1. **Introduction:** The MSc programme in Computer Science is a one year full time or two year part time postgraduate course designed to provide graduate computer scientists and other applicants from numerate disciplines with specialist theoretical knowledge and practical skills in one of: Intelligent Systems; Future Networked Systems; Graphics and Vision Technologies or Data Science. In addition the programme provides all students with research skills, innovation experience and the opportunity to learn complementary computing and data science topics. Creativity and innovation are fostered throughout the course, and cohere around a strong emphasis on practical engagement with the technologies, development and strategies, used in building innovative intelligent systems, future networked systems (cloud, warehouse, mobile and ubiquitous), graphics and vision technologies, or data science solutions, depending on the strand taken. Graduates of the programme will be well-equipped to pursue careers at the cutting edge of the industries relevant to their strand.

2. **Admission Requirements:** This course is open to graduates who have achieved the equivalent of an upper second-class honours degree (2.1), or better, in computing or information technology. Candidates with an upper second-class honours degree (2.1) in disciplines such as engineering, mathematics, or statistics, if they have acquired good programming skills, are also encouraged to apply. Candidates will be required to provide evidence of their computing skills and experience.

Students apply for and are accepted onto a specific strand.

3. **Duration:** One year (September-August), full time, or two years part time. Students will not be permitted to join the course late.

4. **Course structure:**

Students on all strands will take core modules Innovation (5 ECTS credits), Research Methods (5 ECTS credits), Machine Learning (5 ECTS credits) and a Dissertation (30 ECTS
Students will take a further 35 ECTS of strand-specific modules and 10 ECTS of optional modules.

Students taking the course full-time, in MT take 15 ECTS course core modules, 10 ECTS strand specific modules, and one non-strand specific 5 ECTS option, and in HT take 25 ECTS of strand specific modules and one non-strand specific 5 ECTS credits option. In TT students complete a 30 ECTS credits dissertation.

Students may also take the course over two years. In this case, students are required to take 60 ECTS of taught modules in Year 1, as for one-year students, and they take the Dissertation module in Year 2.

Core Modules:

CS7CS1 Research Methods (5 ECTS)
CS7CS2 Innovation (5 ECTS)
CS7CS4 Machine Learning (5 ECTS)
CS7CS5 Dissertation (30 ECTS)

Intelligent Systems Modules:

CS7CS3 Advanced Software Engineering (10 ECTS)
CS7IS1 Knowledge and Data Engineering (5 ECTS)
CS7IS2 Artificial Intelligence (5 ECTS)
CS7IS3 Information Retrieval and Web Search (5 ECTS)
CS7IS4 Text Analytics (5 ECTS)
CS7IS5 Adaptive Applications (5 ECTS)

Future Networked Systems Modules:

CS7CS3 Advanced Software Engineering (10 ECTS)
CS7NS1 Scalable Computing (5 ECTS)
CS7NS2 Internet of Things (5 ECTS)
CS7NS3 Next Generation Networks (5 ECTS)
CS7NS4 Urban Computing (5 ECTS)
CS7NS5 Security and Privacy (5 ECTS)
CS7NS6 Distributed Systems (5 ECTS)

Graphics and Vision Technologies Modules:

CS7CS3 Advanced Software Engineering (10 ECTS)
CS7GV1 Computer Vision (5 ECTS)
CS7GV2 Mathematics of Light and Sound (5 ECTS)
CS7GV3 Real-time Rendering (5 ECTS)
CS7GV4 Augmented Reality (5 ECTS)
CS7GV5 Real-time Animation (5 ECTS)
CS7GV6 Computer Graphics (5 ECTS)

Data Science Modules

CS7DS1 Data Mining and Analytics (10 ECTS)
CS7DS2 Optimisation Algorithms for Data Analysis (5 ECTS)
CS7DS3 Applied Statistical Modelling (5 ECTS)
CS7DS4 Data Visualisation (5 ECTS)
CS7NS1 Scalable Computing (5 ECTS)
CS7NS5 Security and Privacy (5 ECTS)

Other Modules:

LI7870 Advanced Syntactic Theory (10 ECTS)
LI7872 Formal Foundations of Linguistic Theories (10 ECTS)
Not all modules listed may be offered in a given academic year and may be replaced by alternatives.

5. Assessment:

The pass mark for all elements is 50%. The overall mark for the course is the credit-weighted average of the mark awarded for each module. Interim module marks are published after each term. Final results are determined at a final court of examiners with the external examiner present. Module assessments and dissertation are subject to external moderation.

There are no supplemental examinations or re-assessments.

To proceed to the dissertation students must achieve an overall average mark on taught modules of at least 50% and either (i) pass taught modules amounting to 60 ECTS credits or (ii) pass taught modules amounting to at least 50 ECTS credits and achieve a minimum mark of 40% in any failed module(s). Permission to proceed to dissertation is decided by an interim court of examiners.

To qualify for the award of the M.Sc. degree, students must be permitted to proceed to the dissertation, must submit a dissertation by the prescribed date and achieve a pass mark in the dissertation. Those students who achieve a final overall average mark of at least 70% for the taught modules and a mark of at least 70% in the dissertation will be awarded a distinction. A distinction cannot be awarded if a candidate has failed any module during the course.

Students who are permitted to proceed to the dissertation according to the rule above, but who do not submit a dissertation, or who do not satisfactorily complete their dissertation, will be eligible for the award of a Postgraduate Diploma in Computer Science To qualify for the award of Postgraduate Diploma students must achieve an overall average mark on taught modules of at least 50% and either (i) pass taught modules amounting to 60 ECTS credits or (ii) pass taught modules amounting to at least 50 ECTS credits and have a mark of not less than 40% in any failed module. Those students who achieve an overall average mark of 70% or above for the taught modules will be awarded a Postgraduate Diploma with Distinction. A distinction cannot be awarded if a candidate has failed any taught module or has failed the dissertation.

Students who are not permitted to proceed to the dissertation according to the rule above will be deemed to have failed overall and may apply to repeat the course.

6. Course Director: Professor Donal O’Mahony
1. **Introduction:** This M.Sc. in Computer Science is a one-year full-time graduate course in Computer Science focusing on Interactive Entertainment Technology.

2. **Aim:** The aim of this course is to equip students with the theoretical and practical knowledge that will enable them to participate in the design and development of interactive video game and entertainment technology in a wide range of applications and environments. The course presents the state of the art in, and the likely evolution of the technologies employed to create the increasingly complex hardware and software platforms used in the industry. The focus is on skills that will develop graduates’ capacity as agents of change and prepare them for immediate contribution to and subsequent successful careers in the industry.

3. **Admission Requirements:** Admission to the course is competitive, and is normally restricted to graduates who have achieved an upper-second class Honors Bachelors degree, or better, in computing, information technology, or a related discipline. Well-qualified candidates from other disciplines who have sufficient knowledge of computing (including the ability to program) may also be accepted.

4. **Duration:** The course will be offered on a one year, full-time basis.

5. **Course structure:** The taught component of the M.Sc. course will incorporate both taught and practical elements. Students will also undertake an independent research project that will be submitted in the form of a dissertation (30 credits).

All students are required to take the following core modules:

- CS7010 Software Engineering for Distributed Systems (5 credits)
- CS7030 Numerical Methods and Advanced Mathematical Modelling – Part 1 (5 credits)
- CS7038 Interactive Entertainment Technology Group Project (10 credits)
- CS7058 Numerical Methods and Advanced Mathematical Modelling – Part 2 (5 credits)
- CS7059 Software Engineering Individual Project (5 credits)

Additionally, students must select modules amounting to 30 credits from the following list of elective modules:

- CS7002 Data Communications and Networks (5 credits)
- CS7008 Vision Systems (5 credits)
- CS7031 Graphics and Console Hardware (5 credits)
CS7032 Artificial Intelligence (5 credits)

CS7033 Real-time Animation (5 credits)

CS7034 Augmented Reality (5 credits)

CS7048 Data Communications and Networks Practical Module (5 credits)

CS7055 Real-time Rendering (5 credits)

CS7056 Autonomous Agents (5 credits)

CS7057 Real-time Physics (5 credits)

Certain modules in the second term may require the completion of pre-requisite modules in the first term. Students are required to complete 30 credits of modules in each term and reach a full complement of 90 credits for the full year, including the dissertation, in order to be eligible for the award of the M.Sc. degree. Not all modules listed may be offered in a given academic year and may be replaced by alternatives. The list of core modules may also be amended in any given year. Students will be notified of any such changes at the start of the academic year.

6. Assessment: To be allowed to proceed to the dissertation leading to the degree of Master in Computer Science, candidates must (i) achieve an overall average mark of at least 50% across all the taught modules and (ii) for modules amounting to not less than 50 credits, achieve a mark of at least 50% in each individual module and for modules amounting to not more than 10 credits, achieve a mark of at least 40% in each individual module. The overall mark for the taught modules is based on a credit-weighted average of the mark awarded in each module. The maximum mark awarded for supplementary assessment or examinations is 50%.

To satisfactorily complete a dissertation, students must submit their dissertation by the prescribed date and must obtain a passing grade in their dissertation. In order to qualify for the award of Masters with Distinction, students must, as a minimum, achieve a grade of distinction in their dissertation and achieve a mark of at least 68% in the unrounded average mark for the taught modules, and, for modules amounting to not less than half of the credits required for the taught component of the course, achieve a minimum mark of 70% in each individual module. A Distinction cannot be awarded if a candidate has failed any credit during the course.

Students who pass the required modules but who are not permitted to or otherwise do not submit a dissertation, or who do not satisfactorily complete their dissertation, will be eligible for the award of a Postgraduate Diploma in Computer Science. The Postgraduate Diploma with Distinction is awarded to students who achieve at least 68% in the overall average mark and achieve a minimum mark of 70% in individual modules which together amount to at least half of the required credits for the award of the Postgraduate Diploma associated with the
student’s registered course. All assessments and the dissertation will be subject to external review.

7. **Course Director:** Professor Michael Manzke

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**Computer Science (Mobile and Ubiquitous Computing) (M.Sc./P.Grad.Dip.)**

1. **Introduction:** This M.Sc. in Computer Science is a one-year full-time graduate course in Computer Science focusing on mobile and ubiquitous computing.

2. **Aim:** The primary goals of this course are to equip graduate students from diverse backgrounds with an integrated set of skills that will empower them to develop their professional careers in Mobile and Ubiquitous Computing and related areas of information technology to enable them to become leaders in their chosen field of specialisation. The particular focus of the course involves developing and demonstrating specialism and thought leadership in the theoretical and practical concepts that drive innovation in the design and deployment of mobile and ubiquitous computing solutions. The course embraces the state of the art in mobile and ubiquitous computing research and technologies, stimulating engagement in the evolution of the domain. The acquisition of new skills and competencies, closely aligned to the development of the graduates’ capacity as agents of change and innovation, are key foci of the course.

3. **Admission Requirements:** Admission to the course is competitive, and is normally restricted to graduates who have achieved an upper-second class Honors Bachelors degree, or better, in computing, engineering, information technology, or a related discipline. Well-qualified candidates from other numerate disciplines who have sufficient knowledge of computing (including evidence of the ability to program) may also be accepted.

4. **Duration:** One year (September-August), full-time. Students will not be permitted to join the course late.

