W-A-SP” squashing procedure, which you’ll need to practise during milder forms of anxiety in the revision period (so you can learn to recognise the early stages of panic, which are easier to neutralise).

• Familiarity with the procedure, through practice and mental rehearsal is essential emotional preparation.

• **WAIT** – switch off and unwind for a few moments. Focus on breathing and then relax with eyes closed. This will help you return to the task afterwards with a calmer, clearer mind and a more constructive perspective.

• **ABSORB** – taking in the relaxation, flood your mind with constructive self-talk (ideally from a repertoire of previously prepared and practised phrases), then slowly open your eyes and calmly bring yourself to face the exam situation.

• **SLOWLY PROCEED** – calmly get going again with the paper, as best you can, one step at a time.

**Keep in mind:**

• When focusing on your breathing, take a long, slow, deep breath, and allow the air to flow out slowly and smoothly. Sit back comfortably, dangling your arms by your side, and imagine any tension flowing out through your hands and feet. Try any relaxation strategy that works for you.

• If your breathing pattern has been rapid and shallow, you may be at risk of hyperventilating. Instead, pause after long exhalations, and breathe you’re stomach, rather than upper chest, movements. If you continue to hyperventilate, breathe into
cupped hands (or even a paper or plastic bag – take one along if you think you’ll need it).

- It may help to reframe your attitude towards the examiner. Instead of some sadistic, persecuting figure, imagine him or her as a friend, or someone who just wants some help with the question.

Repeat “Stop the Wasp” if necessary – you may have rushed back too soon the first time. Stay longer “waiting” and “absorbing”. If the panic continues or escalates, tell the invigilator without delay.

**After the exam**

Don’t indulge in post-mortems and comparisons with others. Review what went well in your overall approach, including how you handled anxiety, and aim to improve upon it in your next exam.
The Policy and Procedures contained in this document apply to all students and former students at Imperial College registered for Imperial College or University of London awards. A complete copy of the College regulations governing Cheating Offences: Policy and Procedures, under which Plagiarism is categorised, is available to download from the following link:


In any proceedings under these Policy and Procedures, the student shall be presumed to be innocent until the contrary is established beyond reasonable doubt.

Where the offence is an instance of suspected plagiarism, it shall be dealt with in accordance with the following procedures, commensurate with the severity of the suspected offence.

If you are not sure, please ask. Useful reference points are academic and library staff.

**Plagiarism** is defined as the presentation of another person’s words, ideas, judgement or data as though they were your own. For example; not referencing the source of your ideas or arguments when they have derived from your reading; taking verbatim the words of someone else’s work and putting it into your project without quotation marks and referencing; taking whole sections out of books, the internet, articles, lecture notes, other reports or other students’ work, and including them in your report uncited. It may also occur in formal written examinations, the above document addresses this possibility. An example might be where candidates have been able to learn text by heart (by rote) and simply reproduce this without acknowledgement of source. Where the examination is based on technical knowledge, this may be acceptable and not regarded as plagiarism. In other subjects where candidates are asked to write essay-type questions, the examiners may regard text reproduced without reference or critical analysis as plagiarism. This will be clarified, where appropriate, in the examination rubric on the front page of the examination paper.

You should be aware that you have a collective responsibility for the integrity of group work submitted for assessment. This means that if part of the work is plagiarised, all group members will be held accountable unless proof can be provided by each individual member of their contribution. You should, therefore, retain an audit trail of your contribution for this purpose.

When submitting (both individual and group) assessed coursework you will be required to complete and attach a Coursework Cover Sheet (examples on the following page) confirming that you have read and understood the definition of plagiarism. Submitting this form will certify that the work presented is entirely your own, except where indicated.

Plagiarism is a serious offence. The Examination Board reserves the right to take further action as it deems appropriate to protect the name of the Department and the College, and this may involve expulsion of a student from the programme or delay or withdrawal of a degree award.
Coursework and Project Cover Sheet

MSc in Geotechnics Cluster
Department of Civil and Environmental Engineering

Surname _______________ First Name __________ CID __________

Module _________________________________________________________________

Assignment_____________________________________________________________

Supervisor _____________________________________________________________

Submission Date ______________________________________________________

DECLARATION

I certify that I have read the definition of plagiarism given overleaf, and that the work submitted for this coursework assignment is my own work, except where specifically indicated otherwise.

In signing this document I agree that this work may be submitted to an electronic plagiarism test at any time and I will provide a further version of this work in an appropriate format when requested:

Signature: _________________________ Date: _________________________

Note: Until an assignment carries this completed front page it will not be accepted for marking. If the front page is absent, the delay in getting it added may result in a penalty for late submission.

TO BE COMPLETED BY THE MARKER

Grade awarded: _________________________

Late penalty applied: _________________________
## Group Coursework and Project Cover Sheet

**MSc in Geotechnics Cluster**

Department of Civil and Environmental Engineering

<table>
<thead>
<tr>
<th>Module</th>
<th>Assignment</th>
<th>Deadline</th>
</tr>
</thead>
</table>

### DECLARATION

I certify that I have read the definition of plagiarism given overleaf, and that the work submitted for this coursework assignment is my own work, except where specifically indicated otherwise. In signing this document I agree that this work may be submitted to an electronic plagiarism test at any time and I will provide a further version of this work in an appropriate format when requested.

| Name: ___________________ CID: ____________ Signature: __________________ Date: ___________ |
| Name: ___________________ CID: ____________ Signature: __________________ Date: ___________ |
| Name: ___________________ CID: ____________ Signature: __________________ Date: ___________ |
| Name: ___________________ CID: ____________ Signature: __________________ Date: ___________ |
| Name: ___________________ CID: ____________ Signature: __________________ Date: ___________ |

Note: Until an assignment carries this completed front page it will not be accepted for marking. If the front page is absent, the delay in getting it added may result in a penalty for late submission.

### TO BE COMPLETED BY THE MARKER

Grade awarded: __________________________

Late penalty applied: __________________________
Appendix F: Map of South Kensington Campus
SKEMPTON BUILDING

HEALTH AND SAFETY CONTACT INFORMATION

Emergency procedures:

- **MEDICAL, FIRE or SECURITY EMERGENCIES** - DIAL 4444 or 020 7589 1000
- **FIRST AID** – Contact the nearest First Aider (see separate sheet)
- **BUILDING EVACUATION** – Know your evacuation route, use the nearest staircase (east, west or central stairs). **DO NOT USE THE LIFTS.** Leave the building quickly and safely. Do not return to collect personal belongings.
- **ACCIDENTS + DANGEROUS OCCURRENCES** – All accidents and near misses, however minor, MUST BE REPORTED using the online system “SALUS”

Department Emergency Control Team

<table>
<thead>
<tr>
<th>Office</th>
<th>Tel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of Department</td>
<td>Prof N. Buenfeld</td>
</tr>
<tr>
<td>Department Safety Officer</td>
<td>Dr G. D. Fowler</td>
</tr>
<tr>
<td>Technical Services Manager</td>
<td>Mr B. Whiting</td>
</tr>
<tr>
<td>Department Operations Manager</td>
<td>Mrs L. A. Cumming</td>
</tr>
</tbody>
</table>

Assistant to the Technical Services Manager

<table>
<thead>
<tr>
<th>Tel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>45869</td>
</tr>
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Building Health and Safety Committee

<table>
<thead>
<tr>
<th>Office</th>
<th>Tel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chairman of Department Safety Committee</td>
<td>Mr B. Whiting</td>
</tr>
<tr>
<td>DSO; EWRE Rep.; COSHH, Radiation, Fieldwork &amp; Biological Safety Advisor</td>
<td>Dr G. D. Fowler</td>
</tr>
<tr>
<td>Manual Handling Assessor</td>
<td>Mr T. Stickland</td>
</tr>
<tr>
<td>Committee Secretary, DSE Assessor, Fleet Manager</td>
<td>Mr S. Hullcock</td>
</tr>
<tr>
<td>First Aid Coordinator</td>
<td>Dr A. Nievas-Pino</td>
</tr>
<tr>
<td>Fluid Mechanics Section Academic Safety Representative; Laser Safety</td>
<td>Dr H. Burridge</td>
</tr>
<tr>
<td>Geotechnics Section Academic Safety Representative</td>
<td>Dr J. A. H. Carraro</td>
</tr>
<tr>
<td>Structures Section Academic Safety Representative</td>
<td>Dr H. S. Wong</td>
</tr>
<tr>
<td>Transport Section Academic Safety Representative</td>
<td>Dr P. Angeloudis</td>
</tr>
<tr>
<td>UG Student representative (Dept. Rep.)</td>
<td>Miss M. Bouleau</td>
</tr>
<tr>
<td>PG Student representative</td>
<td>Vacancy</td>
</tr>
<tr>
<td>Post-Doctoral Research Staff Representative</td>
<td>Vacancy</td>
</tr>
</tbody>
</table>

- **Skempton Building Manager (Office in City & Guilds Building)**
  - C&G 260
  - Mr G. Fairhurst | 49639 |

- **Assistant Skempton Building Manager (Office in City & Guilds Building)**
  - C&G 260
  - Mr Z. Rahman | 50186 |

- **Department of Aeronautics DSO (Office in City & Guilds Building)**
  - C&G 222
  - Dr N. MacCarthy | 45043 |

- **Department of Mechanical Eng. DSO (Office in City & Guilds Building)**
  - C&G 329
  - Mrs J. Easton | 51270 |

- **Department of Mechanical Eng. Workshop Manager**
  - 238A
  - Mr A. Wallace | 47015 |

- **Wohl Reach Out Laboratory**
  - 100
  - Ms S. Konnur | 41924 |

- **Faculty of Engineering Safety Manager (Desk in Faculty Building L2)**
  - Mr S. Greenwood | 40821 |

Imperial College Safety Department (level 4 Sherfield Building)

<table>
<thead>
<tr>
<th>Tel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr S. Johal</td>
</tr>
<tr>
<td>Dr A. M de Paiva</td>
</tr>
<tr>
<td>Mrs S. Kerai</td>
</tr>
</tbody>
</table>

Any changes to this list should be notified immediately to Dr G. D. Fowler.

Email: g.fowler@imperial.ac.uk
FIRST AID TRAINED STAFF CONTACT DETAILS

In the event of an accident or medical emergency contact the NEAREST first aider without delay!
Your Nearest First Aiders are:

<table>
<thead>
<tr>
<th>NAME</th>
<th>LOCATION</th>
<th>PHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>David de Ruyter*</td>
<td>010b</td>
<td>45925</td>
</tr>
<tr>
<td>Fionnuala Ni Dhonnabhain*</td>
<td>118</td>
<td>45929</td>
</tr>
<tr>
<td>Paul Jobson* (Mech Eng workshop)</td>
<td>150</td>
<td>47015</td>
</tr>
<tr>
<td>Stefan Algar*</td>
<td>236</td>
<td>45169</td>
</tr>
<tr>
<td>Gordon Herbert*</td>
<td>236</td>
<td>45948</td>
</tr>
<tr>
<td>Rebecca Naessens*</td>
<td>328</td>
<td>45990</td>
</tr>
<tr>
<td>Tina Mikellides*</td>
<td>401</td>
<td>45965</td>
</tr>
<tr>
<td>Dr Angel Nievas-Pino*</td>
<td>507</td>
<td>45970</td>
</tr>
<tr>
<td>Dr James Lawrence</td>
<td>528A</td>
<td>40700</td>
</tr>
<tr>
<td>Dr Antonio Carb Carraro</td>
<td>528B</td>
<td>46038</td>
</tr>
<tr>
<td>Dr Richard Ghail</td>
<td>534</td>
<td>46001</td>
</tr>
</tbody>
</table>

* Denotes Defibrillator trained

Alexandra Williams - Mental Health First Aider 45995/46153
Lucy Chivers - Mental Health First Aider 46098

If you cannot get hold of a local first aider, contact Security: 4444
Out of normal working hours contact Security: 020 7589 1000

<table>
<thead>
<tr>
<th>Nearest First Aid Box</th>
<th>General Office (118)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest AED</td>
<td>SAF Building - Foyer</td>
</tr>
</tbody>
</table>

This notice was last updated: 09/2017
### IMPORTANT SAFETY INDUCTION INFORMATION

<table>
<thead>
<tr>
<th><strong>Evacuation procedure:</strong></th>
<th>Evacuate the building on sound of the claxon sounder and evacuation voice and go to the assembly point on the steps of the Queen’s Tower</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Campus emergency number</strong></td>
<td>4444 (from an internal telephone) 020 7589 1000 (from all other telephones)</td>
</tr>
<tr>
<td><strong>Frequency of fire drills</strong></td>
<td>Annual (usually during the first 4 weeks of the autumn term)</td>
</tr>
<tr>
<td><strong>Frequency of alarm testing</strong></td>
<td>Weekly at around 8am on Tuesday mornings</td>
</tr>
<tr>
<td><strong>Locations of:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Fire alarm call points</strong></td>
<td>Five per floor located between each set of fire doors</td>
</tr>
<tr>
<td><strong>Emergency exits</strong></td>
<td>See map in this book</td>
</tr>
<tr>
<td><strong>Evacuation routes</strong></td>
<td>Follow the green arrows located on the back of all office and lecture theatre doors and in the corridors</td>
</tr>
<tr>
<td><strong>Assembly point</strong></td>
<td>On the steps of the Queen’s Tower</td>
</tr>
<tr>
<td><strong>Fire extinguishers etc</strong></td>
<td>Located throughout the building, at least three sets per floor, normally adjacent the emergency exits, plus in all laboratories (look for the Red location signs)</td>
</tr>
<tr>
<td><strong>Safety Notice Board</strong></td>
<td>Located on Level 4 on the wall outside the room 415</td>
</tr>
<tr>
<td><strong>Departmental Safety staff</strong></td>
<td>See the list enclosed in this book and in the lifts</td>
</tr>
<tr>
<td><strong>First Aid Arrangements</strong></td>
<td>See the list enclosed in this book and in the lifts</td>
</tr>
<tr>
<td><strong>Accident reporting</strong></td>
<td>Use SALUS – the online reporting system. This can be accessed from the Safety department web pages on the College intranet: <a href="http://www3.imperial.ac.uk/safety">http://www3.imperial.ac.uk/safety</a></td>
</tr>
<tr>
<td><strong>Safety Department</strong></td>
<td>Provides advice on Safety issues. Located in Sherfield Building, L4.</td>
</tr>
<tr>
<td><strong>Occupational Health</strong></td>
<td>Provides advice and support (including vaccinations and health screening) for all College personnel involved in College work. Located in Sherfield Building, L4.</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>Provides a 24 hour, college-wide service relating to building security, first aid and emergency support.</td>
</tr>
<tr>
<td><strong>Web site information</strong></td>
<td>The College intranet contains all the detailed information required to help staff &amp; students understand College policies &amp; procedures.</td>
</tr>
<tr>
<td><strong>Key Web site addresses</strong></td>
<td>Imperial Home Page: <a href="http://www3.imperial.ac.uk/">http://www3.imperial.ac.uk/</a> Use the bookmarks along the top to locate the required Departments and services. For support services (non-academic issues) use the A-Z index under “Admin and Service” to locate the required area.</td>
</tr>
<tr>
<td><strong>Building Access Hours</strong></td>
<td>7am-Midnight every day except Christmas Day and Boxing Day.</td>
</tr>
<tr>
<td><strong>Normal Working Hours</strong></td>
<td>8am-6pm weekdays.</td>
</tr>
<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td><strong>Departmental Hazards</strong></td>
<td>All department labs are considered to be high hazard areas. Do not enter any laboratories until you have been inducted for the lab and completed a risk assessment for the planned work. The department has a “No Lone Working” policy for laboratories, which applies outside normal hours.</td>
</tr>
<tr>
<td><strong>PPE</strong></td>
<td>All UG MEng students <strong>must</strong> own steel toed and soled safety boots suitable for site work. Other PPE for MEng students is issued in week 1 for use throughout the course. For all other MSc courses, the leaders will advise you regarding the required PPE for each trip.</td>
</tr>
<tr>
<td><strong>Dept. Safety Committee</strong></td>
<td>Meets three times per year to consider all matters relating to Departmental Health and Safety. All Research and Teaching activities are discussed. Student issues are represented by the “Dep Rep”.</td>
</tr>
<tr>
<td><strong>General Advice on Safety</strong></td>
<td>If you have any safety related questions, please contact the DSO: Dr G D Fowler, room 413, ext 45973, email: <a href="mailto:g.fowler@imperial.ac.uk">g.fowler@imperial.ac.uk</a></td>
</tr>
</tbody>
</table>
INTRODUCTION
The Health and Safety of all students whilst studying at Imperial College is a primary concern to the Staff and College. There are several major pieces of legislation that dictate the implementation of Health and Safety Policy and Practise. We must ensure that students are not put at risk during their study at Imperial College. However, there is also a responsibility upon yourself to follow, to the best of your abilities, all instructions and guidance provided. This booklet has been written to provide an outline of Health and Safety arrangements within the Department and to provide you with guidance to your own responsibilities.

GENERAL INFORMATION
Health and Safety within the Department is organised and managed by the Departmental Safety Officer, Dr G. Fowler (room 413, ext. 45973). He is always available to provide advice and guidance on all aspects of Health and Safety. All major Health and Safety decisions are made by the Skempton Building Safety Committee, which meets every term. The committee comprises representatives from all the Sections in the Department, Users of the Building, Student representatives (UG & PG), plus staff with specialist advisory roles for particular activities that may present a risk.

The Orange Health and Safety and Green First Aid/Lifesaver notices provide Health and Safety guidance and list the members of staff with specific safety related duties and responsibilities. Copies of these notices are included inside this book and further copies are spread throughout the Department. These signs are updated regularly. You must yourself familiar with their content.

The College has a significant amount of safety-related information available via its web site: http://www.imperial.ac.uk/safety.

DEPARTMENT SAFETY SHAREPOINT SITE
The Department operates an electronic safety registration and risk assessment system. It is based around an online resource for H+S using the Microsoft SharePoint platform. This system provides a single resource for safety management, including: risk assessment creation and final approval and laboratory safety information. Appendix 1 in this booklet provides a summary of the how you can access the system and complete a risk assessment. As taught students, you will only need to use this system for the research project element of your course where your work include lab or fieldwork activities. Risk assessments will not be needed for desk or computer-based projects. Appropriate training in using this system will be provided when required.
DEPARTMENT SECURITY
Security and safety are closely linked. Please help us keep the building secure and safe by following the following simple rules:

**ALWAYS** wear your College Security/ID card whilst at College. Belt clips or neck lanyards are available from the department General Office.

**DO NOT** allow strangers to enter the building out of hours (deliberately or via tailgating).

**NEVER** lend your ID card to anybody, if they cause damage or present a risk to security or safety, **YOU** will be liable.

DEPARTMENTAL WORKING HOURS
The nature of the College is such that it appears to operate 24 hours per day - research never stops. Nevertheless, there are times of the day which the College considers are "outside normal hours" or access is limited and so special safety procedures including specific risk assessments and or lone working approval may be needed for your work to continue. In addition, there are times of the day when the College is “closed”. The Department open and closed hours are as follows:

Normal opening hours: 8am – 6pm Monday to Friday
Swipe card access only: 7am – 8am and 7pm – 12pm, Weekdays
7am- 12pm Weekends and Public Holidays
College “Closed” (swipe inactive): 12pm to 7am every day and during selected days during College Closure at Christmas and Easter

Please make sure that you leave the Department before midnight. College Security patrol the buildings out of hours and any persons found on the premises will be removed from the building and have their access rights curtailed.

SAFE BEHAVIOUR IN THE DEPARTMENT
This is a large and busy building where many varied and potentially dangerous processes occur. You should always be careful when in the building, to ensure that you do not put your self or others in way of harm. For example, be aware of people around you when walking down corridors, so that you do not obstruct them or inadvertently release a door into their path. All doors on the corridors are fire doors and have automatic closer devices fitted which cause the door to swing back, almost instantaneously, to the closed position. Please note that some of these doors (mainly on Level 5) have a delayed close and should not be forced to close – this will damage the closer device. Fire doors **must never** be propped open with a wedge or other heavy object.
Also, please note:

- Do not run in the corridors.
- The wearing and use of roller blades, inline skates and the use of scooters in the building is forbidden. They are a hazard to other people and damage the floors.
- You must not enter any of the laboratories or workshops without prior permission.
- Bicycles are not allowed in the building – this is a College-wide policy. Bicycles must be stored in the racks provided on Campus.

WASTE DISPOSAL

There are very strict laws governing waste disposal. The College is proactive with regard to waste management and recycling, there are numerous recycling points around the building. Certain wastes generated in the department are separated for recycling/safety reasons. The following is a brief guide to the recycling and waste disposal mechanisms operating throughout the campus and applied within the department.

The College is striving to recycle as much of the waste it generates. One way to achieve this is by segregating waste at source. To achieve this the College has a number of different waste bins in use, which are colour-coded, each one designated for different wastes:

- Waste domestic Glass (not broken glass): Use the red-topped bins
- Paper and Card (no paper cups or food wrappers): Use the blue-topped bins
- Cans and plastic bottles: Use the green-topped bins
- Non-recyclable waste: Use the black-topped bins

Special arrangements exist for non-domestic, electronic and laboratory wastes:
Batteries

A dedicated bin for batteries is located on level 2 (BOSS area) in the area near the photocopiers.

Chemical wastes

Any waste arising from laboratory activity which is contaminated or classified as hazardous (laboratory staff will advise you if you are unsure) must be disposed of in a controlled manner. Each Laboratory has special containers for segregating these wastes, including solvents, flammable waste, oils, corrosive materials, powders, etc. Please follow the guidance in each laboratory appropriate for the waste requiring disposal.

Clinical waste:

Of main concern are syringe needles and any bodily fluids. If you find anything which may fall into this category around the department, please contact the Department Safety Officer (DSO) immediately.

Electrical equipment:

Waste electrical equipment must not be disposed of via the non-recyclable waste route. Please contact the DSO for details of the procedures which exist for disposing of these materials.

Laboratory waste

Every laboratory has rules regarding the disposal of laboratory waste. You will be advised by laboratory staff what is expected in each laboratory.

Laboratory Glass:

The College operates special disposal systems for laboratory glassware which is contaminated or made from Pyrex – it MUST NOT be put into the red recycling bins in communal areas.

Toner cartridges

There is a bin on L2 (BOSS area) and L4 outside room 415, dedicated to printer and toner cartridges.

If you have any doubts regarding the best way to dispose of a laboratory waste, ask the Laboratory staff, your Supervisor or the Department Safety Officer. Your risk assessment should specify all waste disposal procedures required for your work.
FIRE EQUIPMENT AND ESCAPE ROUTES
The Department has several means of escape in an emergency. The plan below shows the building in relation to the rest of Imperial College.

Emergency exit locations and Assembly point for Skempton Building

There are four primary exit routes from the building:
- The East Stairs adjacent Mechanical Engineering/Unwin Road
- The West Stairs which are part of Electrical Engineering
- The Main (Central) Stairs beside the lifts, through reception
- Through the BOSS area on Level 2 into the City and Guilds Building

The emergency evacuation assembly point is the stepped area around the base of the Queens Tower.

All the corridors in the building must be kept clear. Do not put chairs or tables into corridors, as they reduce the width and cause an obstruction. Similarly, because all the doors in the Department corridors are fire doors, they must NEVER be propped open with wedges, fire extinguishers or by any other means.

You MUST know which way is the quickest emergency escape route from your location in the building. All the emergency escape routes are indicated with an “arrow and running directional figure” green sign. The evacuation alarm is a Claxon sounder with voice instructions. If this activates you must stop what you are doing and leave the building IMMEDIATELY by the nearest emergency escape route in an orderly manner, making sure that you close any doors behind you.

There are evacuation notices in every room in the building (please see the following page for an example) indicating with a green arrow the preferred exit route from that part of the building. Please follow these arrows as they will ensure that you can evacuate from the
building with the minimum of delay. Please try to avoid using the main staircase during an emergency evacuation. The congestion on the main staircase can be significant and your evacuation will be much delayed.

Direction of the nearest escape route

The assembly point is adjacent the base of the Queens Tower

For further details see the Department Safety notices

This notice must NOT be removed from this room
There will be a fire drill during the first term, to familiarise you with emergency procedures.

FIRE PREVENTION & SAFETY
The consequences of a fire in any building can be several fold. Apart from the unacceptable loss of life which may result, there are the lesser consequences of damage to the building, the cessation of activities in the damaged area (or the whole building) and the loss of research and data in an Academic building. None of these outcomes are acceptable.

There is a responsibility upon all users of the building to ensure that fire prevention is a core part of all risk assessments and our day-to-day activities. The College has suffered several fires in recent years. The most serious occurred in the Department of Chemical Engineering and resulted in three laboratories being destroyed. The consequence of the lost research, equipment and data was very costly to the students and staff concerned, irrespective of the fiscal implication for the College and Department.

Current UK Fire Brigade policy is to not place fire fighters at risk, if there are no members of the public (College personnel) in the burning building. Thus, they could allow the building to be destroyed.

There have been several fire incidents in the Skempton Building, mostly caused by faulty electrical equipment. Most recently there was an incident involving the communal Microwave Ovens. When using the microwave ovens, the instructions on the ovens must be followed. **Failure to use the ovens responsibly and safely may result in them being removed.**

**IF THE FIRE EVACUATION ALERT SOUNDS, DO NOT:**
- Wait or return to collect any belongings
- Leave the assembly point until instructed to do so
- Return to the building until the all-clear is given

**MICROWAVE OVEN SAFE USAGE**
- Follow the instructions on the front of the microwave oven
- Never microwave loose food – always place it in a container
- Only use “microwave oven safe” containers
- Do not use metallic containers or utensils in the microwave
- Loosen/open the lid on the container
- Do not leave food cooking unattended
- If food spills in the microwave, please clean it up.
- Report any problems with the microwave to the Technical Services Manager (b.whiting@ic.ac.uk)
ACCIDENTS AND DANGEROUS OCCURRENCES

The College has a policy that ALL accidents or dangerous occurrences, however small, MUST be reported. This is because there is a very strict law with regard to reporting accidents to the authorities. There is an online system “SALUS” available for reporting all accidents or dangerous occurrences. A dangerous occurrence is an incident that does not result in personal injury.

SALUS is accessible from the Safety department web page via a quick link: [http://www.imperial.ac.uk/safety](http://www.imperial.ac.uk/safety)

Typical accidents in the Department tend to occur due to “slips, trips, falls” and poor lifting practice. Many of the corridors in the Department are linoleum or terrazzo. When wet, the floors are slippery. **If you see a wet floor, or cause a floor to become wet**, for example by spilling coffee or tea, please do not walk away, clear it up with paper towels (these are available from the General Office).

FIRST AID & LIFESAVERS

The College has a very well organised First Aid system. There are several qualified First Aiders working within the building. The offices of these staff are identified by the Universal first aid sign (a Green & White cross). If you feel unwell or need First Aid assistance please contact any of the staff identified on the list in the front of this book for assistance. In addition, most of the College Security staff are trained in First Aid and can be contacted by calling the College emergency number 4444 or 020 7589 1000. There are supplies of sticking-plasters and bandages available to treat minor injuries (cuts, scrapes and bumps). Any injuries which cannot be readily treated by a First-Aider must be looked at by the Health Centre, who may decide that hospital treatment is necessary.

ELECTRICAL EQUIPMENT

The Department has a **very strict policy regarding mains-powered portable and desk-based electrical equipment** brought onto the premises. This is detailed below. The key aspect of this policy requires that any electrical equipment in the building must be either new or safety tested prior to use. The periodic testing of electrical equipment in the Department is undertaken by external contractors. Thus, unless your electrical equipment meets any of the conditions below, you are **NOT PERMITTED** to plug it into the department electrical 240V sockets.