5. **Course structure:** The taught component of the course will incorporate both taught and practical elements. Students will also undertake an independent research project that will be submitted in the form of a dissertation (30 credits). The list of modules currently available to students includes:

1. Wireless Concepts and Technologies (5 credits)
2. Vision Systems (5 credits)
3. Middleware for Ubiquitous Computing (5 credits)
4. Real-time and Embedded Systems (5 credits)
5. Context Awareness (5 credits)

6. Human-Computer Interaction (5 credits)

7. Mobile & Ubiquitous Computing: State of the Art (5 credits)

8. Data Communications & Wireless Networking Practical (5 credits)

9. Software Engineering/Middleware Group Project (5 credits)

10. Individual Programming Project (5 credits)

11. Information Architecture (5 credits)

12. Mobile and Transient Security (5 credits)

13. Mobile and Autonomous Systems Innovation (5 credits)

Students are required to reach a full complement of 90 credits to be eligible for the award of the M.Sc. degree. Not all modules listed may be offered in a given academic year and may be replaced by alternatives.

6. Assessment: To be allowed to proceed to the dissertation leading to the degree of M.Sc. in Computer Science, candidates must (i) achieve a pass mark of at least 50% in the credit-weighted average mark for all taught modules, and ii) for modules amounting to not less than 50 credits achieve a mark of at least 50% in each individual module, and for modules amounting to not more than 10 credits achieve a mark of at least 40% in each individual module. Students who fail one or more modules may, at the discretion of the Court of Examiners, re-attempt through submission of supplementary assessment(s) by an appointed date or by sitting supplementary examination(s). The maximum mark awarded for supplementary assessment or examinations is 50%. To satisfactorily complete a dissertation, students must submit their dissertation by the prescribed date and must obtain a passing mark of 50% in their dissertation. The final mark for the course is based on a credit-weighted average of the mark awarded in each module, including the dissertation. In order to qualify for the award of M.Sc. with Distinction, students must, as a minimum, achieve a mark of 70% or above in the dissertation, and achieve at least 68% in the unrounded overall average mark for the taught modules, and for modules amounting to not less than half the credits required for the taught component of the course, achieve a minimum mark of 70% in each individual module. A Distinction cannot be awarded if a candidate has failed any credit during the period of study.

Students who pass the required modules but who are not permitted to or otherwise do not submit a dissertation, or who do not satisfactorily complete their dissertation, will be eligible for the award of a Postgraduate Diploma in Computer Science. The Postgraduate Diploma may be awarded with Distinction to candidates who achieve at least 68% in the unrounded overall average mark for the taught modules and achieve a minimum mark of 70% in individual modules which together amount to at least half of the required credits for the
award of the Postgraduate Diploma associated with the student’s registered course. All assessments and the dissertation will be subject to external review.

7. **Course Modules**: Course modules cover a range of topics relevant to the design, implementation and future evolution of complex mobile and ubiquitous systems. A student’s choice of a topic for a dissertation will be subject to the approval of the Course Director.

8. **Course Director**: Professor Ciaran McGoldrick

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**Computer Science (Networks and Distributed Systems) (M.Sc./P.Grad.Dip.)**

1. **Introduction**: The M.Sc. in Computer Science is a one-year, full-time graduate course in Computer Science focusing on networks and distributed systems.

2. **Aim**: The primary aim of the course is to equip graduate students with an integrated set of skills that will allow them to develop their professional careers in information technology. The particular focus of the course is to equip students with the theoretical and practical background that is necessary to enable them to participate in the design of complex networked and distributed systems. The course not only presents the state of the art in the design and implementation of networks and distributed systems but also prepares students to embrace future developments in the field. Specific emphasis is placed on the presentation and assimilation of challenging and stimulating material that has a demonstrated professional relevance. The focus of the course is on skills that are not normally imparted to students during their undergraduate years and that will develop graduates' capacity as leaders in the field. Thus, the course is intended to prepare graduates to pursue careers in industry or to undertake basic research in the field.

3. **Admission Requirements**: Admission is competitive and is normally restricted to graduates who have achieved an upper-second class Honors Bachelor degree, or higher, in computing, information technology, or a related discipline. Well-qualified candidates from disciplines such as engineering, mathematics, statistics, or physics who have sufficient knowledge of computing (including the ability to program) may also be accepted.

4. **Duration**: One-year (September-August), full-time. Students will not be permitted to join the course late.

5. **Course Structure**: The taught component of the M.Sc. course will incorporate both taught and practical elements. Students will also undertake an independent research project that will be submitted in the form of a dissertation (30 credits). The list of modules currently available to students includes:

1. Data Communications and Wireless Networking (5 credits)

2. Middleware for Distributed Systems (5 credits)
3. Networked Applications I (5 credits)

4. Software Engineering for Distributed Systems (5 credits)

5. Business Innovation (5 credits)

6. Management of Networks & Distributed Systems (5 credits)

7. Data Communications & Wireless Networking Practical (5 credits)

8. Software Engineering/Middleware Group Project (5 credits)

9. Individual Programming Project (5 credits)

10. Networked Applications II (5 credits)

11. Sustainable Computing (5 credits)

12. Security of Networks & Distributed Systems (5 credits)

All modules are compulsory for all students. Students are required to reach a full complement of 90 credits to be eligible for the award of the M.Sc. degree. Not all modules listed may be offered in a given academic year and may be replaced by alternatives.

6. **Assessment:** To be allowed to proceed to the dissertation leading to the degree of M.Sc. in Computer Science, candidates must (i) achieve an overall average mark of at least 50% across all the taught modules and (ii) for modules amounting to not less than 50 credits, achieve a mark of at least 50% in each individual module and for modules amounting to not more than 10 credits, achieve a mark of at least 40% in each individual module. The overall mark for the taught modules is based on a credit-weighted average of the mark awarded in each module. Students who fail one or more modules may, at the discretion of the Court of Examiners, re-attempt through submission of supplementary assessment(s) by an appointed date or by sitting supplementary examination(s). The maximum mark awarded for supplementary assessment or examinations is 50%. To satisfactorily complete a dissertation, students must submit their dissertation by the prescribed date and must obtain a passing mark of 50% in their dissertation.

In order to qualify for the award of M.Sc. with Distinction, students must, as a minimum, achieve a mark of 70% or above in their dissertation and achieve at least 68% in the unrounded overall average mark for the taught modules, and, for modules amounting to not less than half of the credits required for the taught component of the course, achieve a minimum mark of 70% in each individual module. A Distinction cannot be awarded if a candidate has failed any credit during the course. Students who pass the required modules but who are not permitted to or otherwise do not submit a dissertation, or who do not satisfactorily complete their dissertation, will be eligible for the award of a Postgraduate Diploma in Computer Science.
The Postgraduate Diploma with Distinction is awarded to students who achieve at least 68% in the overall credit-weighted average mark and achieve a minimum mark of 70% in individual modules which together amount to at least half of the required credits for the award of the Postgraduate Diploma associated with the student’s registered course. All assessments and the dissertation will be subject to external review.

7. Course Modules: Course modules will cover a range of topics of relevance to the design, implementation and future developments of complex networked and distributed systems. A student’s choice of a topic for a dissertation will be subject to the approval of the Course Director.

8. Course Director: Professor Stephen Barrett

Creative and Cultural Entrepreneurship (M.Phil./P.Grad.Dip.)

1. Introduction: This course will enable entrants who have previously explored an area of creative study and practice (music, media, theatre, design, fashion, computer games, or interactive digital media) to develop a creative idea into an entrepreneurial project. The entrepreneurial activity may relate directly to a ‘product’ or ‘process’ arising from the student’s creative engagement or to a form of ‘expertise’ or ‘consultancy’. The course will also equip students, who wish to work within existing organisations with the infrastructure and environment for setting up new creative businesses, with the capacity to flourish in a variety of creative entrepreneurial contexts. Students will be encouraged to create value around their individual creative practices.

The course will be taught in partnership with Goldsmiths, University of London and by staff in five Schools: School of Drama, Film and Music, School of Business, School of Histories and Humanities, School of Computer Science and Statistics, and the School of Languages, Literatures and Cultures.

2. Admission Requirements: Applications are normally accepted only from persons with a first or upper second class degree in an appropriate discipline.

3. Duration: The course is offered on a one-year full-time basis or two-year part-time basis starting in September.

4. Course Structure: The MPhil course offers three different strands to allow students to take taught modules worth 60 ECTS and an entrepreneurial research module worth 30 ECTS specialising in their established or emerging creative practice:

Creative Technologies – including computer games, interactive entertainment and digital media
Performance Arts – including drama, music and dance

Visual Culture – including design, fine art, film and animation

**Strand 1: Creative Technologies**

**Taught modules (60 ECTS):**

Students who elect to pursue the Creative Technologies Strand must take mandatory taught modules worth 40 ECTS and then select two modules worth 10 ECTS each from courses offered in Creative Technologies subjects.

**Strand 2: Performance Arts**

**Taught modules (60 ECTS):**

Students who elect to pursue the Performance Arts Strand must take mandatory taught modules worth 40 ECTS and then select two modules worth 10 ECTS each from courses offered in Performance Arts subjects.

**Strand 3: Visual Culture**

**Taught modules (60 ECTS):**

Students who elect to pursue the Visual Culture Strand must take all the following mandatory modules worth 40 ECTS then select two modules worth 10 ECTS each from courses offered in Performance Arts subjects.

**Students in each strand must also complete an Entrepreneurial Project/Dissertation (30 ECTS)**

Students are expected to engage in an entrepreneurial project/dissertation and this work can be undertaken individually or in collaboration with other students in the course. Specialist supervisors will be assigned to each entrepreneurial project based on subject of the project/dissertation.

Project/dissertation preparation seminars will be held for full-time and second year part-time students during the Hilary Term. These seminars are overseen by a member of staff, who may lead discussion and offer an overview, but are based on student peer review of individual presentations of work in progress. The criteria for selection of dissertation topics and methods are designed to encourage a range of research and discussion appropriate to the limits set on the length of the dissertation, and which will provide students with an opportunity to develop further the exercise of their analytical, critical and methodological skills. Students will receive individually both formally allocated tutorial sessions and time within weekly tutorial sessions. Students will be able to offer dissertations based on entrepreneurial projects where the potential business is at the centre of the work but is complimented by an analytical and critical commentary.
The pass mark for the dissertation/project will be 50%. Candidates who are awarded a mark of 70% or more in the dissertation will be considered for the award of a distinction.

5. **Assessment:** To be allowed to proceed to the dissertation/entrepreneurial project leading to the degree of MPhil in Creative and Cultural Entrepreneurship, candidates must achieve a pass mark of at least 50% in each of the required modules taken in the first year. Students who fail one or more module may, at the discretion of the Court of Examiners, re-attempt through submission of supplementary assessment(s) by an appointed date. The maximum mark awarded for supplementary assessment is 50%.

To satisfactorily complete a dissertation/entrepreneurial project, students must submit their dissertation/entrepreneurial project by the prescribed date and must obtain a pass grade or higher in their dissertation/entrepreneurial. The overall mark for the taught modules is based on a credit-weighted average of the mark awarded in each module. In order to qualify for the award of MPhil with Distinction, students must, as a minimum, achieve a grade of distinction in their dissertation/entrepreneurial project and achieve, a mark of no less than 68% in the unrounded average mark for the taught modules and for modules amounting to not less than half the credits required for the taught component of the course, achieve a minimum mark of 70% in each individual module. A Distinction cannot be awarded if a candidate has failed any credit during the course.