All equipment which has been tested and passed the electrical safety test will have attached a green sticker indicating that it may be used in the department (see image following). Any equipment not displaying this sticker or meeting the exceptions criteria described below the image, will be confiscated.
New equipment brought into the Department
New equipment brought into the Department may be used for the first year without the need for a Portable Appliance Test (PAT). The user is asked to perform a simple visual check on all equipment prior to use. Records of the equipment purchase, usually through the College finance system or a receipt from the supplier, must be kept to be able to prove the date of purchase. It must also be marked with a European CE mark or an otherwise equivalent international directive.

Personal electrical equipment brought into the Department
Personal electrical equipment brought into the Department will be PAT tested as Departmental equipment. To ensure that personal electrical equipment is tested within an acceptable timeframe (limit of one year of safe usage), only new personal equipment may be brought into the Department. Proof of date of purchase will be required. Under no circumstances may old equipment be brought into the Department. If old equipment is found then it will be confiscated and may be destroyed. The exception to the above is personal mains chargers for devices such as laptops, tablets and phones, etc. for which there is no age restriction.

Unauthorised electrical equipment
The list below gives some examples of unauthorised electrical equipment which must not be brought into the Department:

- Electric fires and heaters of any form
- Any form of equipment used for cooking or warming food (kettles, toasters etc.)
- International equipment which is not compatible with the UK mains voltage (220-240V)
• International equipment which is not marked with either the European CE mark or an equivalent international standard.

**Electrical equipment belonging to visitors**

Electrical equipment belonging to visitors and brought into the Department will be subjected to the normal Departmental rules.

**Electrical equipment belonging to third parties**

Electrical equipment belonging to third parties, such as contractors working within the Department, are the responsibility of the third party who will be required to demonstrate that their policies and procedure are at least in accordance with and of a standard compatible to those of the Department.

**Design, construction, checking and testing of electrical equipment**

Those involved in the design and construction of electrical equipment will be required to ensure that such equipment is suitably tested to ensure that it performs within the general conditions of the Department’s “Electrical Equipment – Policy and Code of Practice”.

**Repair, installation or modification of electrical equipment**

Unless otherwise directed, staff and students in the Department are not allowed to undertake any repair, installation or modification to electrical equipment.

**Disposal of electrical and electronic equipment**

Consult the Facilities Management web pages to arrange for the collection and disposal of unwanted College Equipment (there may be a charge for this service).


**LABORATORY COURSES**

There may be several occasions when you will undertake laboratory work as part of your course. The Department is very unusual within the College in that it operates all major classes of laboratories with many diverse activities, which include the traditional mechanical and engineering testing through to specialised chemical and biological work. Each laboratory has their own specific safety procedures which will be explained in detail before any work commences, you MUST abide by the following general rules for any laboratory behaviour/work.
Work in any laboratory must only be conducted during normal College hours (9am-6pm), with at least one other person in sight at all times. Lone laboratory working is NEVER PERMITTED. Additionally, the other person in the laboratory must know the College emergency procedures and be familiar with the working environment so that if they need to isolate a service or make safe an experiment in an emergency, they know what to do.

RISK ASSESSMENTS
Risk assessment is the cornerstone of Health and Safety management. No activity should be started before a risk assessment has been completed. To be able to perform a risk assessment you need to know what you are going to do and have an understanding of the steps and processes required in the task being assessed. If all the information is at hand, the assessment should be a straightforward task. If the risks are considered to be too high, this does not mean that the activity cannot be completed but it may mean that a different approach or better control measures are required to reduce the potential risks.

For most laboratory classes, the assessment will have been undertaken by the course or laboratory organiser. They will explain the assessment to you and indicate the main risks from the work to be conducted and advise you how to avoid these risks. However, some laboratory or fieldwork classes will require you to complete your own assessment (particularly for project work). The Department has standard online forms for this purpose, accessed via the SharePoint site mentioned earlier. Guidance on the completion of these forms will be provided in special introductory sessions prior to you undertaking the projects requiring assessments.

When completing risk assessments, if you need further information or require advice, you must ask the staff supporting your work (Academic or Technical). If they cannot provide the necessary answer or information, please do not hesitate to ask the DSO.

<table>
<thead>
<tr>
<th>Laboratory “Do and Do not”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DO</strong></td>
</tr>
<tr>
<td>- Follow all instructions from the demonstrators/lab staff</td>
</tr>
<tr>
<td>- Wear all necessary personal protective equipment, especially your safety glasses, at all times in all laboratories</td>
</tr>
<tr>
<td>- Tie back long hair</td>
</tr>
<tr>
<td>- Wear appropriate clothing and stout shoes or safety boots, as required.</td>
</tr>
<tr>
<td><strong>DO NOT</strong></td>
</tr>
<tr>
<td>- Wear long/dangly clothing or jewellery which may become snagged in moving machinery</td>
</tr>
<tr>
<td>- Wear sandals or open-toed shoes</td>
</tr>
<tr>
<td>- Run or fool about in the laboratories</td>
</tr>
<tr>
<td>- Eat or drink in ANY laboratory</td>
</tr>
</tbody>
</table>
FIELD COURSES
During the time of your studies within the Department of Civil and Environmental Engineering, there are several major courses of varying duration that require you leave the Department and College premises. Whilst away from these premises your Health and Safety is still our responsibility. We take this responsibility very seriously. The College is covered for most events by its insurance, but there is an important onus (and a legal responsibility) upon you to abide by College Health and Safety rules. Every field course has its own specific set of instructions which detail the risks and methods for minimising these. Copies of these instructions will be given to you prior to your undertaking of the course. The following information is meant as a general benchmark for you to use and apply at all times when away for course purposes.

When we organise any field course, the course co-ordinator carefully considers all the potential risks that may occur and are attributable to the particular situation. For example a visit to a quarry has particular dangers which are different to a visit to a bridge or road, but there are several common risks which can be controlled and minimised if not entirely eliminated by applying several basic rules.

1. Whilst on any field course, the most important rule is that you MUST follow the instructions of the course leader. Pay particular attention to guidance on safe practices whilst on that trip.
2. Do not try to take too much luggage with you, heavy bags can be difficult to carry and cause back strain, as well as being a potential danger if they fall from luggage racks in buses.
3. Ensure that you are suitably dressed for the trip or course i.e.: a hard hat, warm and waterproof clothing and stout shoes would be a minimum requirement for a winter visit to a site – forget fashion!
4. Take particular care when crossing roads checking in both directions for traffic before crossing. When walking alongside roads not designed for pedestrians try to stay at least 1m from the traffic at all times.
5. Make sure that you inform the course leader of any medication which you use or any ailment which you suffer from that may be a problem during the course. For example if you are a diabetic or have food allergies, it is vital that the course leader of a residential trip is aware of this in advance for dietary purposes or in case you require medical assistance on the course. Ensure that you are carrying sufficient medication for the duration of your course. A less obvious condition, but equally dangerous would be if you suffer from vertigo and visits to a bridge or tall building may be a problem or conversely, claustrophobia would be an issue for a visit to sewers.
6. Be aware of problems like dehydration and sunburn which may occur on summer field trips.
7. Any accident or dangerous occurrence, however minor, must be reported immediately to the course leader.
8. The evenings of residential courses may seem like a ideal opportunity to relax and have fun, but alcohol abuse can be dangerous and antisocial behaviour resulting from this will NOT BE tolerated.
9. You are representing Imperial College whilst on the course. Any public nuisance or criminal prosecution resulting from disreputable behaviour whilst on the course will be your liability and not the College’s. For example, some sites are classified as SSI’s (Special Scientific Interest), damaging them by even walking across them can result in prosecution.
10. Visits to sewers, building sites or other outdoor environments may expose you to pathogens such as Tetanus or Leptospirosis (Weils Disease). It is recommended that your tetanus jab is kept up to date. It is usually valid for 10 years. The course leader or coordinator must provide you with course details and risk assessments before commencing the field work activity. If you do not receive this information, ask the coordinator for it. **MEng Students must take the supplied PPE on all the field courses.** Failure to do this will result in you being refused participation in the course which may mean you fail that element and hence the year.

**Visits Abroad**

Trips outside the UK are a feature of some of the courses. However, depending on the reason for your trip abroad, the College’s insurance may not provide full cover in all eventualities (i.e. terrorism and war zones). There may be particular risks which must be considered alongside the normal risks discussed above.

The most obvious hazards are from disease, both insect and water-borne, which will generally be regional specific i.e. tropical climates – Malaria, so advice on the require vaccinations will be needed. The availability of clean drinking water cannot be overlooked.

There may also be hazards due to wildlife, for example, predators such as large cats, venomous creatures (snakes, spiders, fish etc.), sharks, polar bears and so forth.

Despite the growth of global communications, some parts of the world do not have very comprehensive satellite or mobile phone coverage, so communications with other part of the country or globe may be limited. In addition, battery life on mobile telephones must be carefully managed as you cannot guarantee to be able to find a suitable electrical supply to boost your telephone’s charge.

A further factor to consider is the political stability of the country you will be visiting. The risk of kidnap is a real threat in some countries. It is advisable to register with your national Embassy when you arrive in a foreign country, so that they know you are there. There are some countries around the world where organised society has broken down or is badly eroded due to Civil war or natural disasters. There must be very compelling reasons to travel to countries with these particular problems and comprehensive risk assessments will be required. In addition, approval for trip to countries which fall into this category will need to be given by the Head of Department. Your supervisor or course leader should make all the necessary arrangements to cover your trip. This includes activating the College insurance, which is a comprehensive policy. Nevertheless, it is very important to recognise that **no travel insurance** is truly and fully comprehensive. There are limits to what an insurance company can do to recover you from danger or protect you from harm. [International Rescue (“Thunderbirds”) do not exist].

There are several sources of information relevant to trips abroad:

The UK Foreign and Commonwealth Office web pages contain all the information to help make your trips as safe and enjoyable as possible: [http://www.fco.gov.uk/](http://www.fco.gov.uk/). Follow the links for “travel advice”.

If you need to undertake international trips for projects etc., please plan ahead. Discuss the project needs with your supervisors and the DSO, as required and submit the risk assessment form at least three weeks before you intend to travel.

College Occupational Health will provide advice on travel medication, injections etc., and will also undertake immunisation injections for College-required trips. However, you must arrange these well in advance of your trip (ideally, at least one month before travel).

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment, (PPE) is an essential part of Civil Engineering site safety. In recognition of this PPE is an essential requirement for the field courses run by the department.

All first year undergraduate (MEng) students will be issued with a personal safety pack after Christmas, just prior to the commencement of their first fieldtrip. This safety equipment must kept safe and looked after because the items will be needed throughout the four year MEng degree. If you lose any items you will be charged for replacements. If you do not bring them to your course when required, you will not be permitted to undertake the module and may fail the course as a result.

The safety pack will comprise the following items:

- Hard Hat
- Safety Glasses
- Site Gloves
- High-Vis Vest.

**Hard Hat**

British Standard Hard Hats must be thrown away after four years, as their safety performance cannot be guaranteed after this time. MSc students will be issued with hard hats during field courses and other times as required, but these must be returned to the Department. The Department issues Hard Hats as part of the safety pack above for all undergraduate students in the Department. The Hats will be needed for most field courses over the 4 year course and must be looked after.

**Safety Glasses**

MSc students will be issued with safety glasses as required for laboratory and field courses. These are issued as part of the safety pack to the undergraduate students. Safety Glasses are required for all laboratory courses and most field courses. If you do not have a pair of safety glasses, you will be unable undertake the course.
Gloves
Increasing concerns over dermatitis (from cement) and cuts and grazes from construction site activity has seen the compulsory wearing of gloves on all construction sites. A pair of cotton gloves suitable for site are included in the safety pack issued to the undergraduate students and these are needed for all site visits. MSc Students will be issued with a suitable type of glove for laboratory and fieldwork courses.

High-Vis Vests
Site visibility is a key part of safety management, hence all site visits require the wearing of high-vis vests or jackets. A high-vis jacket forms part of the Safety Pack, for UG students, whilst MSc students will be issued with them as required.

Safety Boots
All undergraduates and some MSc students (Check your course information) must own a pair of safety boots. The footwear needs to be classified as complying with EN ISO 20345, which provides the highest level of impact resistance in the toe area and be fitted with a steel mid-sole with steel toe caps and offer ankle support.

Not only are safety boots essential for any visits to construction sites, but some laboratories within the Department require that they be worn at all times and they are needed for the Surveying, Geology and Constructionarium field trips during the first and second years of the MEng degree respectively.

The Department will be arranging for a specialist supplier to attend the Skempton Building during the first week of term to sell these boots (check your course information for more details). The wearing of safety boots is compulsory during certain courses and failure to abide by this rule will result in you being barred from the course and possibly failing that module (and hence the year). Safety boots can be readily purchased from many high-street suppliers, but these must meet the minimum requirement described above.

Some MSc courses will issue the safety equipment as the class need arises, but this must be returned to the Department at the end of the class.

WEB RESOURCES FOR HEALTH AND SAFETY AT THE COLLEGE

The College Intranet, which is accessible for all College networked PC’s, has comprehensive health and safety information covering most aspects of the activities undertaken by the College. This information can be readily accessed from either the Safety Department or the Occupational Health web pages, which can be reached under the “A-Z” tab (admin and Services) on the right-hand side of the College main menu bar of the Home Page.

Some of this information is protected and you will need your College username and system password to view all the information contained within. You can access SALUS for reporting accidents and dangerous occurrences (as described above) from this site, plus view the College policy on health and safety and guidance on many aspects of safety.
COMPUTER USE
The Department is particularly well equipped with open access computing laboratories on levels 2 and 3 that are used for teaching as well as research purposes. However, it is becoming increasingly common for people who use computers or “display screen equipment” (DSE) for long hours to start to suffer from eye and skeletal/musculature problems, particularly if you use a laptop rather than a “fixed” desk computer. This may result in eye strain, back, neck and shoulder pain, problems with wrist and arm joints. The College has produced detailed guidance on ways of minimising/eliminating potential problems from DSE use. A copy of this information sheet is appended to this booklet. Please read and apply this information, it may save you much discomfort later in life.

If you undertake a project which involves long hours of computer use then you should follow the guidance below and undertake a DSE assessment of the workstation you are using. The “Computer Health & Safety Checklist” (DSE assessment) form is available to download from the following link:

http://www3.imperial.ac.uk/OCCHEALTH/formsandchecklists

Computer Use – Healthy Working
All members of the college community use computers to a greater or lesser extent. You should undertake a simple DSE assessment of the workstation you are using.

It is becoming increasingly common for people who use computers or “display screen equipment” (DSE) for long hours to start to suffer from eye and skeletal/musculature problems, particularly if you use a laptop rather than a “fixed” desk computer. This may result in eye strain, back, neck and shoulder pain, problems with wrist and arm joints. This is called “Cumulative Trauma Disorder”. The set-up of your computer workstation is very important. A poor set-up may cause the above health issues. If you start to suffer from any of the above symptoms from using computers, you must contact the departmental Display Screen Assessor (Dr Fowler) for any questions or concerns you have with regard to healthy computer usage.

The following guidance will help you in minimising the likelihood of the symptoms developing indicative of Cumulative Trauma Disorder.

Staying Healthy With Your Computer

Avoiding Cumulative Trauma Disorder
Computers can damage your health. Every year we see several cases of Cumulative Trauma Disorder (CTD) formerly called RSI or Repetition Strain Injury in staff and students and the problem is becoming more common. Avoid it happening to you by taking care to organise your work-station and organise your time spent using a computer both at work and at home.

Follow these simple rules and find that your computer can work for you without causing harm.
Take Breaks - The Key Issues
1. Intersperse with other work (take note laptop users!): phone calls, writing/reading work, filing, proof reading, photocopying, talking with colleagues. Even coffee breaks!
2. Five minute break every hour and don’t spend a whole day on computer-based activities (applies equally to work at home). Web surfing, updating Facebook, Blogging or online gaming do not count as a break!

Keep Your Desk Tidy
Avoid cluttering it up with books, papers etc. Make sure you have enough clear space to operate your mouse easily and to access your keyboard. Keep most frequently used items close to hand to avoid stretching.

Adjust Your Computing Equipment to Suit You
1. Set your screen to a comfortable height, usually with the top just below eye level, so you do not have to stretch your neck. Avoiding any twist in your spine, sit face-on to your screen.
2. Ensure sufficient room to rest your hands in front of keyboard when not keying. Interchange position of keyboard and mouse depending on data input device predominantly in use at the time.
3. Adjust your seat height so your arms are horizontal to the keyboard and avoid flexing/extending wrists. If you use a laptop, work with it on a table, never on your lap.
4. Ensure room for your feet to rest under your desk. A footrest may be beneficial for small people.

Get Comfortable

Make use of the illustrations below to see whether you’ve organised your desk and your work to avoid unnecessary problems. The rules for desktop users apply to work with laptops; whenever possible the same advice should be followed.

Don’t ruin your work by poor practice. Be organised, be sensible with your work-time & be successful— without damaging your health.
1. Adjust the seat height and back tilt/height to fit you. Twisted or cramped posture to be avoided.
2. If you are copying documents, use a document holder.
3. Sit back when you are thinking, rather than staying hunched over your screen.
4. Use a soft touch when keying and avoid flexing your wrists. Try to adopt a neutral position. If possible, learn how to use short cut keys and touch typing.
5. Give your eyes a comfort break too. Look away from your screen or close your eyes when thinking. Avoid staring at the screen and throw in a few extra blinks as natural blink reflexes are often unconsciously suppressed.

**DON'T IGNORE SYMPTOMS**

If your arms or shoulders start aching/tingling, follow steps below.

1. Take a break and re-organise work to give yourself more breaks in future.
2. If symptoms persist or keep recurring, contact your occupational health (OH) service for help.

**Make Use of the Experts**

1. All College departments should have a DSE (Display Screen Equipment) Assessor who knows about computer ergonomics and can help you check your workstation. They'll help you with the computer checklist if you don't feel confident to complete it yourself. Also if you identify problems through the checklist which you can't solve yourself or which may affect your or other's safety.
2. Your local OH service can assess and advise on CTD problems.
3. Students can arrange vision screening with the OH service.

**Personal Safety for Laptop Users**

1. Do not endanger your health by carrying too heavy a total load with the addition of your laptop.
2. Take precautions to avoid theft while your laptop is in transit and check your insurance cover. Your personal safety is more important than loss of your laptop.

Dr G. D. Fowler

Departmental Safety Officer
August 2017
Appendix 1: A quick guide to using the Department SharePoint Safety Site
Risk Assessments

- All research activities undertaken in the College **MUST** have a risk assessment.
- Risk assessments **MUST** be done **BEFORE** the work starts.
- All the necessary forms and processes are available via a SharePoint system.
- Academic Supervisors must approve the assessment and electronically sign it off.
- Secondary Checker also approves (Lab manager or DSO)

The SharePoint Site

- An automated system to enable the creation of risk assessments and manage their approval and archiving

- Accessible from any Networked PC or VPN connection – use College ID and Logon

- Works with most internet browsers. It **does not** work in Linux
The SharePoint site allows you to attach extra information linked to your General Risk Assessment:

- COSHH Assessment
- Computer use (DSE)
- Fieldwork Risk Assessment
- These separate Word forms are all on Blackboard & SharePoint for download

Risk Assessment – A Step-by-Step guide

- Log onto SharePoint:
  https://imperiallondon.sharepoint.com/sites/foe/CivilEng/HealthandSafety/default.aspx
  - The Microsoft SharePoint logon page may open first, asking for your College username ("USERNAME@ic.ac.uk"). Enter your details and then you will be transferred to the Imperial College SharePoint logon page. Enter your College Password and then:
  - The Department H&S SharePoint site will open

*Use Explorer v10, Firefox or Chrome. It does not work in Linux or Explorer v11*
Logging on to SharePoint – Initial 365 sign in

Enter your College username. Use "@ic.ac.uk" as the address identifier. The site will automatically forward you to the Imperial College SharePoint Office 365 (cloud-based) main login page.

Logging into SharePoint – Imperial 365 site

Enter your College password. Then click the "sign in" button. The department Health and Safety site should open.
Using the Site

• **1st step**: Complete a General Risk assessment:
  - This covers many activities, but occasionally you will need to use special forms for certain tasks (COSHH, Fieldwork, Biological work)
  - You need to identify all the risks and quantify them
  - Attach extra information including Engineering/experimental designs, SOPs etc.

• **2nd Step**: submit your form(s) for approval:
  - Approvers may include: Your Supervisor, the Laboratory Manager, A qualified 2nd engineering academic (for Structures), the HoD (for hazardous fieldwork) & the DSO.

• **3rd Step**: Forms are assessed and approved (or rejected) by your Supervisor & Lab Manager
SharePoint General Risk Assessment
How to complete the form (1)
Starting the form & selecting the assessors

SharePoint General Risk Assessment
How to complete the form (2)
Lone Working & Hazard identification

Use these options to help identify hazards. Ticking a box opens a guidance section with links to a specific specialist risk assessment forms. The specialist forms (COSH, Fieldwork etc.) must be completed too and attached to this form for submission and approval as part of this risk assessment process.
SharePoint General Risk Assessment
How to complete the form (3)
Risk assessment

Raw risk:
Probability is always 4
Severity is selectable (1-4)

Use the help box to understand what severity and probability mean and the difference between each numerical value (1-4).

Identify each hazard on a separate line (lines can be added using the "insert another hazard box")

Attach all supporting documents here. These can include: COSHH forms, Fieldwork Forms, method descriptions, Biot1 approval forms, experiment design notes and other supporting documents.

Residual risk: Probability should have reduced
Severity is unlikely to change

Do not leave an empty line in this table – it will prevent the form from being submitted

SharePoint General Risk Assessment
How to complete the form (4).
Completion and Submission

Answer all these questions. Use the risk analysis outputs to ensure that you do not overlook any required measures.

Select a review period longer than the planned length of the project. If the assessment is for a 3 month MSc project, pick at least 6 months as the review period etc.

You do not need to complete the form in a "single sitting." You can save the form at any time and return to it later.

This box will remain unavailable until you have completed all the required sections/boxes.

Once you have completed the form and are happy with the content. You should submit it and await the assessors’ opinion. Hopefully, they will approve it. If they do not, you should receive feedback on the rejection email stating what improvements are required. You will need to make the changes and resubmit the form.

You CANNOT start work until the form has been approved.
The SharePoint site allows you to attach extra information linked to your General Risk Assessment:

- **COSHHA Assessment (Dept specific form)**
  - Legally required for any work involving harmful substances: Acids, glues, gases, solder, flux, dyes, etc.

- **BIO1 form**
  - College requirement for any work involving biological agents. Any Biological work MUST be discussed with the DSO before you do any preparation work.

- **Fieldwork Risk Assessment (FW1)**

- Each of these forms are separate WORD documents available through SharePoint.

5 Steps for undertaking a risk assessment

- **Step 1**: Identify the hazards
- **Step 2**: Decide who might be harmed and how
- **Step 3**: Evaluate the risks and decide on precautions
- **Step 4**: Record your findings and implement them
- **Step 5**: Review your assessment and update if necessary
Hazard & Risk Defined

• HAZARD: anything that may cause harm, such as chemicals, electricity, working from ladders, an open drawer etc;

• RISK: the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.

Lone Working

• There must be at least one other person in a laboratory with you outside of normal hours.

• That person must know what to do in an emergency (A “BUDDY”).
  – How to stop the experiment
  – Emergency procedures
  – Who to call

• The best way to avoid lone working concerns is to plan your work
Research Specific Training

- It is **essential** that you know how to perform your research competently and safely.
- You are **forbidden** to use any item of Laboratory equipment or undertake a procedure until you have been appropriately trained.
- If you have any doubts or concerns about the equipment or methods, even after training, then **you must ask for more instruction**.
- Failure to do this may result in harm to you, your colleagues and/or the equipment.
- This may result in prosecution of the College, your Supervisor and you.

FINALLY…

- If in doubt about any safety issue, **ALWAYS ask somebody**:
  
  1. Your Supervisor
  2. Laboratory Staff
  3. Department Safety Officer
If you have any questions about using the SharePoint Site, need assistance to complete a risk assessment or have any other safety-related questions, please contact the department Safety Officer:

Dr Geoff Fowler  
Room 413  
g.fowler@ic.ac.uk
CI9-GEO-01 Consolidation and Seepage

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Dr Catherine O'Sullivan</th>
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</thead>
<tbody>
<tr>
<td>Other contributors:</td>
<td></td>
</tr>
<tr>
<td>Module status:</td>
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<td>Pre- or co-requisites</td>
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<tr>
<td>Term:</td>
<td>Autumn</td>
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<tr>
<td>Contact hours:</td>
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<tr>
<td>ECTS units:</td>
<td>5</td>
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<tr>
<td>FHEQ Level:</td>
<td>7</td>
</tr>
<tr>
<td>Assessment:</td>
<td>Coursework, written examination</td>
</tr>
</tbody>
</table>

1.0 Aims

- To deliver knowledge covering: The flow of water in compressible and incompressible soil strata; The formulation of governing equations; Boundary conditions and applying them to solve engineering problems; Formulate the solutions to real engineering problems by direct analytical or numerical methods.

2.0 Syllabus

- Introductory session covering what is to be studied and why.
- Principle of effective stress.
- Physical phenomenon observed in the field.
- Flow of water through soil - physics of flow, Darcy’s law, covering history, experimental determination, mathematical derivation and its validity.
- Continuity and volume change.
- Develop seepage equations - Laplace equation.
- Solve seepage equations using finite differences and flow nets.
- Pumping well solutions.
- Development of Terzaghi 1xD and Biot consolidation equations.
- Solve 1xD consolidation - Fourier series and Laplace transform, introducing the time factor Tv and the degree of consolidation U; time stepping finite difference solutions.
- Use of vertical drains to accelerate consolidation.
### 3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Be able to plot pore water pressure distributions (hydrostatic and seepage related cases) and relate them to effective stresses.
- Understand Darcy's law and its application in geotechnical engineering.
- Have an appreciation of permeability in 2 and 3 dimensions.
- Be able to determine two dimensional flow paths using both flow nets and finite differences.
- Be able to calculate permeabilities from well tests in both steady and non-steady state conditions and for partially penetrating wells.
- Understand the mechanics of consolidation.
- Understand the origin of Terzaghi's theory of consolidation and be able to solve his consolidation equation using both Fourier series and finite differences.
- Be able to explain how Biot Theory for coupled consolidation analysis was formulated.
- Be able to predict the time taken for consolidation where vertical drains are used.

### 4.0 Teaching methods

This course includes lectures, tutorials, group work, and pc lab sessions.

### 5.0 Assessment

The assessment of the module is based on the final exam.

### 6.0 Recommended textbooks

Category as defined by Central Library: C = Core, S = Supplementary

<table>
<thead>
<tr>
<th>Category</th>
<th>Title</th>
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</table>


Other books and papers which have some relevance will be mentioned in the lecture courses.

7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

<table>
<thead>
<tr>
<th>Design</th>
<th>Health &amp; Safety Risk Management</th>
<th>Sustainability</th>
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<tbody>
<tr>
<td>P</td>
<td>-</td>
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</tbody>
</table>
1.0 Aims

- To provide deeper insight into important aspects of advanced soil behaviour, the understanding of which is necessary for contemporary design of geotechnical structures that may involve advanced numerical analysis.
- To introduce the concept of constitutive modelling of soils, by explaining how the observed soil behaviour from laboratory and field experiments can be translated into mathematical formulations for use in advanced geotechnical analysis tools.