Students who pass the required modules, but who are not permitted to or otherwise do not submit a dissertation, or who do not satisfactorily complete their dissertation/entrepreneurial project, will be eligible for the award of a Postgraduate Diploma in Creative and Cultural Entrepreneurship. The Postgraduate Diploma with Distinction may be awarded to student who achieve at least 68% in the overall average mark and achieve a minimum mark of 70% in individual modules which together amount to at least half of the required credits for the award of Postgraduate Diploma associated with the student’s registered course. All assessments and the dissertation will be subject to external review.

6. **Course Director:** Professor Marie Redmond

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**Health Informatics (M.Sc./P.Grad.Dip.)**

1. **Introduction:** This course is jointly-offered by the School of Computer Science and Statistics and the School of Medicine. Health Informatics is broadly concerned with the application of Information Technology in the health sector. It is a truly interdisciplinary field in which Medicine, Computer Science, Management Science, Statistics and Engineering are all represented.

2. **Aim:** The main aim of the course is to give students from both computing and health sciences backgrounds a broad understanding of both the principles underlying the field of Health Informatics and of its practical applications. The course is intended for suitably
qualified applicants currently working or aspiring to work in a position in the health sector which requires the efficient and cost effective application of information technology.

3. **Admission Requirements:** Applications will be accepted from those who:

1. hold a good Honors Bachelor degree in a professional (health sciences or computer engineering) discipline, or

2. hold an equivalent qualification with relevant professional experience, or

3. hold other appropriate qualifications with at least three years relevant professional experience, or

4. otherwise satisfy the course admission committee that they have the ability to complete and benefit from the course.

Applicants meeting these requirements will normally be interviewed.

4. **Duration:** The M.Sc. in Health Informatics will run over two academic years (September–June) on a part-time basis on Friday afternoons and Saturday mornings to facilitate those in full-time employment.

5. **Course Structure:** The course runs over two years part-time and consists of taught modules in year one (60 ECTS credits) with a substantial research dissertation (30 credits) in year two. There is a strong emphasis on practical team-based continuous assessment.

The list of year one modules currently available to students includes:

1. Introduction to Health Informatics (10 credits)

2. Health Information Systems (10 credits)

3. Clinical Decision Support Systems (10 credits)

4. Human Computer Interaction in Healthcare (10 credits)

5. Research Paper (10 credits)

6. Introduction to Programming (5 credits)

7. Basic Medical Sciences (5 credits)

8. Medical Imaging (5 credits)

9. Bioinformatics (5 credits)

Modules 1, 2, 3, 4 and 5 are core, and taken by all students. The other modules are options and students are assigned to either module 6 or module 7 depending on their background,
and are required to choose either module 8 or module 9. Year one thus consists of 60 credits. It should be noted that not all modules listed may be offered in a given academic year and may be replaced by alternatives.

Students are required to reach a full complement of 90 credits to be eligible for the award of the M.Sc. degree.

6. **Assessment:** To be allowed to proceed to the dissertation leading to the degree of M.Sc. in Health Informatics, candidates must achieve a pass mark of at least 50% in each of the required modules taken in the first year. Students who fail one or more modules may, at the discretion of the Court of Examiners, re-attempt through submission of supplementary assessment(s) by an appointed date or by sitting supplementary examination(s). The maximum mark awarded for supplementary assessment or examinations is 50%. To satisfy all requirements, students must submit their dissertation by the prescribed date and must obtain a pass grade or higher in their dissertation. The overall mark for the taught modules is based on a credit-weighted average of the mark awarded in each module. In order to qualify for the award of M.Sc. with Distinction, students must, as a minimum, achieve a grade of distinction in their dissertation and achieve a mark of at least 68% in the unrounded average mark for the taught modules and, for modules amounting to not less than half the credits required for the taught component of the course, achieve a minimum mark of 70% in each individual module. A Distinction cannot be awarded if a candidate has failed any credit during the course.

Students who pass the required modules but who are not permitted to or otherwise do not submit a dissertation, or who do not satisfactorily complete their dissertation, will be eligible for the award of a Postgraduate Diploma in Health Informatics. The Postgraduate Diploma with Distinction may be awarded to students who achieve at least 68% in the overall average mark and achieve a minimum mark of 70% in individual modules which together amount to at least half of the required credits for the award of the Postgraduate Diploma associated with the student’s registered course. All assessments and the dissertation will be subject to external review.

7. **Course Director:** Professor Lucy Hederman

Interactive Digital Media (M.Sc./P.Grad.Dip)

1. **Admission Requirements:** Applications will be accepted from good Honors Bachelor graduates in any discipline, or with relevant work experience. The creative and academic ability of selected applicants will be assessed from submitted applications. Mathematical and problem solving ability will also be taken into consideration when assessing the applications. Applicants meeting the requirements will normally be interviewed.

2. **Duration:** The course is one year, full-time.
3. **Course Structure:** The course will be run over a twelve-month period. Lecture courses will be given over the two terms and examinations will take place in April/May. Students will undertake significant coursework during the academic year. Starting in Hilary term, each student proposes a multimedia final project which leads to a multimedia installation in September. This project can be undertaken individually (at the course director’s discretion) or collaboratively with other students from the class. A dissertation must be submitted by the end of March on an approved research topic by each student. The list of modules currently available to students includes:

1. Programming for Digital Media (10 credits)
2. Authoring for Digital Media (10 credits)
3. Contextual Media (10 credits)
4. Audio, Video and Sensor Technologies (10 credits)
5. Image Processing and 3D Modelling (10 credits)
6. Research Paper (10 credits)

Students are required to reach a full complement of 90 credits to be eligible for the award of the M.Sc. degree. Not all modules listed may be offered in a given academic year and may be replaced by alternatives.

4. **Assessment:** To be allowed to proceed to the Research Project (30 credits) leading to the degree of M.Sc. in Computer Science, candidates must (i) achieve an overall mark of at least 50% in the credit-weighted average mark for all taught modules, and (ii) for modules amounting to not less than 50 credits, to include the Research Paper, achieve a mark of at least 50% in each individual module and for modules amounting to not more than 10 credits achieve a mark of not less than 40% in each individual module. Students who fail one or more modules or who fail the Research Paper, may, at the discretion of the Court of Examiners, re-attempt through submission of supplementary assessment(s) by an appointed date or by sitting supplementary examination(s). The maximum mark awarded for supplementary assessment or examinations is 50%. To complete their Research Project satisfactorily, students must submit their Research Project by the prescribed date and must obtain a passing mark of 50% in their Research Project. The Research Project is assessed in compliance with research dissertation regulations. The final mark for the course is based on a credit-weighted average of the mark awarded in each module, including the Research Project.

In order to qualify for the award of M.Sc. with Distinction, students must, as a minimum, achieve a mark of 70% or above in the Research Project, and achieve at least 68% in the unrounded overall average mark for the taught modules and, for modules amounting to not less than half of the required credits for the taught component of the course, achieve a minimum mark of 70% in each individual module. A Distinction cannot be awarded if a candidate has failed any credit during the course.
Students who pass the required modules and the Research Paper, but who are not permitted to or otherwise do not submit a Research Project, or who do not satisfactorily complete their Research Project, will be eligible for the award of a Postgraduate Diploma in Computer Science. The Postgraduate Diploma with Distinction is awarded to students who achieve at least 68% in the unrounded overall average mark for the taught modules and achieve a minimum mark of 70% in individual modules which together amount to at least half of the required credits for the award of the Postgraduate Diploma associated with the student's registered course. All assessments and the Research Project will be subject to external review.

5. **Course Director:** Professor Glenn Strong

**Management of Information Systems (M.Sc./P.Grad.Dip.)**

1. **Introduction:** This course aims to provide the student with the professional knowledge, expertise and competencies required to assume senior roles in IS management in business and/or the IS/ICT industry. It brings together the latest research coupled with best internationally accepted management practice and relates these to the needs of today's organisation. In the first year, the student takes four taught modules which involve formal lectures, workshops, problem-based learning, case study methods and performance simulations. In the second year, the student chooses a topic to be researched and produces a 15,000 – 20,000 word dissertation.

2. **Admission Requirements:** Applicants for this course must normally hold a good Honors Bachelor degree (upper-second class or higher) in computer science, information systems, information technology, business and information technology, computer engineering or a cognate discipline. Relevant professional experience is also desirable. Applicants may be interviewed.

3. **Duration:** Two years, part-time evening course, to facilitate those in full-time employment.

4. **Course Structure:** The course consists of a taught component and a substantial research project resulting in a dissertation of approximately 15,000-20,000 words. The list of modules and their credits is as follows:

   Year 1:

   Strategic IS Planning (15 credits)
   Social and Organisational Impact of Information Systems (15 credits)
   Strategic IS Sourcing (15 credits)
   Innovation, Enterprise and Business Planning (15 credits)
Year 2:

Research Methods and Dissertation (30 credits)

5. **Assessment:** To be allowed to proceed to the second year leading to the degree of M.Sc., candidates must achieve a pass mark of at least 50% in each of the required modules taken in the first year. Students who fail one or more modules may, at the discretion of the Court of Examiners, re-attempt through submission of supplementary assessment(s) by an appointed date or by sitting supplementary examinations. The maximum mark awarded for supplementary assessment or examinations is 50%. Students in the second year must complete their dissertation to be eligible for the award of an M.Sc. To complete a dissertation satisfactorily, students must submit their dissertation by the prescribed date and must obtain a pass grade or higher in their dissertation. The overall mark for the taught modules is based on a credit-weighted average of the mark awarded in each module. In order to qualify for the award of M.Sc. with Distinction, students must, as a minimum, achieve a grade of distinction in their dissertation and achieve a mark of at least 68% in the unrounded average mark for the taught modules and, for modules amounting to at least half of the credits required for the taught component of the course, achieve a minimum mark of 70% in each individual module. A Distinction cannot be awarded if a candidate has failed any credit during the course.

Students who pass the required modules in the first year but who are either (i) not permitted to proceed to the second year, or (ii) for some other reason are unable to complete the second year, or (iii) who do not satisfactorily complete the second year, will be eligible for the award of a Postgraduate Diploma in Management of Information Systems. The Postgraduate Diploma with Distinction may be awarded to students who achieve at least 68% in the overall average mark and achieve a minimum mark of 70% in individual modules which together amount to at least half of the required credits for the award of the Postgraduate Diploma associated with the student’s registered course. All assessments and the dissertation will be subject to external review.

6. **Course Director:** Professor Denise Leahy

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Statistics (P.Grad.Cert.)

1. **Introduction:** This is a continuing professional development course for graduates of disciplines other than statistics. It aims to develop participants’ skills in data collection and analysis.

2. **Admission Requirements:** Applications will be considered from graduates in any discipline who have some background in mathematics.

3. **Course Structure:** The course consists of a base module and a series of elective modules. To obtain the Postgraduate Certificate (35 ECTS credits) participants must pass
the base module and two elective modules within two academic years. The list of modules currently available to students includes:

1. Base Module (15 credits)
2. Introduction to Regression (10 credits)
3. Design and Analysis of Experiments (10 credits)
4. Aspects of Survey Design (10 credits)
5. Time Series Analysis (10 credits)

Module 1 is core, and taken by all students. The other modules are options and students are required to choose two out of the three normally available in any one year. It should be noted that not all modules may be offered in a given academic year and may be replaced by alternatives.

4. Assessment: Each module will be examined separately. The form of the examination may vary from module to module and may include assignments, written examinations or both. Written examinations will take place in the annual examination session. The pass mark in all modules is 50%. Modules are weighted according to their credit value.

Subject to the recommendation of the examiners a student who fails the examination for a module may be allowed a supplemental examination. If required, supplemental written examinations will be held for all modules in the supplemental examination period.