2.0 Syllabus

- Standard geotechnical design employs classical calculation methods which introduce simplifications in the representation of soil behaviour. Most often soil is considered to be a rigid material with a simple failure criterion, or at the most an ideal elasto-plastic material. Contemporary geotechnical design, however, requires better accuracy of the predicted behaviour of geotechnical structures and relies increasingly on modern calculation methods to achieve this.
- Such methods involve finite element or finite difference calculations, which enable significantly more accurate representation of real soil behaviour through application of advanced constitutive models.

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
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<tbody>
<tr>
<td>01</td>
<td>Effective stress principle; soil strength criteria</td>
<td>LZ</td>
</tr>
<tr>
<td>02</td>
<td>Drained strength of soils</td>
<td>LZ</td>
</tr>
<tr>
<td>03</td>
<td>Drained strength of soils</td>
<td>LZ</td>
</tr>
<tr>
<td>04</td>
<td>Critical State framework of soil behaviour</td>
<td>LZ</td>
</tr>
<tr>
<td>05</td>
<td>Critical State framework of soil behaviour</td>
<td>LZ</td>
</tr>
<tr>
<td>06</td>
<td>Critical State framework of soil behaviour</td>
<td>LZ</td>
</tr>
<tr>
<td>07</td>
<td>Behaviour of natural clays</td>
<td>LZ</td>
</tr>
<tr>
<td>08</td>
<td>Behaviour of sands</td>
<td>LZ</td>
</tr>
</tbody>
</table>
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Develop an understanding of advanced aspect of soil behaviour.
- Make an appropriate choice of strength parameters to be used in design, based on the nature of the geotechnical problem.
- Make an appropriate choice of soil stiffness for geotechnical design.
- Develop an understanding of the critical state framework of soil behaviour and its advantages and limitations.

4.0 Teaching methods

A combination of lectures and tutorials.

5.0 Assessment

The assessment of the module is based on a 3-hour written exam.

6.0 Recommended textbooks

Category as defined by Central Library: C = Core, S = Supplementary

<p>| | |</p>
<table>
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<tr>
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<tbody>
<tr>
<td>C</td>
<td>Reading will be mostly via lecture notes and a number of selected papers – an important reason for running the module is that books that cover these subjects at the required level do not exist. However, two books are suggested for broader information on the critical state framework.</td>
</tr>
<tr>
<td>S</td>
<td>D. Muir Wood (2004), Geotechnical modelling; Spon Press, UK.</td>
</tr>
</tbody>
</table>

7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

<p>| | | | |</p>
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<tbody>
<tr>
<td>Design</td>
<td>Analysis</td>
<td>Health &amp; Safety Risk Management</td>
<td>Sustainability</td>
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<tr>
<td>P</td>
<td>C</td>
<td>C</td>
<td>S</td>
</tr>
</tbody>
</table>
CI9-GEO-03 Embankments and Earthworks

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Klementyna Gawecka</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other contributors:</td>
<td>Visiting Professor George Dounias</td>
</tr>
<tr>
<td>Module status:</td>
<td>Core</td>
</tr>
<tr>
<td>Pre- or co-requisites:</td>
<td></td>
</tr>
<tr>
<td>Term:</td>
<td>Spring</td>
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<td>Contact hours:</td>
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<td>FHEQ Level:</td>
<td>7</td>
</tr>
<tr>
<td>Assessment:</td>
<td>Written examination</td>
</tr>
</tbody>
</table>

1.0 Aims

- To understand the principles of soil mechanics as applied to earthworks and embankments, including water-retaining embankments (flood-embankments and dams) and railway/highway embankments.
- Although the principal focus of the course is on embankments, students must also aim to understand the additional relevant material, which includes cuttings, tunnels and other foundation problems.

2.0 Syllabus

- The course deals with topics related to the behaviour and properties of embankment fills (granular and cohesive), challenging conditions during construction of embankments and earthworks, and the behaviour of soils on which these are founded. In particular, stiff and soft clay foundations are discussed in detail.
- Particular emphasis is given to numerical modelling and monitoring of earth structures. The effect of seasonal variations of suction (soil-atmosphere interaction) on the stability and serviceability of embankments is considered.
- One session is devoted to embankment dam design, given by Professor George Dounias, which is linked in to the Greek field trip.

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
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</thead>
<tbody>
<tr>
<td>01</td>
<td>Introduction to Earthworks; Embankment fill materials</td>
<td>KG</td>
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<tr>
<td>02</td>
<td>Behaviour of granular and of cohesive fills</td>
<td>KG</td>
</tr>
<tr>
<td>03</td>
<td>Lateral earth pressures; Embankments on stiff clay foundations</td>
<td>KG</td>
</tr>
<tr>
<td>04</td>
<td>Stability and serviceability effects of soil-atmosphere interaction; Numerical analysis of embankments on stiff clays</td>
<td>KG</td>
</tr>
<tr>
<td>05</td>
<td>Earth Dams</td>
<td>GD</td>
</tr>
<tr>
<td>06</td>
<td>Embankments on soft clays: behaviour</td>
<td>KG</td>
</tr>
<tr>
<td>07</td>
<td>Embankments on soft clays: monitoring and numerical analysis</td>
<td>KG</td>
</tr>
</tbody>
</table>
3.0  Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Classify various types of fill and their respective behaviour.
- Understand clear differences between granular and clayey fills.
- Anticipate a number of practical issues relating to compacted fills.
- Understand potential problems with stiff and soft embankment foundations.
- Understand challenges in numerical analysis of earth structures.
- Estimate lateral earth pressures induced during compaction.
- Develop basic monitoring schemes for various situations.

4.0  Teaching methods

Combination of lectures, one lecture from a visiting professor and tutorials. There will be question and answer sessions at the start of most lectures to recap and develop what has been learnt in previous lectures.

5.0  Assessment

The assessment of the module is based on the final exam.

6.0  Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

|   | Full comprehensive course notes will be given. |

7.0  Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

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</thead>
<tbody>
<tr>
<td>P</td>
<td>C</td>
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</tbody>
</table>
1.0 Aims

- To provide a comprehensive understanding of slope stability problems.
- To comprehend the role of geomorphology and soil behaviour in slope stability problems.
- To critically review existing methods for slope stability analysis.
- To discuss current ideas of the conditions leading to the failure of soil slopes.
- To discuss the main methods of slope design and stabilisation.

2.0 Syllabus

- Classification of generic 'Mass Movement'. Landslide classification: geomorphological classification; geotechnical classification by degree of 'drainage', and as 'first-time' or reactivated movement.
- General methods of stability analysis. Simplified and rigorous limit equilibrium analysis of planar, circular and non-circular slides.
- Slope and landslide investigation and instrumentation. Location of shear surfaces; movement observations. Slope stabilisation methods: ground profile modification, drainage, retaining structures, other methods.
- Case studies. 'First-time' landslides and theories of landslide generation: 'softening' and progressive failure. Factors to be considered for design: rate effects, anisotropy, sample-size, etc. Landslide reactivation and residual strength.

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Classification of Mass Movement and Landslides</td>
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<tr>
<td>02</td>
<td>Slope Stability Methods for Translational Slides</td>
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<tr>
<td>03</td>
<td>Slope Stability Methods for Rotational Slides</td>
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<tr>
<td>04</td>
<td>Slope Stability Methods for Compound Slides</td>
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<tr>
<td>05</td>
<td>Slope Stabilisation and Mitigation Measures</td>
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</tr>
<tr>
<td>06</td>
<td>Slope and Landslide Investigation and Instrumentation</td>
<td>SK</td>
</tr>
<tr>
<td>07</td>
<td>Lessons Learnt from Back-Analysis</td>
<td>SK</td>
</tr>
</tbody>
</table>
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Comprehend the role of geomorphology, shear strength, brittle soil behaviour and pore water conditions in slope failures.
- Distinguish between the various methods of slope stability analysis, and apply the appropriate method to assess the stability of slopes under short-term and long-term conditions.
- Design remedial measures where necessary.

4.0 Teaching methods

This module is delivered through lectures, group discussions and tutorials.

5.0 Assessment

The assessment of the module is based on the final exam.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

| C | Other books and papers which have some relevance will be mentioned in the lecture courses. |

7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

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</table>
CI9-GEO-05 Foundations

Course leader: Dr Antonio Carraro
Other contributors: Professor Lidija Zdravkovic; Dr David Taborda
Module status: Core
Pre- or co-requisites: 
Term: Spring
Contact hours: 21
ECTS units: 3
FHEQ Level: 7
Assessment: Written examination

1.0 Aims

- To build on the material covered in the autumn term, particularly the strength and deformation of soils, and introduce students to the design of shallow and deep foundations.
- To review the fundamentals of foundation analysis, in particular bearing capacity theory and foundation settlement analysis, and then to introduce students to the latest developments in foundation analysis and design.

2.0 Syllabus

- Analyses of foundation settlement including: Elastic Stresses Beneath Loaded Areas; Elastic Displacement Theory; Methods of Settlement Prediction on Clays; Accuracy of 1xD Settlement Predictions for Stiff 'Elastic' Materials; Accuracy of 1xD Settlement Predictions on Soft Normally Consolidated Materials; Settlement on Sand and Coarse-Grained Soils.
- Analysis and design of shallow foundations, in particular bearing capacity theory.
- Pile foundation analysis and design including: Piles in Sand; Piles in Clay; Bored Piles; Lateral Loading of Piles; Pile Groups; Piled Rafts.

<table>
<thead>
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<th>Topic</th>
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<tbody>
<tr>
<td>01</td>
<td>Shallow foundations: serviceability limit states (settlement analyses)</td>
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</tr>
<tr>
<td>02</td>
<td>Shallow foundations: ultimate limit states (undrained bearing capacity)</td>
<td>AC</td>
</tr>
<tr>
<td>03</td>
<td>Shallow foundations: ultimate limit states (drained bearing capacity)</td>
<td>AC</td>
</tr>
<tr>
<td>04</td>
<td>Shallow foundations: factors of safety for use in design</td>
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<tr>
<td>05</td>
<td>Deep foundations: bearing capacity of single piles in clay</td>
<td>AC</td>
</tr>
<tr>
<td>06</td>
<td>Deep foundations: bearing capacity of single piles in sand</td>
<td>AC</td>
</tr>
<tr>
<td>07</td>
<td>Deep foundations: bearing capacity of pile groups, piled rafts</td>
<td>AC</td>
</tr>
</tbody>
</table>

Module Descriptor 2017-18
Revised: 26-May-2017
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Evaluate 1D settlements using typical elastic solutions.
- Use the bearing capacity equation to evaluate the bearing capacity of shallow and deep foundations.
- Understand the origin of the different values of the bearing capacity factor $N_c$.
- Understand the benefits of using piled raft foundations.
- Understand the difficulties associated with the assessment of combined loads in foundation design.

4.0 Teaching methods

This course is taught through lectures, with some tutorial sessions.

5.0 Assessment

The assessment of the module is based on the final exam.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

<p>| | |</p>
<table>
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</table>

7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

<table>
<thead>
<tr>
<th>Design</th>
<th>Health &amp; Safety Risk Management</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>P</td>
<td>S</td>
</tr>
</tbody>
</table>
1.0 Aims

- To cover the design and analysis of a variety of different earth retaining structures.

2.0 Syllabus

- Classification of earth retaining structures; design requirements; mobilisation of earth pressure; gravity walls; embedded cantilever walls; single propped embedded cantilever walls; multi-propped walls.

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Introduction</td>
<td>DMP</td>
</tr>
<tr>
<td>02-07</td>
<td>Earth pressures</td>
<td>DMP</td>
</tr>
<tr>
<td>08-10</td>
<td>Gravity walls</td>
<td>DMP</td>
</tr>
<tr>
<td>11-15</td>
<td>Embedded walls</td>
<td>DMP</td>
</tr>
<tr>
<td>16-18</td>
<td>Multi-propped walls</td>
<td>DMP</td>
</tr>
<tr>
<td>19</td>
<td>Case study</td>
<td>DMP</td>
</tr>
<tr>
<td>Tutorial 01</td>
<td>Gravity walls</td>
<td>DMP</td>
</tr>
<tr>
<td>Tutorial 02</td>
<td>Embedded walls</td>
<td>DMP</td>
</tr>
</tbody>
</table>

3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:
• Develop an understanding of different types of earth retaining structures.
• Be able to perform design of gravity walls.
• Be able to perform design of embedded cantilever walls.
• Be able to perform design of propped/anchored embedded walls.

4.0 Teaching methods
A combination of lectures and tutorials.

5.0 Assessment
The assessment of the module is based on the final exam.

6.0 Recommended textbooks
Category as defined by Central Library:

\[
\begin{array}{|c|}
\hline
C = \text{Core}, S = \text{Supplementary} \\
\hline
X & \text{A set of full lecture notes will be provided.} \\
\hline
\end{array}
\]

7.0 Subject threads
The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

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<thead>
<tr>
<th>Design</th>
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</thead>
<tbody>
<tr>
<td>P</td>
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</tbody>
</table>
CI9-GEO-07 Analysis & Constitutive Modelling

Course leader: Professor Lidija Zdravkovic
Other contributors: Core
Module status: Core
Pre- or co-requisites: Autumn
Term: Autumn
Contact hours: 30
ECTS units: 5
FHEQ Level: 7
Assessment: Written examination

1.0 Aims

- To arm students with sufficient knowledge about finite element analysis so that they can assess and compare the capabilities of available commercial software, as well as judge the credibility of numerical results that they may obtain, or review, in the future.

2.0 Syllabus

- The course begins by considering general design requirements, fundamental theoretical considerations and conventional methods of analysis used in geotechnical design.
- The majority of the course then concentrates on finite element analysis: the full theoretical background of the finite element method is derived for linear materials in 2D problems; the necessary adjustments are then explained for the method to be used for analysing nonlinear problems; the boundary conditions specific to geotechnical problems are presented; elastic and elasto-plastic constitutive laws for soil behaviour are introduced; the necessary requirements for 3D analysis are presented; finally some restrictions and pitfalls of the method are illustrated to point out risks involved with an uneducated use of numerical analysis.

- Classical methods of analysis.
- Finite element theory for linear materials.
- Geotechnical considerations.
- Elastic constitutive models.
- Elements of elasto-plastic soil behaviour.
- Elasto-plastic constitutive models.
- Nonlinear finite element analysis.

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
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<tbody>
<tr>
<td>01</td>
<td>Classical methods of analysis</td>
<td>LZ</td>
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<tr>
<td>02</td>
<td>Classical methods of analysis</td>
<td>LZ</td>
</tr>
<tr>
<td>03</td>
<td>Classical methods of analysis</td>
<td>LZ</td>
</tr>
</tbody>
</table>
3.0 **Intended learning outcomes**

On successfully completing this course unit, students will be able to:

- Develop an understanding of assumptions and limitations involved with classical analysis methods.
- Be able to perform simple design calculations using classical methods of analysis.
- Develop an understanding of the theory behind the finite element method.
- Understand the components of the soil constitutive models.
- Become familiar with most common constitutive models and boundary conditions applied in geotechnical finite element analysis.
- Understand the importance of nonlinear solvers in the finite element method.

4.0 **Teaching methods**

A combination of lectures and tutorials.

5.0 **Assessment**

The assessment of the module is based on a 3-hour written exam.

6.0 **Recommended textbooks**

Category as defined by Central Library:

C = Core, S = Supplementary

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>C</td>
<td>Full set of written lecture notes.</td>
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7.0 Subject threads

The table below shows how the themes of design, analysis, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

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<tbody>
<tr>
<td>P</td>
<td>P</td>
<td>S</td>
<td>C</td>
</tr>
</tbody>
</table>
1.0 Aims

- To be able to understand the techniques used to characterise soil properties and quantify the mechanical behaviour of soils.

2.0 Syllabus

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures 1-8</td>
<td>Overview; sampling; in-situ testing and interpretation: SPT; CPT; vane; plate loading tests; pressuremeters.</td>
<td>RJJ</td>
</tr>
<tr>
<td>Lecture 9-17</td>
<td>Field instrumentation; settlement gauges; extensometers; inclinometers; piezometers etc.; measurements of soil stresses and permeabilities; suction measurements and air entry.</td>
<td>RJJ</td>
</tr>
<tr>
<td>Lectures 18-25</td>
<td>Laboratory methods: role and scope of lab tests; fundamentals of stress-strain and strength measurements; minimising errors for forces, stresses, pore pressures and strains; transducers and control systems; practical applications.</td>
<td>RJJ</td>
</tr>
</tbody>
</table>

3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Acquire broad knowledge of the wide range of techniques that are applied to characterise and measure soil behaviour through in-situ testing, sampling, field monitoring and laboratory testing.
- Undertake quantitative analysis of the data obtained by these techniques, and solve a range of problems set in tutorial example sheets.
- Appreciate the role of multiple measurement techniques in integrated site characterisation, field monitoring and geotechnical research.
- Understand the key principles of geotechnical sampling.
• Specify and interpret standard penetration and cone penetration in-situ tests.
• Have an understanding of the background of mechanics and methods of interpretation for plate, vane and pressuremeter in-situ testing techniques.
• Have a broad appreciation of the operating principles of a range of geotechnical instrumentation, the applications of the devices and the issues that have to be addressed in obtaining reliable data.
• Have an in-depth understanding of how pore water pressures may be measured in the field, considering a range of piezometer designs and a quantitative understanding of potential sources of measurement error such as time lag and gas diffusion.
• Know how soil permeability may be measured in-situ including analysis of a variety of testing types.
• Know the potential roles for laboratory testing in characterising soil behaviour.
• Have an understanding of the fundamentals of measuring stress-strain and strength behaviour.
• Have a quantitative grasp of the problems encountered in designing and conducting experiments, including potential errors in stresses, strains and pore pressures.
• Utilise an understanding of how transducers are designed and calibrated and how control systems work.
• Have an appreciation of practical applications including triaxial testing procedures and methods of sample saturation.

4.0 Teaching methods

30 contact hours (25 lectures and 5 tutorials) over the autumn term and will involve lectures, tutorials, use of video material and associated lab classes. In addition to practical laboratory sessions, we also arrange for the visit of a high technology CPT truck to College and site visits are made during the various MSc field courses.

5.0 Assessment

The assessment of the module is based the final exam. The related practical laboratory classes are assessed through coursework.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

| S | Full course notes will be provided, along with access to chapters from the text book by Clayton et al. which has been published online through the Geotechnique website. |
7.0 **Subject threads**

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

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<thead>
<tr>
<th>Design</th>
<th>Health &amp; Safety Risk Management</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>S</td>
<td>-</td>
</tr>
</tbody>
</table>
1.0 Aims

- To introduce the students to fundamental elements of integrating multiple sources of surface and subsurface geotechnical data in order to develop a 3D understanding of the ground, recognising the variability and uncertainty inherent in all geotechnical engineering, and identifying hazards.
- To provide an understanding of the techniques used to interpret the wide variety of geological and geotechnical data acquired during the site investigation process and how risk is assessed.
- Investigate the highly variable nature of the geological environment and the inherent uncertainties in trying to quantify both processes and products for engineering design purposes.
- To introduce students to new SI methods and techniques, including geophysics, remote sensing, and ground modelling / 3D GIS databases.

2.0 Syllabus

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Hazards, risk and insurance</td>
<td>JL</td>
</tr>
<tr>
<td>02</td>
<td>Desktop study</td>
<td>JL</td>
</tr>
<tr>
<td>03</td>
<td>Assessing the ground</td>
<td>JL</td>
</tr>
<tr>
<td>04</td>
<td>Assessing the ground</td>
<td>JL</td>
</tr>
<tr>
<td>05</td>
<td>Understanding core</td>
<td>JL</td>
</tr>
<tr>
<td>06</td>
<td>Non-invasive techniques</td>
<td>JL</td>
</tr>
<tr>
<td>07</td>
<td>New techniques</td>
<td>JL</td>
</tr>
<tr>
<td>08</td>
<td>Building a ground model</td>
<td>JL</td>
</tr>
<tr>
<td>09</td>
<td>Using a 3D database</td>
<td>JL</td>
</tr>
<tr>
<td>10</td>
<td>Predictive modelling</td>
<td>JL</td>
</tr>
</tbody>
</table>
3.0  **Intended learning outcomes**

On successfully completing this course unit, students will be able to:

- Understand the basic elements of site investigation and how they are used to obtain pertinent information for geotechnical design.
- Approach problems of geotechnical design with a full awareness of the basic issues and principles involved.
- Construct and develop ground models and appreciate their significance in the site investigation process.
- Use basic competences in assessing geological environments, characterising geological processes and products, to evaluate likely engineering behaviour of earth materials, identify potential geological hazards and assess their risk and impact on engineered structures, and make recommendations for further investigations.

4.0  **Teaching methods**

This course provides students with an introduction to new techniques, databases, and assessment methods available in order to understand the basis of site investigation, and gathering information. This course is delivered through lectures and practical exercises.

5.0  **Assessment**

The assessment of the module is based on the final exam and on coursework.

6.0  **Recommended textbooks**

Category as defined by Central Library:

C = Core, S = Supplementary

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</table>
7.0 Subject threads

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<tbody>
<tr>
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<td>-</td>
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</table>
CI9-GEO-10 Engineering Geomorphology

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Dr Richard Ghail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other contributors:</td>
<td></td>
</tr>
<tr>
<td>Module status:</td>
<td>Core: All Geotechnics programmes</td>
</tr>
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<td>Pre- or co-requisites:</td>
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<tr>
<td>Term:</td>
<td>Autumn</td>
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<tr>
<td>Contact hours:</td>
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<td>ECTS units:</td>
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<td>FHEQ Level:</td>
<td>7</td>
</tr>
<tr>
<td>Assessment:</td>
<td>Written examination</td>
</tr>
</tbody>
</table>

Please note that this module descriptor is subject to change

1.0 Aims

- To familiarise students with reading the landscape to understand its engineering implications.
- To describe the geological characteristics of soils and rocks, as materials and en-masse, and explains their influence upon the engineering behaviour of these materials

2.0 Syllabus

- Subjects covered include weathering and pedogenesis; fluvial, glacial and aeolian transport; periglacial, arid and humid tropical environments; and tectonic and volcanic activity.

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Reconnaissance, landslides, soils</td>
<td>RG</td>
</tr>
<tr>
<td>02</td>
<td>Glaciation, periglaciation, deserts</td>
<td>RG</td>
</tr>
<tr>
<td>03</td>
<td>Fluvial and marine</td>
<td>RG</td>
</tr>
<tr>
<td>04</td>
<td>Bristol and Cheddar exercise</td>
<td>RG</td>
</tr>
<tr>
<td>05</td>
<td>Plate boundary processes</td>
<td>RG</td>
</tr>
<tr>
<td>06</td>
<td>Teluk Bridge exercise</td>
<td>RG</td>
</tr>
<tr>
<td>07</td>
<td>Orogenesis, rifting, shear</td>
<td>RG</td>
</tr>
<tr>
<td>08</td>
<td>Calvary Tower exercise</td>
<td>RG</td>
</tr>
<tr>
<td>09</td>
<td>Gulf of Corinth</td>
<td>RG</td>
</tr>
<tr>
<td>10</td>
<td>London Basin</td>
<td>RG</td>
</tr>
</tbody>
</table>

3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- View a landscape and visualise the processes that led to its observed appearance.
• Deduce the subsurface materials and hazards.
• Generate a 3D ground model.

4.0 Teaching methods

30 hours of lectures and practical exercises in ten three-hour blocks, consisting of 14 hours of lectures, 14 hours of practical exercises and four half-hour tutorials. Lectures are designed to support a series of practical exercises that require students to assess the ground conditions in a variety of locations, combination of lectures, tutorials and progress tests.

5.0 Assessment

The module is foundational for many aspects of the MSc and is assessed in the final examinations.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

|---|---------------------------------------------------------------------------------|

7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

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<tbody>
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</table>
CI9-GEO-11 Advanced Soil Behaviour

<table>
<thead>
<tr>
<th>Course leader</th>
<th>Dr David Taborda</th>
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<tbody>
<tr>
<td>Other contributors</td>
<td>Professor Catherine O'Sullivan</td>
</tr>
<tr>
<td>Module status</td>
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</tr>
<tr>
<td>Term</td>
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<td>Contact hours</td>
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<td>ECTS units</td>
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<td>FHEQ Level</td>
<td>7</td>
</tr>
<tr>
<td>Assessment</td>
<td>Written examination</td>
</tr>
</tbody>
</table>

1.0 Aims

- To provide insight into the response of sands and clays under generalised loading conditions.

2.0 Syllabus

- The course covers recent developments in the characterisation and understanding of the behaviour of saturated sands and clays (DMGT).
- The main topics include the elastic-plastic response of soils, highlighting issues such as the effect of structure on their behaviour and the anisotropy of stiffness and strength properties (DMGT).
- Particular emphasis will also be given to a description of soil response under a wide-range of strains and how it can be modelled numerically. Additional topics include the description of the effect on the response of geomaterials of repeated loading, the applied strain-rate and temperature (DMGT).
- The particulate nature of soils and how experimental and numerical research on this topic has impacted on current understanding of soil behaviour will be discussed (COS).

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Sand behaviour: fundamentals and the state parameter</td>
<td>DMGT</td>
</tr>
<tr>
<td>02</td>
<td>Sand behaviour: notable states and cyclic response</td>
<td>DMGT</td>
</tr>
<tr>
<td>03</td>
<td>Behaviour at small strains: measurement and influencing factors</td>
<td>DMGT</td>
</tr>
<tr>
<td>04</td>
<td>Behaviour at small strains: frameworks and modelling</td>
<td>DMGT</td>
</tr>
<tr>
<td>05</td>
<td>Yielding of reconstituted and natural soils</td>
<td>DMGT</td>
</tr>
<tr>
<td>06</td>
<td>Strain rate effects / Heat transfer and temperature effects</td>
<td>DMGT</td>
</tr>
<tr>
<td>07</td>
<td>Particulate mechanics in geotechnical engineering</td>
<td>COS</td>
</tr>
</tbody>
</table>
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Understand the effect of stress level and density on the behaviour of granular materials.
- Be familiar with the anisotropic nature of the strength and stiffness of soils.
- Characterise the stiffness of geomaterials under a wide range of strains.
- Be aware of the effect on the response of soils of strain rate, cyclic loading and temperature.
- Recognise the link between the microscopic characteristics of granular materials and their macroscopic behaviour.

4.0 Teaching methods

Lectures are delivered using presentations, which are made available to students. These are complemented by tutorial questions and an extensive set of references published in international journals, which are discussed during lectures.

5.0 Assessment

The assessment of the module is based on the final exam.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

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<table>
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<tr>
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7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

<table>
<thead>
<tr>
<th>Design</th>
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<th>Sustainability</th>
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<tbody>
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CI9-GEO-12 Geotechnical Processes

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Dr Jamie Standing</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Core</td>
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<tr>
<td>Pre- or co-requisites:</td>
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<tr>
<td>Term:</td>
<td>Spring</td>
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<td>Contact hours:</td>
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<td>7</td>
</tr>
<tr>
<td>Assessment:</td>
<td>Coursework</td>
</tr>
</tbody>
</table>

1.0 Aims

- To stimulate interest and encourage reading round various subjects within the geotechnical field.
- The students will be presented with the theory behind geotechnical processes; the design processes; and the construction processes. In all instances the students will be exposed to state-of-the-art thinking and supporting case studies.