To qualify for the award of the Postgraduate Certificate in Statistics students must pass the base module and two elective modules. A Distinction may be awarded to students who, in addition, achieve an overall average mark of 70% or above.

5. Course Director: Professor Rozenn Dahyot

Technology and Learning (M.Sc./P.Grad.Dip.)

1. Introduction: This course is jointly-offered by the School of Education and the School of Computer Science and Statistics. The field of Technology and Learning is broadly concerned with the application of Information Technology (I.T.) to teaching and learning processes across formal and informal learning settings and within the framework of lifelong learning. It is an interdisciplinary field in which Pedagogy, Computer Science, and all the domains within which learning occurs interplay.
2. **Aim:** The overarching objective of the course is to give students a broad understanding of the underlying principles and practical application of Technology Enhanced Teaching and Learning. The course is intended for those whose work involves the use of I.T. in teaching and learning processes. Graduates of the course should be able to play a leadership role in the use of I.T. to support teaching and learning in both formal and informal educational settings.

3. **Admission Requirements:** Admission is normally restricted to graduates who hold an upper-second class Honors Bachelor degree, or higher. Where applicants do not have upper-second class honors in their primary degree substantial relevant experience may be taken into account. Preference will be given to applicants with at least three years experience. A qualification in Computer Science is not required but applicants are expected to be computer literate. Applicants meeting the necessary requirements will normally be interviewed.

Applicants who have successfully completed the University of Dublin, Trinity College Dublin, level 9 certificate in 21st Century STEM/CS Teaching and Learning may apply for exemption for up to 30 ECTS in year one of the M.Sc. Technology & Learning programme. If admitted, and if exemption is permitted, such candidates would be required to complete the capstone module CS7040 Technology and Learning Year 1 project (20 ECTS) and module(s) worth 10 ECTS as specified by the course director. In all other aspects candidates admitted by this route are subject to the same rules and regulations as other participants on the programme.

4. **Duration:** Two years, part-time.

5. **Course Structure:** The M.Sc. Technology and Learning runs over two academic years on a part-time basis. It consists of taught modules (40 credits) and a research project (20 credits) in year one and a substantial research dissertation (30 credits) and research methods course in year two. Course modules will cover topics of relevance to the design, implementation and evaluation of Technology Enhanced Learning scenarios. The list of modules currently available to students includes:

   **Year One**

   Pedagogy for Technology Enhanced Learning (10 credits)

   Technologies for Teaching and Learning (10 credits)

   e-Learning – Principles and Practice 1 (10 credits)

   e-Learning – Principles and Practice 2 (10 credits)

   Technology and Learning Year 1 project (20 credits)

   **Year Two**

   Research Methods and Technology and Learning Dissertation (30 credits)
All modules are core and compulsory for all students. Not all modules listed may be offered in a given academic year and may be replaced by alternatives.

Students are required to reach a full complement of 90 credits (60 credits in year one and 30 credits in year two) to be eligible for the award of the M.Sc. degree.

6. **Assessment:** To be allowed to proceed to the dissertation leading to the degree of M.Sc. in Technology and Learning, candidates must achieve a pass mark of at least 50% in each of the required modules taken in the first year. Students who fail one or more modules may, at the discretion of the Court of Examiners, re-attempt through submission of supplementary assessment(s) by an appointed date or by sitting supplementary examination(s). The maximum mark awarded for supplementary assessment or examinations is 50%. To satisfactorily complete a dissertation, students must submit their dissertation by the prescribed date and must obtain a pass grade or higher in their dissertation. The overall mark for the taught modules is based on a credit-weighted average of the mark awarded in each module. In order to qualify for the award of M.Sc. with Distinction, students must, as a minimum, achieve a grade of distinction in their dissertation and achieve a mark of at least 68% in the unrounded average mark for the taught modules and, for modules amounting to at least half of the credits required for the taught component of the course, achieve a minimum mark of 70% in each individual module. A Distinction cannot be awarded if a candidate has failed any credit during the course.

Students who pass the required modules but who are not permitted to or otherwise do not submit a dissertation, or who do not satisfactorily complete their dissertation, will be eligible for the award of a Postgraduate Diploma in Computer Science. The Postgraduate Diploma with Distinction may be awarded to students who achieve at least 68% in the overall average mark and achieve a minimum mark of 70% in individual modules which together amount to at least half of the required credits for the award of the Postgraduate Diploma associated with the student’s registered course. All assessments and the dissertation will be subject to external review.

7. **Course Director:** Professor Richard Millwood
School of Engineering

Applied Building Repair and Conservation (P.Grad.Dip.)

1. **Introduction:** The aim of this Postgraduate Diploma course is to provide a good understanding of all the issues related to the repair and conservation of existing fabrics, both modern and traditional.

2. **Admission Requirements:** An Honors Bachelor degree in civil engineering or equivalent professional qualification.

3. **Duration:** The duration of this course is one academic year.

4. **Course Structure:** The course consists of two taught modules, worth 15 credits each, and one individual project module worth 15 credits. The taught modules are:
   1. Materials, the built heritage, surveying;
   2. Damage and repair, building technologies, project management.

   Lectures are normally held on Friday evenings and Saturday mornings each week throughout the two semesters (September to April).

5. **Assessment:** The award of a Postgraduate Diploma in Applied Building Repair and Conservation carrying 45 credits, is based on the results of two examination papers (one on each of the taught modules) and the examination of the research project. The annual examinations are held in April/May. The pass mark for all elements is 40%. Each element contributes equally to the overall mark in accordance with their credit weighting. To qualify for the award of the Postgraduate Diploma, students must pass each module and the project and achieve an overall mark of at least 40%. There is no system of compensation. A student who fails a module or modules may re-sit the relevant module(s) during the supplemental examination session. Failed coursework/project work must be re-submitted. A Distinction is awarded to those who, in addition, obtain an overall average mark of 70% or more across the three modules. A Distinction cannot be awarded if a candidate has failed any credit during the course.

6. **Course Director:** Professor Sara Pavia
1. **Introduction:** The course aims to develop engineers with an advanced understanding of the technologies underpinning the Biomedical research and the medical device industry, particularly the design, development and market regulation of medical devices and associated healthcare products. Elements of the course are taught jointly with University College Dublin, the National College of Art and Design and the Royal College of Surgeons in Ireland where students attend lectures or carry out their research projects.

2. **Admission Requirements:** Candidates for this course must (i) hold an upper second-class honors Bachelor degree in engineering, physical sciences, mathematics or a cognate discipline, or hold appropriate qualifications in engineering with at least three years professional experience, and (ii) satisfy the course committee that they have a sufficient understanding of the fundamentals of medical science. Applicants from a medical or life sciences background are also encouraged to apply provided they have proven mathematical ability.

3. **Duration:** One year full-time is the standard.

4. **Course Structure:** The M.Sc. in Bioengineering consists of taught modules and a project focusing on medical devices and important clinical needs and carries 90 credits to be completed in one year for full-time students. Each student is required to conduct a research project and submit a dissertation (30 credits). The remaining credits must be taken from the following taught modules:

- Basic Medical Sciences (5 credits)
- Biomechanics (5 credits)*
- Advanced Biomechanics (10 credits)
- Advanced Physiological Measurement (5 credits)
- Biomaterials (5 credits)*
- Advanced Biomaterials (5 credits)
- Research Methods (15 credits)
- Neural Engineering (5 credits)
- Tissue Engineering (5 credits)
- Advanced Cell and Tissue Engineering (10 credits)
- Rehabilitation Engineering (5 credits)
- Neural Signal Analysis (10 credits)
- Form and Function of the Nervous System (5 credits)
- Implantable Neural Systems (5 credits)
- Neuro-imaging Technology (5 credits)
- Current Research Topics and Methods in Neural Engineering (10 credits)
- Medical Device Design (10 credits)
- Foundation Medical Device Design (5 credits)
- Laboratory Techniques in Cell and Tissue Engineering (5 credits)
- Cellular Biology and Cell Signaling Mechanisms (5 credits)
- Multibody Dynamics (5 credits)*
- Advanced Multibody Dynamics (10 credits)
- Injury Biomechanics and Musculoskeletal Dynamics (5 credits)
- Case Study/Design/Innovation (10 credits)
- Current Research Topics and Techniques in Medical Device Design (10 credits)
- Current Research Topics in Cell and Tissue Engineering (10 credits)
- Medical imaging (5 credits)

A maximum of 10 credits of Level 8 modules (indicated by *) may be taken as part of the 90 credits. Other approved modules may be added. A number of linear pathways exist within this MSc course supporting flexible entry options and progression from Postgraduate Certificate through to Postgraduate Diploma through to Masters level, as indicated in the table below.

<table>
<thead>
<tr>
<th>#</th>
<th>Generic Programme Framework</th>
<th>Status</th>
<th>Duration</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Postgraduate Certificate in Bioengineering</td>
<td>Part-time</td>
<td>1 year</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Progress from Certificate to Postgraduate Diploma in Bioengineering</td>
<td>Part-time</td>
<td>1 year</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Postgraduate Diploma in Bioengineering</td>
<td>Part-time</td>
<td>2 years</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>Progress from Diploma to Masters</td>
<td>Part-time</td>
<td>1 year</td>
<td>30</td>
</tr>
</tbody>
</table>

Those students undertaking the Certificate and Diploma option must select their modules in consultation with the Course Director and will be formally progressed from the Certificate to the Diploma option based on their performance at the end-of-year examinations. A minimum of 30 credits is required to proceed from the Certificate to the Diploma option at the end of the first year.

5. **Assessment:** The overall pass mark is 50%. The overall mark for the course is the credit-weighted average of the mark awarded for each module. Taught modules are assessed by examination papers at the end of Michaelmas and Hilary terms together with in-course assessments and are non-compensatable. To qualify for the award of the M.Sc. in Bioengineering, students are required to pass all modules of the course, including the research dissertation. Those students who achieve an overall average mark of 70% or above in both the taught modules and the research dissertation will be awarded a Distinction. Candidates who do not proceed to the dissertation, or who have failed their dissertation but have passed all required modules, may, on the recommendation of the examiners, be awarded a Postgraduate Diploma in Bioengineering, provided that they have passed individual modules amounting to 60 credits. Candidates may be required to present their research thesis to the external examiner during a *viva voce* examination. Both the
examinations and the dissertation are subject to external moderation. In addition, an external examiner may be appointed for each specialisation strand.

6. **Course Director:** Assistant Professor Conor Buckley / Professor Richard Reilly

**Construction Law and Contract Administration (P.Grad.Dip.)**

1. **Introduction:** This Postgraduate Diploma course is designed to enable the students to acquire knowledge of construction law equivalent to that required by a competent arbitrator, adjudicator or administrator.

2. **Admission Requirements:** The normal entry requirement for this course is an Honors Bachelor degree in civil engineering or another suitable professional qualification, including a law qualification.

3. **Duration:** The duration of this course is one academic year.

4. **Course Structure:** The course consists of two taught modules, worth 15 credits each, and one coursework module carrying 15 credits and consisting of a number of individual projects. The taught modules are:

   1. Law and Dispute Resolution,
   2. Contracts in construction

The first module focuses on legal systems and litigation, the laws of tort, contract and evidence, and dispute resolution methods in construction, while the second module focuses on contracts in construction, procurement, claims, risk and insurance, sureties, statutory duties, and professional relationships.

A series of special lectures on construction methods, codes and terminology may be provided as an alternative for some of the lectures on the basic aspects of law for those with law qualifications.

Lectures are normally held on Friday evenings and Saturday mornings each week throughout the two semesters (September to April) with some lectures scheduled for Friday afternoons. In addition to attending lectures, students are required to participate in workshops and submit coursework, which comprise an important part of the course.

5. **Assessment:** Assessment is by examination and coursework. The annual examinations, consisting of one paper for each taught module, are held in April/May. Both papers and the coursework must be passed. The pass mark for all elements is 40%. 


The overall mark for the course is the credit-weighted average of the mark awarded for each module. To qualify for the award of the Postgraduate Diploma students must pass all elements of the course amounting to 45 credits and achieve an overall average mark of at least 40%. A student who fails a module or modules may re-sit the relevant module(s) during the supplemental examination session. Failed coursework/project work must be re-submitted by the Friday before the supplemental examinations are held.

The Postgraduate Diploma with Distinction may be awarded to students who, in addition, achieve an overall average mark of 70% or above. A Distinction cannot be awarded if a candidate has failed any credit during the course.

6. **Course Co-ordinator:** Professor Niamh Harty

**Engineering (Environmental / Structural and Geotechnical / Transport Policy and Planning / Sustainable Energy) (M.Sc./P.Grad.Dip.)**

1. **Introduction:** This course aims to develop engineers with specialist understanding in one of: Environmental Engineering; Structural and Geotechnical Engineering; Transport and Planning Engineering; or Sustainable Energy Engineering. In addition, the course offers students the opportunity to obtain knowledge in complementary subject areas within the Civil Engineering Discipline.

2. **Admission Requirements:** Candidates for this course must normally hold a first or second class, first division Honors Bachelor degree in Engineering, Science or a cognate discipline and pursue the course full-time for a period of not less than 12 consecutive months. Alternatively the course may be taken part-time over two or three years. Students register on the Masters course in the first instance.

3. **Course Structure:** Candidates must take eleven modules, namely the three mandatory modules (CE7M01, CE7M02 and CE7M03), together with at least four of the modules in their chosen specialisation and four other modules, which in total amount to 90 credits.

In the first semester, candidates pursuing the course full time must take modules CE7M01 and CE7M02 along with four five-credit modules selected from options (including at least two from their selected specialisation), listed below. In the second semester, candidates pursuing the course full time must take module CE7M03 along with four five-credit modules selected from options (including at least two from their selected specialisation), also listed below:

- **Mandatory modules**
  - CE7M01 Civil Engineering Management (10 credits)
  - CE7M02 Research Methodology (10 credits)
CE7M03  Research Dissertation (30 credits)

*Environmental Engineering*

CE7E01  Hydrological Processes and Hydrometry (5 credits)
CE7E02  Spatial Environmental Analysis and Impact Assessment using GIS (5 credits)
CE7E03  Air Quality and Noise Pollution (5 credits)
CE7E04  Waste Management and Energy Recovery (5 credits)
CE7E05  Water Quality and Hydrological Modelling (5 credits)
CE7E06  Water Resource Planning and Climate Change (5 credits)
CE7E07  Sustainable Water Supply and Sanitation (5 credits)
CE7E08  Water Treatment Technologies (5 credits)
CE7E09  Introduction to Environmental Engineering (5 credits)

*Structural and Geotechnical Engineering*

CE7S01  Geotechnical Engineering (5 credits)
CE7S02  Advanced Structural Analysis (5 credits)
CE7S03  Structural Dynamics and Earthquake Engineering (5 credits)
CE7S04  Bridge Engineering (5 credits)
CE7S05  Advanced Concrete Technology (5 credits)
CE7S06  Soil-Structure Interaction (5 credits)
CE7S07  A Unified Theory of Structures (5 credits)
CE7S08  Concrete Durability & Sustainability (5 credits)
CE7S09  Advanced Theory of Structures (5 credits)

*Sustainable Energy*

CE7J01  Wind Energy (5 credits)
Transport Engineering, Policy and Planning

CE7T01 Transportation Policy (5 credits)
CE7T02 Transportation Modelling and Planning (5 credits)
CE7T03 Highway Engineering (5 credits)
CE7T04 Transportation Data and Evaluation (5 credits)
CE7T05 Transport Design (5 credits)

Common

CE7C03 Modelling of Civil Engineering Systems (5 credits)
CE7C04 Façade Engineering (5 credits)
CE7C05 Advanced Spatial Analysis using GIS (5 credits)
CE7C06 Construction Innovation and Research (5 credits)

Some of the module options in either semester may be withdrawn from time to time and some new modules may be added, subject to demand. In the event that insufficient module options are available to meet the minimum module requirements of a particular specialisation then an alternative specialisation or a general Civil Engineering specialisation may be chosen.

Postgraduate Diploma candidates will be assessed on the basis of written examinations and successful completion of the Research Methodology module. M.Sc. candidates will, in addition, complete a substantial research project and submit a dissertation of approximately 30,000 words.

Candidates may also take the course part-time over two-years. In this case, during the first year, the candidates take seven modules, namely: the mandatory modules CE7M01 and CE7M02 along with five of the module options (including at least two from their chosen specialisation), which together amount to 45 credits. During the second year, candidates must complete the compulsory CE7M03 module together with three other module options
Candidates may also take the course part-time over three years. In this case, during the first year, the candidates take four modules, namely: the mandatory module CE7M01 along with three of the module options which amount to 25 credits. During the second year, candidates must complete mandatory module CE7M02, along with a further 3 module options which amounts to 25 credits. In the third and final year, students complete their last two module options amounting to 10 credits. The compulsory CE7M03 Research Dissertation module, amounting to 30 credits must be completed by the last year but may also be spread across the three year duration of the course. By the end of the course, three-year part-time candidates must have completed at least four of their specialisation module options and four of the other module options, together with the compulsory modules amounting to a total of 90 credits.

4. **Assessment:**

The pass mark for all elements is 50%. The overall mark for the course is the credit-weighted average of the mark awarded for each module. To qualify for the award of the M.Sc. degree, students must achieve an overall average mark of at least 50%, achieve a pass mark in CE7M03 Dissertation module and either i) pass taught modules amounting to 60 credits or ii) pass taught modules amounting to at least 50 credits and have a mark of not less than 40% in the failed modules.

Those students who achieve an overall average mark of 70% or above both for the course and in CE7M03 *Dissertation Phase 2* will be awarded the M.Sc. with Distinction. A Distinction cannot be awarded if a candidate has failed any credit during the course.

5. **Course Co-ordinator:** Professor Aonghus McNabola

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**Engineering (by Module) M.Sc. (St.)**

1. **Introduction:** M.Sc. courses are provided by the School of Engineering through the selection of appropriate modules from those available. Candidates seeking to apply for M.Sc. courses in the School are required to contact the Director of Teaching and Learning (Postgraduate) for further information and application procedures.
2. **Admission Requirements:** Candidates for this course must normally hold a first or second class, first division honors Bachelor degree in engineering or a cognate discipline and pursue the course full-time for a period of not less than 12 consecutive months.

3. **Course Structure:** The M.Sc. in Engineering (by module) consists of taught modules and a project amounting to 90 credits. The taught component comprises modules totalling 60 credits. In the first semester, candidates pursuing the course must take modules worth at least 25 credits. In the second semester, candidates pursuing the course must take the balance of the credits. M.Sc. candidates will, in addition, complete a substantial research project and submit a dissertation which accounts for a further 30 credits to be eligible for the award of the degree.

All candidates are required to take the following module(s):

- CE5E2 Research Methods (5 credits)
  
  or

- ME7B07 Research Methods (15 credits)

In addition, candidates select modules from the following list to bring their total credits to 60:

- CE7C05 Advanced Spatial Analysis using GIS (5 credits)
- CE7J01 Wind Energy (5 credits)
- CE7J02 Solar Energy Conversion and Applications (5 credits)
- CE7T01 Transportation Policy (5 credits)
- ME5B01 Flow Induced Vibration and Fluid Structure Interaction (5 credits)
- ME5B02 Advanced Materials (5 credits)
- ME5B03 Advanced Thermal Fluid Sciences (5 credits)
- ME5B04 Engineering Vibrations and Noise (5 credits)
- ME5B05 Human Factors (5 credits)
- ME5B09 Control Engineering 2 (5 credits)
- ME5B10 Instrumentation and Experimental Techniques (5 credits)
- ME5BIO1 Medical Devices (10 credits)
ME5BIO3  Tissue Engineering (5 credits)
ME5M19  Biomechanics (5 credits)
ME5M20  Biomaterials (5 credits)
ME5MM1  Micro and Precision Manufacturing (5 credits)
ME5MM2  Advanced Manufacturing (5 credits)
ME5MM3  Supply Chain Management (5 credits)

Some of the module options in either semester may be withdrawn from time to time and some new modules may be added, subject to demand. In the event that insufficient module options are available to meet the minimum module requirements of a particular specialisation then an alternative level 9 specialisation or a general level 9 Mechanical/Electrical/Civil Engineering specialisation may be chosen, subject strictly to timetabling compatibility, with the prior approval of the relevant Head of Department.

4. **Assessment:** The pass mark for all elements is 50%. The overall mark for the course is the credit-weighted average of the mark awarded for each module. To qualify for the award of the M.Sc. degree, students must achieve an overall average mark of at least 50%, achieve a pass mark in the dissertation and either (i) pass taught modules amounting to 60 credits or (ii) pass taught modules amounting to at least 50 credits and have a mark of not less than 40% in the failed modules. Both examination and dissertation are subject to external moderation.

Those students who achieve an overall average mark of 70% or above both for the course and in the dissertation will be awarded a distinction. A distinction cannot be awarded if a candidate has failed any module during the course.

5. **Course Co-ordinator:** Professor David Taylor, Department of Mechanical and Manufacturing Engineering.

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**Environmental Engineering (P.Grad.Dip.)**

1. **Introduction:** This Postgraduate Diploma course is designed to provide engineers and other suitably qualified graduates with a sound knowledge and understanding of present day practice in environmental engineering. The course has been developed so as to have special relevance to local authority and state sector engineers as well as those involved with environmental management.

2. **Admission Requirements:** The normal entry requirement for this course is an Honors Bachelor degree in engineering or cognate discipline.
3. **Duration:** The duration of this course is one academic year.

4. **Course Structure:** The course consists of two taught modules, worth 15 credits each, and one coursework module carrying 15 credits and consisting of a number of individual projects. The taught modules are:

1. Environmental concepts and regulation
2. Environmental engineering and design

The first module focuses on essential aspects of environmental science including the physics of air quality, acoustics, hydrology and hydrogeology, fire engineering and the principles of environmental impact assessment. The second module encompasses the approaches to engineering and mitigation including the treatment and management of solid waste, contaminated land, water and wastewater, radiation, and renewable energies. Both modules include relevant aspects of environmental legislation and the course includes sessions on topical issues as appropriate.

Lectures are normally held on Friday evenings and Saturday mornings each week throughout the two semesters (September to April), with some field or site visits scheduled for Saturday mornings. In addition to attending lectures, students are required to prepare and submit individual original pieces of coursework relating to the subject matter of each of the modules, involving design calculations or analysis.

5. **Assessment:** Assessment is by examination and coursework. The annual examinations, consisting of one paper for each taught module, are held in April/May. Both papers and the coursework must be passed. The pass mark for all elements is 40%.