2.0 Syllabus

Topics will include: soft ground tunnelling, ground improvement, bored piles and pile testing, reinforced earth and soil nailing, and deep excavations.

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Tunnelling in soft ground.</td>
<td>JS</td>
</tr>
<tr>
<td>02</td>
<td>Tunnelling in soft ground.</td>
<td>JS</td>
</tr>
<tr>
<td>03</td>
<td>Deep excavations.</td>
<td>JS</td>
</tr>
<tr>
<td>04</td>
<td>Soil nailing and reinforced earthfill.</td>
<td>JS</td>
</tr>
<tr>
<td>05</td>
<td>Bored piling and pile testing.</td>
<td>JS</td>
</tr>
<tr>
<td>06</td>
<td>Ground improvement techniques.</td>
<td>JS</td>
</tr>
<tr>
<td>07</td>
<td>Ground improvement techniques.</td>
<td>JS</td>
</tr>
</tbody>
</table>

3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Identify various tunnelling machines and methods.
- Predict ground movements and their effect on overlying structures.
- Think about a wide range of ground improvement techniques, and their advantages and disadvantages.
- Be conversant with practical issues relating to piling and pile testing.
• Understand the differences between soil nailing and reinforced earthfill and how such systems are designed.
• Assess and predict mechanisms of movement from various techniques of deep excavation.
• Be conversant with a wide range of case histories.

4.0  Teaching methods

The course has 21 hours of time-tabled contact time. This is divided into seven three-hour sessions. There will be coursework elements to the course. The sessions will be used for lecturing, group projects, discussion and investigation.

5.0  Assessment

The assessment of the module is based on two coursework assignments, one related to tunnelling and the other ground improvement.

6.0  Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

<table>
<thead>
<tr>
<th></th>
<th>Digital copies of paper notes and PowerPoint slides from the lectures will be made available on Blackboard Learn.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
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</table>

7.0  Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

<table>
<thead>
<tr>
<th>Design</th>
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<th>Sustainability</th>
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</thead>
<tbody>
<tr>
<td>P</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>
1.0 Aims

- To introduce the student to the fundamentals of soil dynamics giving emphasis on the behaviour of soils under seismic and dynamic loading and on the effect of superficial geology on strong-motion.
- The coursework of the module will enable the student to perform an equivalent-linear site response analysis.

2.0 Syllabus

- Wave propagation and field measurement of dynamic soil properties.
- Dynamic stress deformation and strength characteristics of soils.
- Liquefaction, assessment of hazard and mitigation.
- Site response analysis.
- Seismic slope stability.
- Seismic design of geotechnical structures.
- Mini project on site response analysis.

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
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<tbody>
<tr>
<td>01</td>
<td>Wave Propagation</td>
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<tr>
<td>02</td>
<td>Dynamic Soil Properties</td>
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<tr>
<td>03</td>
<td>Liquefaction Phenomenon</td>
<td>SK</td>
</tr>
<tr>
<td>04</td>
<td>Liquefaction Hazard Assessment and Mitigation Measures</td>
<td>SK</td>
</tr>
<tr>
<td>05</td>
<td>Site Response Analysis – Analytical Solution</td>
<td>SK</td>
</tr>
<tr>
<td>06</td>
<td>Numerical Site Response Analysis</td>
<td>SK</td>
</tr>
<tr>
<td>07</td>
<td>Seismic Design of Geotechnical Structures</td>
<td>SK</td>
</tr>
<tr>
<td>08</td>
<td>Dynamic Numerical Analysis of Geotechnical Structures</td>
<td>SK</td>
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<tr>
<td>09</td>
<td>Seismic Slope Stability</td>
<td>SKS</td>
</tr>
<tr>
<td>10</td>
<td>Mini Project on Site Response Analysis</td>
<td>SK</td>
</tr>
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</table>
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Understand the fundamental principles of wave propagation and apply them in engineering examples.
- Understand basic facets of soil behaviour under dynamic loading.
- Understand the role of soil deposits in modifying the seismic ground motion.
- Perform a site response analysis using analytical and numerical approaches.
- Evaluate the liquefaction potential using a range of simplified methodologies and understand the principles of mitigation measures.
- Understand the behaviour of soil slopes under seismic loading and the sliding block methodologies.

4.0 Teaching methods

A combination of lectures and tutorials.

5.0 Assessment

The assessment of the module is based on the final exam and on coursework.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tr>
<td>C</td>
<td>Kramer, S L, Geotechnical Earthquake Engineering. Prentice-Hall, 1996</td>
</tr>
<tr>
<td>S</td>
<td>Idriss, IM; Boulanger, Ross W; Soil liquefaction during earthquakes, Earthquake Engineering Research Institute, MNO-12, 2008</td>
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</table>
**7.0 Subject threads**

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

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CI9-GEO-15 Current Developments in Geotechnical Engineering

<table>
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<tr>
<th><strong>Course leader:</strong></th>
<th>Dr Stavroula Kontoe</th>
</tr>
</thead>
<tbody>
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<td><strong>Term:</strong></td>
<td>Spring</td>
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<tr>
<td><strong>Contact hours:</strong></td>
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<td>7</td>
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<td><strong>Assessment:</strong></td>
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</table>

This module comprises a series of lectures given by Industry to our MSc students in the Spring Term.

Experts from industry share their hands-on experience and present prominent projects from all over the world.

A wide variety of subjects is covered, including Site investigation and Geophysics, Environmental Geotechnics, Engineering Seismology and application of numerical methods on practical design problems.

Most of the visiting lectures are given by representatives of companies forming the MSc industrial bursary panel.
CI9-GEO-16 Partly Saturated Soil Behaviour

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Dr Jamie Standing</th>
</tr>
</thead>
<tbody>
<tr>
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<td>7</td>
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<tr>
<td>Assessment:</td>
<td>Written examination</td>
</tr>
</tbody>
</table>

1.0 Aims

- To understand the behaviour and concepts of partly saturated soil behaviour from first principles using laboratory testing techniques, case histories and test data.

2.0 Syllabus

- Fundamental behaviour of partly saturated soils in terms of soil suction, water content, volume change and shear strength.
- Pore pressure profiles in the partly saturated zone: appropriate stress variables for partly saturated soils; the application of effective stress to partly unsaturated soils, direct suction measurement; indirect suction measurement; laboratory testing techniques; soil-water relationships; the influence of suction on the volume of reconstituted and compacted soils and the influence of suction on shear strength.
- The course is illustrated with recent test data and case histories.

<table>
<thead>
<tr>
<th>No.</th>
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<th>Staff</th>
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<tbody>
<tr>
<td>01</td>
<td>Basic principles and definitions.</td>
<td>JS</td>
</tr>
<tr>
<td>02</td>
<td>Collapsible and expansive soils.</td>
<td>JS</td>
</tr>
<tr>
<td>03</td>
<td>Suction definition and measurement.</td>
<td>JS</td>
</tr>
<tr>
<td>04</td>
<td>Laboratory testing of unsaturated soils.</td>
<td>JS</td>
</tr>
<tr>
<td>05</td>
<td>Volume change behaviour.</td>
<td>JS</td>
</tr>
<tr>
<td>06</td>
<td>Shear strength and elasto-plastic constitutive model.</td>
<td>JS</td>
</tr>
<tr>
<td>07</td>
<td>Flow processes and practical applications.</td>
<td>JS</td>
</tr>
</tbody>
</table>

3.0 Intended learning outcomes

On successfully completing this course unit, students will:

- Have basic knowledge of where unsaturated soils are encountered.
• Be familiar with all basic terminology used in unsaturated soils.
• Understand the effect of fabric on the response of consolidated soils, especially in expansive and collapsible soils.
• Differentiate between different types of suction.
• Be conversant with the soil-water retention curve and appreciate its significance.
• Understand the effect of suction on volume change and shear strength behaviour.
• Understand various apparatus that enable unsaturated soils to be tested with and without suction control and measurement.

4.0 Teaching methods

21 hours of lectures and contact time in the spring term. There will be question and answer sessions at the start of most lecture sessions to recap and develop what has been learnt in previous lectures. Simple laboratory demonstrations are included to illustrate some of the basic principles.

5.0 Assessment

The assessment of the module is based on the final exam.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

<table>
<thead>
<tr>
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<td>Design</td>
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</table>

X Full course notes will be provided.

7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).
CI9-GEO-17 Advanced Constitutive Modelling

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Klementyna Gawlecka</th>
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<td>FHEQ Level:</td>
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<tr>
<td>Assessment:</td>
<td>Coursework</td>
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</tbody>
</table>

1.0 Aims

- To cover the basis of soil modelling presented in the Analysis course, by considering additional concepts of soil plasticity: Double yield surface models; Bounding surface plasticity models; ‘Bubble’ models.
- To further demonstrate the ability of finite element analysis in modelling real boundary problems and make students aware of the fact that, for complex problems, simple models of soil behaviour may not be appropriate.

2.0 Syllabus

- The course provides student with an overview of advanced constitutive models for soil behaviour and their correct and appropriate use in finite element analysis of boundary value problems.
- Different case studies showcase the advantages and disadvantages of various constitutive models, emphasising on the importance of selecting appropriate constitutive models for different geotechnical engineering problems.
- Two models (Modified Cam clay – MCC – and kinematic surface hardening – KSH – models) are studied in detail and used in finite element analyses of standard laboratory experiments in two three-hour tutorials. The same models are then adopted in finite element analysis of boundary value problems (tunnel, retaining wall, embankment), also in two three-hour tutorials.
- Finally, emphasis is given in the post-processing, assessment and interpretation of the numerical data produced.

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
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<tr>
<td>01</td>
<td>Lecture: Application of Advanced Constitutive models in Geotechnical Engineering Practice</td>
<td>KG</td>
</tr>
<tr>
<td>02</td>
<td>Lecture: Modified Cam clay; Two-surface kinematic hardening model</td>
<td>KG</td>
</tr>
<tr>
<td>03</td>
<td>Tutorial: Single element analysis: Modified Cam clay model</td>
<td>KG</td>
</tr>
<tr>
<td>04</td>
<td>Tutorial: Single element analysis: Two-surface kinematic hardening model</td>
<td>KG</td>
</tr>
</tbody>
</table>
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Gain experience in performing a finite element analysis.
- Understand the key differences between simple and more complex elasto-plastic constitutive models in terms of resulting predictions from finite element analyses.
- Understand the importance and function of model input parameters.

4.0 Teaching methods

This course is delivered through lectures and tutorials.

5.0 Assessment

The assessment of the module is based on coursework only.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

<table>
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<tr>
<th></th>
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X

7.0 Subject threads

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<tr>
<th>Design</th>
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</thead>
<tbody>
<tr>
<td>P</td>
<td>-</td>
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</table>
CI9-GEO-19 Geotechnics Fieldwork

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Dr Richard Ghail</th>
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<tbody>
<tr>
<td>Other contributors:</td>
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<td>Pre- or co-requisites:</td>
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<td>FHEQ Level:</td>
<td>7</td>
</tr>
<tr>
<td>Assessment:</td>
<td>Fieldwork</td>
</tr>
</tbody>
</table>

Please note this module descriptor is subject to change

1.0 Aims

- To attend all three field courses, and apply practical experience in geotechnical fieldwork.

2.0 Syllabus

- Lyme Regis Field Course: This weekend trip takes place in October. The visits are to sites of geotechnical and geological interest and involving issues on slope stability. The group is based overnight in Lyme Regis/Dorchester.
- Cheddar Gorge Field Course: This weekend trip takes place in March. The overnight stay is in Weston-Super-Mare. The main purpose of the course it to look closely at the fantastic geology exposed in Cheddar Gorge and to study a rock mass in situ.
- Field Course to Greece: This week long trip starts a few days after finishing the examinations in May the group flies off to Greece to sample the culture, taste the food and wine, and to study at first hand the geology, geomorphology and seismicity. We also visit some remarkable geotechnical projects - motorways, large dams, metro systems, and bridges.

3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Record clear and concise data and descriptions in the field, including sketches.
- Measure structural information, perform rock quality assessments and retrieve soil samples.
- Appreciate a range of engineering sites, including dams, earthworks and tunnels.
- Identify landslide deposits, assess slope stability and mitigation techniques.
4.0  Teaching methods
Taught solely through fieldwork, with introductory safety briefings.

5.0  Assessment
Assessment is by field notebooks and group presentations.

6.0  Recommended textbooks
Category as defined by Central Library:
C = Core, S = Supplementary

| X | None required |

7.0  Subject threads
The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

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</thead>
<tbody>
<tr>
<td>P</td>
<td>C</td>
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</tbody>
</table>
1.0 **Aims**

- To introduce the students to fundamental elements of engineering seismology and seismic hazard assessment, including the effects of soil deposits at the site, as well as to present basic concepts concerning other geohazards, such as volcanoes, tsunamis and landslides.
- To enable the students to use hazard assessment as a generic tool which can be applied to all types of geohazards.

2.0 **Syllabus**

- Introduction to major Geohazards (volcanoes, tsunamis, ground shaking and landslides).
- Landslides (flows and mudslides): mechanisms, hazard zonation, monitoring, management and mitigation.
- Fundamentals of Engineering Seismology (ground motion parameters, source characterisation, recurrence relationships and ground motion prediction equations).
- Probabilistic Seismic Hazard Analyses (PSHA).
- Epistemic uncertainty and logic trees; seismic hazard and design codes.
- Fundamentals of wave propagation, dynamic soil properties and site effects.
- Site response analysis and its incorporation into PSHA.
- Liquefaction: mechanisms, assessment of hazard and estimation of liquefaction induced deformations.
- Seismic Slope Stability.
### Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Understand major types of geotechnical/geological hazards: volcanoes, tsunamis, ground shaking, landslides.
- Describe approaches applied in hazard zonation, prediction and monitoring.
- Understand the mechanisms that trigger major landslides (mudslides and flows).
- Develop basic competence in assessing seismic hazard and in characterising earthquake actions.
- Evaluate the seismic response of soil layers.
- Evaluate the liquefaction potential using simplified methodologies.
- Estimate slope movements induced by seismic motion.