The overall mark for the course is the credit-weighted average of the mark awarded for each module. To qualify for the award of the Postgraduate Diploma students must pass all elements of the course amounting to 45 credits and achieve an overall average mark of at least 40%. A student who fails a module or modules may re-sit the relevant module(s) during the supplemental examination session. Failed coursework/project work must be re-submitted by the Friday before the supplemental examinations are held.

The Postgraduate Diploma with Distinction may be awarded to students who, in addition, achieve an overall average mark of 70% or above. A Distinction cannot be awarded if a candidate has failed any credit during the course.

6. **Course Co-ordinator:** Professor Paul Johnston
1. **Introduction:** This Postgraduate Diploma course is designed to enable engineers, architects, fire prevention officers and other suitably qualified professionals to acquire a sound knowledge of the important aspects of fire safety practice in buildings and other structures.

2. **Admission Requirements:** The normal entry requirement for this course is an Honors Bachelor degree in civil engineering or architecture or another suitable professional qualification.

3. **Duration:** The duration of this course is one academic year.

4. **Course Structure:** The course consists of two taught modules, worth 15 credits each, and one coursework module carrying 15 credits and consisting of two individual projects. The taught modules are:
   
   1. Fire safety engineering;
   2. Fire safety legislation and regulations;


   Lectures are normally held on Friday evenings and Saturday mornings each week throughout the two semesters (September to April), with some lectures scheduled for Friday afternoons. In addition to attending lectures, students are required to prepare and submit individual original pieces of coursework involving the design of fire safety systems and the development of a strategy for a project that assists negotiations with the fire authorities for acceptance.

5. **Assessment:** Assessment is by examination and coursework. The annual examinations, consisting of one paper for each taught module, are held in April/May. Both papers and the coursework must be passed. The pass mark for all elements is 40%. The overall mark for the course is the credit-weighted average of the mark awarded for each module. To qualify for the award of the Postgraduate Diploma students must pass all elements of the course amounting to 45 credits and achieve an overall average mark of at least 40%. A student who fails a module or modules may re-sit the relevant module(s) during the supplemental examination session. Failed coursework/project work must be re-submitted by the Friday before the supplemental examinations are held.

   The Postgraduate Diploma with Distinction may be awarded to students who, in addition, achieve an overall average mark of 70% or above. A Distinction cannot be awarded if a candidate has failed any credit during the course.

6. **Course Co-ordinator:** Professor Trevor Orr
1. **Introduction:** This Postgraduate Diploma course is designed to enable civil engineers and other construction professionals to become familiar with the latest developments in Health and Safety legislation and practice. In addition, the course will provide them with knowledge to perform the roles of Project Supervisor, Health and Safety Co-ordinator, Safety Advisor and Safety Officer. The issue of Health and Safety related competency in design and on construction sites is comprehensively dealt with in this programme.

2. **Admission Requirements:** An Honors Bachelor degree in civil engineering or equivalent professional qualification.

3. **Duration:** The duration of this course is one academic year.

4. **Course Structure:** The course consists of two taught modules, worth 15 credits each, and one coursework module carrying 15 credits and consisting of a number of projects. The taught modules are:

   1. Health and safety legislation and regulations in construction;
   2. Health and safety systems in construction;

   The first module focuses on the legislation and regulations relating to health and safety in construction, while the second module focuses on risk management, health and welfare issues in practice, health and safety management and training, and regulations and controls relating to physical and chemical agents.

   Lectures are normally held on Friday evenings and Saturday mornings each week throughout the two semesters (September to April). In addition to attending lectures, students are required to prepare and submit individual and group original pieces of coursework involving risk assessment and safety and health planning.

5. **Assessment:** Assessment is by examination and coursework. The annual examinations, consisting of one paper for each taught module, are held in April/May. Both papers and the coursework must be passed. The pass mark for all elements is 40%.

   The overall mark for the course is the credit-weighted average of the mark awarded for each module. To qualify for the award of the Postgraduate Diploma students must pass all elements of the course amounting to 45 credits and achieve an overall average mark of at least 40%. A student who fails a module or modules may re-sit the relevant module(s) during the supplemental examination session. Failed coursework/project work must be re-submitted by the Friday before the supplemental examinations are held.
The Postgraduate Diploma with Distinction may be awarded to students who, in addition, achieve an overall average mark of 70% or above. A distinction cannot be awarded if a candidate has failed any credit during the course.

6. **Course Co-ordinator:** Professor Niamh Harty

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**Highway and Geotechnical Engineering (P.Grad.Dip.)**

1. **Introduction:** This Postgraduate Diploma course is designed to provide the specialised knowledge to enable a graduate engineer plan, locate, design, construct and manage roads.

2. **Admission Requirements:** The normal entry requirement for this course is an Honors Bachelor degree in civil engineering.

3. **Duration:** The duration of this course is one academic year.

4. **Course Structure:** The course consists of six taught modules, worth 5 credits each, and one project module worth 15 credits. The modules are:

   1. Pavement materials and thickness design
   2. Cost estimation
   3. Geometric design
   4. Project management
   5. Geotechnical engineering
   6. Traffic operation and control
   7. Project

   Lectures are normally held on Friday evenings and Saturday mornings each week throughout the two semesters (September to April). The project should be on a topic related to the course and approved by the Course Director. In addition to attending lectures, students are required to prepare and submit individual and group original pieces of coursework involving risk assessment and safety and health planning.

5. **Assessment:** Assessment is by examination and coursework. The annual examinations, consisting of one paper for each module, are held in April/May. Each student
must submit a report on their project. Both papers and the project report must be passed. The pass mark for all elements is 40%. The overall mark for the course is the credit-weighted average of the mark awarded for each module. To qualify for the award of the Postgraduate Diploma students must pass all elements of the course amounting to 45 credits and achieve an overall average mark of at least 40%. The Postgraduate Diploma with Distinction may be awarded to students who, in addition, achieve an overall average mark of 70% or above. A Distinction cannot be awarded if a candidate has failed any credit during the course.

6. **Course Director:** Vacant

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**Music and Media Technologies (M.Phil./P.Grad.Dip.)**

Run jointly with the School of Drama, Film and Music

1. **Introduction:** This course provides an exposure to a broad spectrum of music technology related subjects ranging from computer music and multimedia through to audio engineering and production. The primary objective of the course is to encourage creative musical and audio activities through the medium of digital technologies.

2. **Admission Requirements:** This course is open to holders of good honours Bachelor degrees (preferably, but not necessarily) in music, engineering or science. Candidates holding degrees in disciplines other than music must also have suitable music qualifications which will be assessed at an application interview. Consideration will also be given to mature applicants who do not have a primary degree but who do have exceptional track records in music or a media related discipline.

3. **Duration:** The MPhil course is a full-time course for one calendar year, or part-time over two years. A Diploma is awarded to those students who successfully complete the taught part of the programme but do not complete the dissertation.

4. **Course Structure:** The taught modules to be undertaken are structured in two semesters and will amount to 60 credits. The modules offered include core and elective subjects, which will involve study of some of the following areas:

- Research Methods & Innovation (5 credits)
- Contemporary Composition (5 credits)
- Electroacoustic Composition (5 credits)
- Music Theory and Instrumentation (5 credits)
- Orchestration (5 credits)
- Psychoacoustics (5 credits)
Programming (5 credits)

Audio Programming & Digital Signal Processing (5 credits)

Interactive Design (5 credits)

Music and Image (5 credits)

Visual Music (5 credits)

Synthesis & Sound Design (5 credits)

Audio Production Techniques (5 credits)

Audio Engineering (5 credits)

Spatial Audio (5 credits)

Research Project (30 credits): this may be a dissertation, a musical composition or a technological project with a significant research component.

Part-time students will select modules for year 1 and year 2 in consultation with the course director.

All elective modules require a minimum number of students and may not be offered if this quota is not met. Compulsory and elective modules may vary from year to year according to availability.

5 Assessment: Assessment is by a combination of coursework and written examinations. The pass mark for all elements is 50%.

The final mark awarded at the end of the year is based on a credit-weighted average of the mark awarded in each module taken in that year.

In order to qualify for the award of Postgraduate Diploma, students must achieve an overall average mark of at least 50% in taught modules taken. The Postgraduate Diploma with distinction may be awarded to students who achieve an overall average mark of at least 70%.

In order to qualify for the award of the Masters degree students must achieve an overall average mark of at least 50% in taught modules taken, and achieve a mark of at least 50% in the Research Project. A distinction may be awarded to students who achieve at least 70% in the Research Project and have an overall module average mark of at least 70%.

6 Course Director: Professor Dermot Furlong
1. **Introduction:** This Postgraduate Diploma course is designed to enable those who have some role in the planning and designing of the physical infrastructure, particularly those working for county councils and local authorities, to acquire a sound basic knowledge of planning and understanding of the role of all professional bodies involved in planning the physical infrastructure.

2. **Admission Requirements:** The normal entry requirement for this course is an Honors Bachelor degree in civil engineering or another suitable qualification.

3. **Duration:** The duration of this course is one academic year.

4. **Course Structure:** The course consists of six taught modules, worth 5 credits each, and one individual project worth 15 credits. The modules are:

   1. Planning theory and control;
   2. Planning practice;
   3. Transportation and computer methods;
   4. Law and economics;
   5. Environment; waste; water; ground and minerals;
   6. Sociology; psychology; politics and the media;
   7. Project.

   Lectures are normally held on Friday evenings and Saturday mornings each week throughout the three teaching terms (September to April). The project should be on a topic related to planning approved by the Course Director.

5. **Assessment:** Assessment is by examination and dissertation. The examinations, consisting of two papers, are held in April/May. Each student must submit a report on their project. Both papers and the project report must be passed. The pass mark is 40%. Each examination paper and the project report constitute one-third of the overall assessment for the course.

6. **Course Co-ordinator:** Professor Trevor Orr
Project Management (P.Grad.Dip.)

1. **Introduction:** This Postgraduate Diploma course is designed to provide engineers and other suitably qualified graduates with a sound knowledge and understanding of all aspects of project management in civil engineering and construction.

2. **Admission Requirements:** The normal entry requirement for this course is an Honors Bachelor degree in engineering, architecture or quantity surveying. A small number of places are available for applicants without these particular qualifications but with other relevant qualifications and experience. These places will be offered on the basis of interviews normally held in the spring.

3. **Duration:** The duration of this course is one academic year.

4. **Course Structure:** The course consists of two taught modules, worth 15 credits each, and one coursework module carrying 15 credits and consisting of a research report and a project management software exercise.

   The taught modules are:
   1. Project management practice;
   2. Project management systems

   The first module focuses on project management principles and practice, contracts, tendering procedures, insurances, legal principles and legislation, while the second module focuses on project accounting, cost control, the computer and IT in project management, human resources management and health and safety.

   Lectures are normally held on Friday evenings and Saturday mornings each week throughout the two semesters (September to April). The coursework involving use of project management software on the College computers is an integral part of the course that takes place on some Friday evenings.

5. **Assessment:** Assessment is by examination and coursework. The annual examinations, consisting of one paper for each taught module, are held in April/May. Both papers and the coursework must be passed. The pass mark for all elements is 40%.
   
   The overall mark for the course is the credit-weighted average of the mark awarded for each module. To qualify for the award of the Postgraduate Diploma students must pass all elements of the course amounting to 45 credits and achieve an overall average mark of at least 40%. A student who fails a module or modules may re-sit the relevant module(s) during the supplemental examination session. Failed coursework/project work must be re-submitted by the Friday before the supplemental examinations are held.

   The Postgraduate Diploma with Distinction may be awarded to students who, in addition, achieve an overall average mark of 70% or above. A Distinction cannot be awarded if a candidate has failed any credit during the course.

6. **Course Co-ordinator:** Professor Trevor Orr
Sustainable Energy (P.Grad.Dip.)

1. **Introduction:** This is a one-year course designed to provide civil engineers and other suitably qualified professionals with a good understanding of energy management and efficiency as well as sustainable energy generation. The course will further advanced knowledge in efficiency techniques, sustainable energy technologies and energy management systems and strategies. It will include theory and practice along with economics, current legal requirements and standards. The course will be of particular interest to those already in employment as part of ongoing professional training as well as leading to the widening of new job opportunities for its graduates.

2. **Admission Requirements:** A minimum lower-second class (2.2) award in an Honors Bachelor of Engineering or Science Degrees or another suitable degree. Alternatively, the applicant must hold a qualification or combination of qualifications deemed as being of equivalent standard to the above, when taken in conjunction with relevant work experience. The candidate will be interviewed to establish his/her suitability for the course.

3. **Duration and Delivery:** Lectures will be held on Friday evenings and Saturday mornings each week throughout the two terms (September to April), with laboratories or site visits scheduled for Saturday mornings. In addition to attending lectures, students are required to prepare and submit individual original pieces of coursework relating to the subject matter of each of the modules.

4. **Course Structure/Content:** The course will cover both energy conservation as well as the development of alternative sustainable sources of energy. The course consists of three taught modules each carrying 20 credits.

   - Module 1: Energy Management and Efficiency;
   - Module 2: Sustainable Energy Technologies;
   - Module 3: Individual Project.

5. **Module Descriptions:** In module 1 energy management and efficiency will be addressed sectorally in terms of energy in buildings; in transport and in industry. In module 2 sustainable energy technologies will concentrate on renewable energy generation technologies (wind, wave, tidal, biomass, biofuels, geothermal, hydro, solar, waste to energy) and low carbon technologies (nuclear energy, hydrogen, fuel cells). In module 3 each student will be expected to engage in a piece of original study to reveal some novel aspect of sustainable energy.

6. **Assessment and Progression:** Assessment is by examination and coursework. Modules 1 and 2 are each assessed by a three-hour examination paper held in April/ May and coursework. Both papers and the coursework must be passed. The pass mark for all elements is 40%. The marks for the examination in Module 1 and Module 2 (excluding 33% continuous assessment i.e. the laboratory project and the site visit) will constitute 66% of the total assessment of each module. Examinations will take place during the annual examination session in Trinity Term, with supplemental examinations to take place in
Michaelmas Term. Failed assessments may be re-submitted in June whereas failed project work may be re-submitted at the end of August. Module 3 is 100% continuous assessment. The overall mark for the course is the credit-weighted average of the mark awarded for each module. Students who have passed all three modules of the course and accumulated 60 credits will be awarded a Postgraduate Diploma in Sustainable Energy. Students who, in addition, have achieved an overall average mark of at least 70% across all three modules passed will be awarded a Postgraduate Diploma in Sustainable Energy with Distinction. The Postgraduate Diploma with Distinction cannot be awarded if a candidate has failed any module, assignment or examination during the period of study.

7. **Course Director:** Professor Laurence Gill

**Course Co-ordinator:** Professor Sarah McCormack

**Master in Engineering (M.A.I. (Ind.))**

1.1 **Admission:** Applicants for the Research Master in Engineering (M.A.I. (Ind.)) degree must be engineering graduates and hold a University of Dublin B.A.I./B.Sc.(Ing.) degree with three years’ experience in practice as a professional engineer

OR

Hold, in addition to their primary qualification, a combination of two Trinity College Dublin Postgraduate Diplomas approved by the Director of Teaching and Learning (Postgraduate). This degree carries 120 credits.

Commencing with the 2019-2020 academic year, in addition to the above requirements, applicants taking the first route must hold a minimum II.2 grade University of Dublin B.A.I./B.Sc.(Ing.) degree while applicants taking the second route must hold a minimum II.2 grade on a level 8 engineering degree.

1.2 **Duration:** The duration of the programme is normally two years part-time and the dissertation should be submitted not later than three years after registering for the degree.

1.3 **Dissertation:** The candidate is required to prepare a dissertation on a research project carried out in his/her professional environment. The work is to be carried out to academic criteria and should include some contribution to knowledge. It will be supervised by a member of staff from the School of Engineering. The agreement, in writing, of a person in authority from the student’s workplace to carry out this research will normally be required.

1.4 **Assessment:** The award of Master in Engineering (M.A.I. (Ind.)) degree will be based on a dissertation submitted by a suitably qualified engineering graduate. The candidate is required to submit two bound copies of his/her dissertation and will normally be asked to undergo a *viva voce* examination on the subject matter of the dissertation.

1.5 **Course Director:** Professor Brendan O'Kelly
1. **Introduction:** This is a one-year taught course organised by the School of Mathematics. It aims to provide training in modern applications of high-performance computing for graduates of disciplines with a strong mathematical base. High-performance computing covers the use of multiple computational cores in parallel to solve large-scale numerical or data-intensive problems. Application areas span numerical simulations in academic research and industrial development and data analysis in pure research, financial markets and networks and telecommunications.

2. **Admission Requirements:** Applicants should normally have a first class or second class (upper division) Honors Bachelor degree in a subject with a significant mathematical component and should have some knowledge of computing and numerical simulation. The course is appropriate for both new graduates and for those currently working in relevant applications areas.

3. **Course Structure:** The course is full-time, lasting one year from September each year until the end of August the following year. It consists of coursework, laboratory work and a supervised project in an application area. The modules offered will normally include options in a variety of application areas, and some modules given by other Schools in College or by professionals in relevant areas. The project may be supervised by staff from any School in College where the techniques developed in the course are used in research.

**Core and optional modules**

1. **Core modules in High-Performance Computing**
   a) High-performance computing software (10 credits)
   b) High-performance computing systems and hardware (10 credits)
   c) C programming (5 credits)
   d) Numerical methods for HPC (5 credits)
   e) Tools for scientific and technical computing (5 credits).

2. **Seminars in application areas (compulsory) (5 credits)**
The seminars will be given by speakers who make use of HPC techniques in their work. The module is examined on the basis of two submitted technical essays of approximately 2,500 words each.

3. Optional modules in High-Performance Computing:

a) Stochastic methods (5 credits)

b) Monte Carlo Methods (5 credits)

c) Financial Applications (5 credits)

d) Case studies in HPC (5 credits)

e) GPU programming (5 credits)

f) Individual Reading module (5 credits)

g) Other relevant modules (up to 10 credits)

4. An individual project leading to a dissertation and oral presentation (30 credits).

The availability of optional modules depends on resources available in a given year. Students choose their options in consultation with the course co-ordinator.

4. Assessment: Coursework is examined in the May/June period and by continuous assessment. A dissertation describing the project work should be completed by the end of August for examination in September. The pass mark for all elements is 50%. To be awarded the M.Sc., students must achieve a pass in the dissertation, have an overall average mark for the course of at least 50%, and pass core and optional modules amounting to at least 50 credits and achieve a minimum of 40% in any failed modules. The final mark for the course is the credit-weighted average of the mark awarded in each module. The M.Sc. with Distinction may be awarded to students who pass all modules, and achieve at least 70% both in the overall mark for the course and in the dissertation.

If exceptional circumstances have arisen during the year to make it impossible to undertake a project, a student registered for the Masters course may apply for a Postgraduate Diploma in High Performance Computing. Such students must have an overall average mark of at least 50%, have passed taught modules amounting to at least 50 credits and achieved a minimum mark of 40% in any failed modules. The Postgraduate Diploma with Distinction may be awarded to students who have passed outright modules amounting to 60 credits and have achieved an overall average mark of at least 70%.

5. Course Co-ordinator: Professor Michael Peardon
School of Natural Sciences

Biodiversity and Conservation (M.Sc./P.Grad.Dip.)

1. **Introduction:** This course is designed to provide students with a sound theoretical and practical grounding in the science of biological diversity and its conservation. This modular course utilises a range of teaching methods to develop key theoretical knowledge and links this to practical skills. Skills in developing research methods are developed through desk studies and (for M.Sc. candidates only) a research project resulting in a submission of a dissertation.

2. **Admission Requirements:** Applicants will be required to hold at least an upper-second class Honors Bachelor degree in a science subject that included significant components of botany, zoology or a relevant life science. Non-EU applicants will be required to hold an equivalent qualification. Candidates with relevant, and significant, experience as professional practitioners in biodiversity management or policy may also be accepted.

An Admissions Committee from the School of Natural Sciences awards places on a competitive basis. Applications must be accompanied by a one page letter outlining the applicant’s interest and experience in biodiversity and its conservation.

3. **Duration and course structure:** The course, carrying 90 ECTS credits, runs over a twelve-month period, using learning modules as described below. All modules are compulsory.

   - Introduction to biodiversity (5 credits)
   - Environmental and biodiversity policy (5 credits)
   - Introduction to conservation biology (5 credits)
   - Desk studies (10 credits)
   - Data handling (5 credits)
   - Taxonomy, systematics and identification skills (5 credits)
   - Human impacts with biodiversity (5 credits)
   - Project planning (5 credits)
Overseas field course (5 credits)

Global Environmental change (5 credits)

Practical conservation biology (5 credits)

Research project: Dissertation (30 credits)

4. **Assessment:** Candidates are assessed throughout the course by written examination, coursework and essays, presentations, web-based tests, a desk-based project and a dissertation based on a research project.

To pass the taught component of the course, the candidate must achieve a pass mark (50% or above) in all the taught modules. The final mark for the course is the credit-weighted average of the mark awarded in each module. A student may be permitted to undertake supplemental assessment or a supplemental examination in one module only at the discretion of the Court of Examiners. If successful, the mark for the relevant module will be recorded as 50%. To proceed to the individual research project, the candidate must, as a minimum, have passed outright taught modules amounting to at least 50 credits including the Project Planning module, and have an overall average mark of at least 50% and, for modules amounting to not more than 10 credits, have achieved a mark of at least 40% in each failed module. In order to be awarded the degree of Master of Science in Biodiversity and Conservation, candidates must satisfy the Court of Examiners by passing outright or by compensation all the taught modules of the course, and by obtaining a pass in the dissertation. A student who passes the taught component of the course but fails the project planning module will be required to submit a revised research project proposal prior to being permitted to commence the individual research project leading to a dissertation. If the revised proposal remains unsatisfactory, the student may apply for the Postgraduate Diploma in Biodiversity and Conservation, provided that s/he has an overall mark of at least 50%, has passed modules amounting to at least 50 credits and has a mark of at least 40% in the failed module(s).

To obtain a Masters degree with Distinction, a candidate must satisfy the examiners by: (i) passing all taught modules and achieving an overall average mark for the course of 70% or above, and (ii) achieving a mark of 70% or above for the dissertation relating to the individual research project. A Distinction cannot be awarded if a candidate has failed any credit during the period of study.

5. **Course Director:** Professor Stephen Waldren

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**Development Practice (M.Sc./P.Grad.Dip.)**

1. **Introduction:** The Master in Development Practice (Joint M.Sc./P.Grad.Dip) (MDP) is a two-year programme that blends science and social science to evaluate the impact of new technological and scientific innovations in the international development context. Cutting edge scientific and social science techniques are combined to influence the international
development policy framework, driving societal change through effective public policies, rooted on a firm scientific basis. The MDP involves intensive training of development practitioners across four basic pillars of economics and social science, natural science, health science and management science, and requires 120 ECTS credits for its completion at the Masters level. The degree and the related Postgraduate Diploma are jointly awarded by the University of Dublin Trinity College and University College Dublin, and the course is jointly taught by academic staff of both institutions. Students have joint institutional registration on the course.