### Teaching methods

A combination of lectures and tutorials.

### Assessment

Assessment information will be provided separately.

### Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
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<tbody>
<tr>
<td>01</td>
<td>Introduction to geohazards (volcanoes, tsunamis, ground shaking and landslides). Landslides (flows and mudslides).</td>
<td>SK</td>
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<tr>
<td>02</td>
<td>Seismic sources, types of earthquakes, earthquake characteristics.</td>
<td>PJS</td>
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<tr>
<td>03</td>
<td>Recurrence relationships, seismicity analysis, seismic recordings.</td>
<td>PJS</td>
</tr>
<tr>
<td>04</td>
<td>Strong motion engineering seismology.</td>
<td>PJS</td>
</tr>
<tr>
<td>05</td>
<td>Seismic Hazard Analysis.</td>
<td>PJS</td>
</tr>
<tr>
<td>06</td>
<td>Epistemic uncertainty, representation in seismic codes.</td>
<td>PJS</td>
</tr>
<tr>
<td>07</td>
<td>Fundamentals of wave propagation, dynamic soil properties and site effects.</td>
<td>SK</td>
</tr>
<tr>
<td>08</td>
<td>Site response analysis and its incorporation into PSHA.</td>
<td>SK</td>
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<td>09</td>
<td>Liquefaction: mechanisms, assessment of hazard and estimation of liquefaction induced deformations.</td>
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<tr>
<td>10</td>
<td>Seismic Slope Stability.</td>
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7.0 Subject threads

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CI9-EE-04 Contaminated Land & Groundwater (CI9-GEO-34)

<table>
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<th>Course leader:</th>
<th>Dr Adrian Butler</th>
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<td>Mr Adrian Shields, Dr Hugh Potter, Mr Matthew Pearce</td>
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<tr>
<td>Assessment:</td>
<td>Written examination</td>
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</table>

1.0 Aims
- Understand the problems associated with contaminated land that have arisen from the unmanaged release of pollutants into the environment.
- Gain a detailed understanding of the physical processes governing the fate and transport of organic and inorganic pollutants in the subsurface, and how these can be represented using mathematical models.
- Learn methods for good practice in data collection for site characterisation.
- Develop remediation options through risk assessment techniques in order to ensure a rational approach to site assessment and clean up, subject to environmental and economic constraints.

2.0 Syllabus
- Students undertaking the course are assumed to be familiar with the basics of hydrogeology, particularly groundwater flow (incl. head, Darcy's law, permeability, hydraulic conductivity, transmissivity, groundwater monitoring and interpretation of head data).

<table>
<thead>
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<th>Week No.</th>
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<tbody>
<tr>
<td>16</td>
<td>Introduction/Regulatory Context</td>
<td>Dr A. Butler, Dr Hugh Potter</td>
</tr>
<tr>
<td>17</td>
<td>Mass Transport I (aqueous phase)</td>
<td>Dr A. Butler</td>
</tr>
<tr>
<td>18</td>
<td>Mass Transport II (multiphase)</td>
<td>Dr A. Butler</td>
</tr>
<tr>
<td>19</td>
<td>Risk Assessment</td>
<td>Dr A. Butler</td>
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<tr>
<td>20</td>
<td>Site Evaluation</td>
<td>Adrian Shields</td>
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<tr>
<td>21</td>
<td>Site Remediation</td>
<td>Adrian Shields</td>
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<tr>
<td>22</td>
<td>Remediation Design Exercise</td>
<td>Adrian Shields</td>
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<tr>
<td>23</td>
<td>Remediation Economics</td>
<td>Dr A. Butler</td>
</tr>
<tr>
<td>24</td>
<td>Client's Perspective</td>
<td>Matthew Pearce</td>
</tr>
</tbody>
</table>
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Understand the regulatory framework governing contaminated land assessment and its remediation.
- Understand the processes that govern the fate and transport of contaminants in the subsurface and how they can be understood and simulated using mathematical models.
- Apply physical principles and models to understand the source, movement, fate and environmental impact of contaminants and how these can be evaluated in terms of risk.
- Use economic principles in remediation decision making and in the choice of remediation technologies.

4.0 Teaching methods

Weekly lectures by a variety of speakers from both academia and industry.

5.0 Assessment

The assessment of the module is by examination only.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

Recommended pre-course texts:

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<tbody>
<tr>
<td>S</td>
<td>Hydrogeology: Principles &amp; Practice (Hiscock, 2005)</td>
</tr>
<tr>
<td>S</td>
<td>Physical and Chemical Hydrogeology (Domenico &amp; Schwartz, 1998)</td>
</tr>
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Recommended course texts:

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<thead>
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</thead>
<tbody>
<tr>
<td>S</td>
<td>Contaminant Hydrogeology (Fetter, 2008)</td>
</tr>
<tr>
<td>S</td>
<td>Economics of Groundwater remediation (Hardisty and Ozdemiroglu, 2004)</td>
</tr>
</tbody>
</table>
7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

<table>
<thead>
<tr>
<th>Design</th>
<th>Health &amp; Safety Risk Management</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>S</td>
<td>P</td>
</tr>
</tbody>
</table>
CI9-GEO-37  Rock Engineering

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Dr James Lawrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other contributors:</td>
<td></td>
</tr>
<tr>
<td>Module status:</td>
<td>Core H2U3 (SM), H2UG (EG)</td>
</tr>
<tr>
<td>Pre- or co-requisites:</td>
<td></td>
</tr>
<tr>
<td>Term:</td>
<td>Autumn</td>
</tr>
<tr>
<td>Contact hours:</td>
<td>21</td>
</tr>
<tr>
<td>ECTS units:</td>
<td>3</td>
</tr>
<tr>
<td>FHEQ Level:</td>
<td>7</td>
</tr>
<tr>
<td>Assessment:</td>
<td>Practicals, Written examination</td>
</tr>
</tbody>
</table>

1.0 Aims

- Engineering rock mechanics is the study of both rock mechanics and rock engineering, and is concerned with all structures that are built in or on rock. This includes structures formed from the rock itself, such as slopes and caverns, as well as engineering structures such as tunnels and foundations.

- This module is an introduction to the subject, and aims to familiarise students with the principal concepts and techniques used in the discipline, whilst indicating more advanced issues. Through a series of weekly worksheets, students have the opportunity to apply the fundamentals presented in the lectures to typical engineering problems.

2.0 Syllabus

- The course is broadly divided into two sections, the first half dealing with principals and the second with their application. It is an introduction to the subject, and aims to familiarise students with the principal concepts and techniques used in the discipline, whilst indicating more advanced issues. A series of weekly practical sessions give students the opportunity to apply the fundamentals presented in the lectures to typical engineering problems.


<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Fundamentals</td>
<td>Dr James Lawrence</td>
</tr>
<tr>
<td>02</td>
<td>Intact Rock</td>
<td>Dr James Lawrence</td>
</tr>
<tr>
<td>03</td>
<td>Fracturing</td>
<td>Dr James Lawrence</td>
</tr>
<tr>
<td>04</td>
<td>Fractured Rock Masses</td>
<td>Dr James Lawrence</td>
</tr>
<tr>
<td>05</td>
<td>Jointing and Faults</td>
<td>Dr James Lawrence</td>
</tr>
<tr>
<td>06</td>
<td>Slope Stability</td>
<td>Dr James Lawrence</td>
</tr>
</tbody>
</table>
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Perform simple rock mechanics and rock engineering analysis.
- Understand the fundamentals of rock engineering design.
- Confidently apply the material to which they have been introduced.

4.0 Teaching methods

A combination of lectures and practical sessions.

5.0 Assessment

Assessment of the module is based on two assessed practical exercises and a final exam.

6.0 Recommended textbooks

Category as defined by Central Library: C = Core, S = Supplementary

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Authors and Publishers</th>
</tr>
</thead>
</table>

7.0 Subject threads

The table below shows how the themes of design, analysis, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

<table>
<thead>
<tr>
<th>Design</th>
<th>Health &amp; Safety Risk Management</th>
<th>Sustainability</th>
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</thead>
<tbody>
<tr>
<td>P</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
CI9-EE-29 Containment Engineering (CI9-GEO-38)

<table>
<thead>
<tr>
<th>Course leader:</th>
<th>Dr Russell Jones (Golder Associates UK Ltd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other contributors:</td>
<td>Professor Chris Cheeseman; Roger White (Golder Associates UK Ltd); Joe Jackson (Keltbray Remediation)</td>
</tr>
<tr>
<td>Module status:</td>
<td>Core H2UM, H2UN</td>
</tr>
<tr>
<td>Pre- or co-requisites:</td>
<td></td>
</tr>
<tr>
<td>Term:</td>
<td>Autumn</td>
</tr>
<tr>
<td>Contact hours:</td>
<td>18</td>
</tr>
<tr>
<td>ECTS units:</td>
<td>3</td>
</tr>
<tr>
<td>FHEQ Level:</td>
<td>7</td>
</tr>
<tr>
<td>Assessment:</td>
<td>Written examination and coursework</td>
</tr>
</tbody>
</table>

1.0 Aims

- To understand the role of containment engineering in the protection of public health and the environment.
- The focus is on the issues associated with waste containment technologies including landfill as this remains the dominant waste disposal method used world-wide.
- To introduce waste degradation processes and the geological aspects of landfill design required to limit potential environmental impacts.
- To discuss the significant problems associated with mining tailings dam.
- To understand the properties of liners, landfill site hydrogeology, gas control and monitoring. The course includes a group case study on a detailed landfill design.

2.0 Syllabus

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Introduction to waste management and landfill</td>
<td>Professor C. Cheeseman</td>
</tr>
<tr>
<td>02</td>
<td>Chemistry and biology of waste decomposition processes</td>
<td>Professor C. Cheeseman</td>
</tr>
<tr>
<td>03</td>
<td>Use of geosynthetics for sustainable development</td>
<td>Dr R. Jones</td>
</tr>
<tr>
<td>04</td>
<td>Barrier system performance</td>
<td>Dr R. Jones</td>
</tr>
<tr>
<td>05</td>
<td>Geosynthetic liners and slope stability</td>
<td>Dr R. Jones</td>
</tr>
<tr>
<td>06</td>
<td>Containment engineering: industrial case studies</td>
<td>Joe Jackson</td>
</tr>
<tr>
<td>07</td>
<td>Material liners and construction quality assurance</td>
<td>Dr R. Jones</td>
</tr>
<tr>
<td>08</td>
<td>Mining Tailings Dams</td>
<td>Roger White</td>
</tr>
<tr>
<td>09</td>
<td>Project presentations</td>
<td>Dr R. Jones; Dr C. Cheeseman</td>
</tr>
</tbody>
</table>
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Have an excellent appreciation of the general issues associated with containment engineering and particularly a detailed understanding of all aspects associated with engineering landfill sites.

4.0 Teaching methods

The content is delivered primarily through lectures. There is also a piece of coursework set – the focus of which is on the design of a landfill. This involves students working in small groups, and each group is required to give a short presentation.

5.0 Assessment

The assessment of the module is by a combination of examination and coursework.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

S Comprehensive lecture notes are provided, together with various codes and guidance notes.

7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

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<tr>
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<td>S</td>
</tr>
</tbody>
</table>
1.0 Aims

- To introduce a range of typical geotechnical laboratory tests, starting from basic manually operated apparatus, leading to advanced tests on computer-controlled stress path apparatus.
- To illustrate and reinforce aspects of soil behaviour covered in many of the lecture courses throughout the year.
- To allow students to gain additional understanding of practical issues related to the collection and interpretation of laboratory test data through practicals, demonstrations and worked examples.

2.0 Syllabus

Topics covered in this module will include:

- Classification of soils: particle size distribution; Atterberg limits.
- Oedometer (1D consolidation) testing.
- Direct shear box testing – stress dilatancy relationship, shear strength.
- Laboratory compaction of soils.
- Stress path triaxial testing.
3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Describe basic principles of various geotechnical testing apparatuses.
- Understand the effects of sample preparation, specimen reconstitution and apparatus setup on the acquired data.
- Use rigorous methods to interpret geotechnical laboratory testing data.
- Know the merits and pitfalls of different types of testing.
- Identify tests that determine the nature of soil.
- Quantify aspects of the soil state from geotechnical tests.
- Understand the importance of boundary conditions imposed by basic geotechnical tests.

4.0 Teaching methods

This module is taught through lectures, practical sessions, demonstrations and tutorials. Some of these tutorials will take place in a computer room to facilitate discussions on data analysis.

5.0 Assessment

The module is assessed purely through coursework in the form of an individual laboratory report covering each of the topics during each term. Four reports are due in the autumn term and one report is due in the spring term. The deadlines for the coursework are on Friday 12:00 as follows:

<table>
<thead>
<tr>
<th>Week</th>
<th>Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 6</td>
<td>Report 1: Classification</td>
</tr>
<tr>
<td>Week 7</td>
<td>Report 2: Oedometer testing.</td>
</tr>
<tr>
<td>Week 9</td>
<td>Report 3: Direct shear box testing.</td>
</tr>
<tr>
<td>Week 11</td>
<td>Report 4: Compaction.</td>
</tr>
<tr>
<td>Week 15</td>
<td>Report 5: Triaxial stress path testing.</td>
</tr>
</tbody>
</table>
6.0  Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>S</td>
<td>LADE, P. V. Triaxial testing of soils. Wiley</td>
<td></td>
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<tr>
<td>S</td>
<td>GERMAINE, J.T. and GERMAINE, A.V. Geotechnical laboratory measurements for engineers. Wiley</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>BS 1377: 1990, Methods of test for soils for civil engineering purposes.</td>
<td></td>
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<tr>
<td>S</td>
<td>ASTM International: Annual Book of ASTM Standards (Section 4).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: relevant British Standards and ASTM International standards are available online through the library.</td>
<td></td>
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</table>

7.0  Subject threads

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