2. **Admission Requirements:** As development practice is a multidisciplinary field, applicants can be Honors Bachelor graduates of any academic discipline.

Entry to the course is based on competitive selection. A second class Honours Bachelor degree is a general requirement. In exceptional cases applicants with a lower grade in their primary degree will be considered if they have demonstrated outstanding achievement in their practical work in the field of international development through their work for government or inter or non-governmental organizations.

3. **Duration:** The format of delivery is full-time over two years. The course curriculum consists of four key disciplinary pillars: Natural Sciences, Social Sciences, Management and Health Sciences. Students are required to take core modules in each of these areas. The M.Sc. in Development Practice combines a range of teaching and learning approaches and mechanisms in the seminar room, in the global classroom, and in the field (students engage in three internships and fieldwork modules), and brings to bear expertise from both academics and practitioners.

4. **Modular Course Structure:** All modules are obligatory as follows:

1. Sustainable Agriculture and Land Use (5 credits)
2. Climate Change: Science, Development and Justice (5 credits)
3. Science, Technology and Sustainable Development (5 credits)
4. Economic and Policy Analysis I (5 credits)
5. Economic and Policy Analysis II (5 credits)
6. Gender and Development (5 credits)
7. Economics of Sustainable Development (5 credits)
8. Introduction to Statistics (5 credits)
9. Global Health (5 credits)
10. Impact Measurement in Development Aid (5 credits)
10. Post-Conflict Situations (5 credits)

11. Governance, Politics, and Development (5 credits)

12. Globalisation and African Development (5 credits)

13. Global Classroom: Foundations of Sustainable Development Practice (5 credits)

14. NGO Placement (5 credits)

15. NGOs: Law, Governance, and Social Change (5 credits)

16. Fieldwork 1 (10 credits)

17. Fieldwork 2 (5 credits)

18. Smart eco-cities of the future (5 credits)

19. Intensive pre-MDP Boot Camp (not for credit)

20. MDP Dissertation (20 Credits) - In year two students will write up and submit a 10,000 word dissertation (maximum) based on an agreed thematic area. Dissertations will draw on research conducted during the Fieldwork Modules. Dissertation supervisors will be allocated from amongst the UCD and TCD staff teaching on the course to fit with the students’ topics. Where appropriate a student may be jointly supervised by two supervisors, with the approval of the Course Director and Co-ordinators.

5. Progression rules:

1. Students are assessed for each taken module with a numerical percentage mark (%) at the end of the semester/term during which delivery of a module is completed. All end-of-module marks are returned by module co-ordinators to the course offices in TCD and UCD.

2. The Pass mark for a module is 50% of the total marks available for the module. Pass by compensation is not permitted for any module.

3. Students are entitled to one supplemental examination and/or can re-submit failed assignments in any failed module. Re-submission of failed assessments is normally by August 31st, or as arranged with the module lecturer and course co-ordinator.

4. Fieldwork: The Fieldwork Modules can only be offered once during the academic year in the summer and may not be repeated within the same academic year. A failed fieldwork module may only be repeated once with permission to go off-books the following academic year unless recommended otherwise by the course committee which can also recommend an alternative programme of study where the student cannot undertake or complete a fieldwork Module for documented medical reasons or in the case of a documented family emergency.
5. An exit award of Postgraduate Diploma in Development Practice will be considered where a student has passed year one of the course accumulating 60 credits.

6. The graduand who has been awarded the Postgraduate Diploma in Development Practice is not eligible to re-register on the course in the future for the award of the Masters degree.

7. Students must pass all modules on the course, including the dissertation, in order to be considered for an award of Masters degree.

6. **Award:** To qualify for the award of the M.Sc. degree, students must pass outright taught modules amounting to 100 credits and achieve a pass in the research project/dissertation amounting to 20 credits. In order to be awarded the M.Sc. with Distinction, students must achieve a grade of distinction for the research dissertation and obtain an overall credit-weighted average mark for the course of 70% or above. A Distinction cannot be awarded if a candidate has failed any credit during the period of study.

Students who have passed taught modules amount to at least 60 credits but who do not achieve a pass mark in the dissertation will be deemed to have failed overall. Such students may be awarded the Postgraduate Diploma. Students who have achieved an overall average mark of at least 70% will be eligible for the award of Postgraduate Diploma with Distinction.

7. **Course Co-ordinator:** Professor Susan Murphy

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**Environment and Development (M.Sc./P.Grad.Dip.)**

1. **Introduction:** The course is designed to provide students with a sound theoretical and practical grounding in the theory of political ecology and development, while also exposing them to case studies of environmental transformation and management in the developing world and developing their research skills. This modular course will utilize a range of teaching methods to develop key theoretical knowledge and link this to practical skills. Skills in developing research methods will be developed through desk studies and (for M.Sc. candidates only) a research project.

2. **Admission Requirements:** Applicants will be required to hold at least an upper-second class Honors Bachelor degree in a social science or science subject. Non-EU applicants will be required to hold an equivalent qualification. Relevant, and significant, experience as professional practitioners in environmental or development management or policy will also be taken into consideration.

3. **Duration and course structure:** The course will run over a twelve-month period, using learning modules as described below. All modules are compulsory for M.Sc. students.
while candidates for the P.Grad.Dip. are required to take all modules except the Research Project.

Modules:

Introduction to Environment and Development (5 credits)

Political Ecology and Sustainable Development (5 credits)

Biodiversity-Human Interactions (5 credits)

Environmental Change (5 credits)

Desk Study (10 credits)

Research Methods (5 credits)

Globalization and African Development (5 credits)

Conflict in the Developing World (5 credits)

Project Planning (5 credits)

Research Project (30 credits)

Induction and Field Trip (10 credits)

4. **Assessment:** Candidates shall be assessed throughout the course by written examination, coursework and essays, presentations, and a dissertation based on a research project. The pass mark for all elements is 50%. In the calculation of the overall average mark for the course, modules are weighted according to their ECTS credit value. To pass the taught component of the course, the student must achieve a pass mark (50% or above) in each of the taught modules. Compensation is permitted in modules amounting to not more than 10 credits provided that the student has achieved an overall average mark for the taught modules of at least 50%, has passed outright modules amounting to at least 50 credits and has a mark of not less than 40% in the failed module(s).

In order to be awarded the degree of Master of Science in Environment and Development, candidates must satisfy the Court of Examiners by passing, outright or by compensation, all the taught modules of the course and by obtaining a pass in the dissertation. Where a module involves more than one assessment all items of assessment must be passed. Candidates who pass all taught modules and the desk study can exit with a Postgraduate Diploma or may proceed and undertake a dissertation. Candidates must obtain a pass mark (50%) in their dissertation to be awarded an M.Sc.

Candidates who pass all taught modules and the desk study amounting to 60 credits but fail their dissertation may be awarded a Postgraduate Diploma. Students who fail to satisfy the Court of Examiners in any module may be permitted at the discretion of the Court to
represent themselves on one occasion only for supplementary written work or examination. Where a student is required to take such supplementary work or examination the original mark in the failed module will be replaced by 50% in the case of a successful outcome. Any candidate who fails any piece of supplementary coursework or repeat examination will be required to withdraw from the programme. A candidate who fails more than two modules at the first attempt will be required to withdraw from the course.

To qualify for the award of the M.Sc. degree, students must achieve a pass mark overall and in the dissertation, and pass outright or by compensation taught modules amounting to not less than 60 credits. Students who fail in any taught module may be permitted, on one occasion only and at the discretion of the Court of Examiners, to undertake supplementary work or examination. Where a student is required to take such supplementary work or examination, the mark will be capped at 50% in the case of a successful outcome. A student who fails more than two modules at the first attempt will be required to withdraw from the programme. Students may compensate a fail mark in modules amounting to not more than 10 credits provided that they have an overall average mark of at least 50%, have achieved at least 50% in the dissertation, and have a mark of at least 40% in the failed module(s). The M.Sc. degree with Distinction may be awarded to students who fulfilled the requirements of the course, have a mark of at least 70% in the dissertation and in the overall average mark for the course. A Distinction cannot be awarded if a candidate has failed any credit during the course.

Students who do not choose to proceed to, or fail, the dissertation, will qualify for the award of the Postgraduate Diploma provided that they have passed outright, or by compensation according to the course regulations, modules amounting to at least 60 credits and have an overall average mark of at least 50%.

5. **Course Director:** Professor Pádraig Carmody

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**Environmental Sciences (M.Sc./P.Grad.Dip.)**

1. **Introduction:** This one-year, full-time course aims to provide a firm scientific understanding of current environmental issues whilst developing a wide range of knowledge and skills relating to the expanding subject of Environmental Science. It is intended for graduates with an appropriate biological/earth sciences background or relevant experience in an environmental field, in addition to established administrative and scientific workers in applied environmental sciences.

2. **Admission Requirements:** Applications for admission are accepted from:

   (i) holders of first or upper-second class Honors Bachelor degrees, or their overseas equivalent, awarded by recognised universities, institutions and degree awarding bodies;
(ii) holders of other degrees of relevant qualifications including professional qualifications, who have at least three years work experience in a relevant profession.

An Admissions Committee from the School of Natural Sciences awards places on a competitive basis. Applications must be accompanied by a one page letter outlining the applicant’s interest and experience in the environmental field.

3. Course Structure: The course, which carries 90 ECTS credits, comprises the following two components:

(i) A taught component comprising modules totalling 60 credits

(ii) An individual research project carrying 30 credits

The course comprises the following modules or their equivalents:

Introduction to Environmental Sciences (5 credits)

Desk Study (10 credits)

Environmental Policies (5 credits)

Environmental Chemical Analysis (5 credits)

Data Handling and Analysis (5 credits)

Environmental Change I (5 credits)

Hydrology and Groundwater Quality (5 credits)

Waste and Energy Management (5 credits)

Environmental Change II (5 credits)

Practical Environmental Skills (5 credits)

Project Planning (5 credits)

Research Project: Dissertation (30 credits)

To complete the course and be eligible for the degree of Master in Science in Environmental Sciences, the candidate must successfully pass both the taught component and the individual research project resulting in a submission of a dissertation.
A student registered for the M.Sc. in Environmental Sciences may apply for a Postgraduate Diploma in Environmental Sciences on successful completion of the taught component of the M.Sc. course.

4. **Assessment:** To pass the taught component of the course and proceed to the research project and dissertation, the candidate must first pass, outright or by compensation, all taught modules. The pass mark for all assessment components is 50%. In the calculation of the overall average mark for the taught component and the course as a whole, modules, including the dissertation, are weighted according to their ECTS credit weighting. A student may be permitted to undertake supplemental assessment or examination in a maximum of one module at the discretion of the Court of Examiners. If successful, the mark for the given module will be recorded as 50%. A student may fail one module and pass the taught component of the course by compensation providing that they have passed outright modules amounting to at least 50 credits, have an overall average mark of at least 50% across all taught modules and a mark of at least 40% in the failed module(s). A candidate who fails to pass modules amounting to more than 10 credits will be required to withdraw from the programme without proceeding to the research project and dissertation module.

To proceed to the individual research project component of the course, the candidate must satisfy the examiners by:

(i) achieving a pass (50% or above) in the project planning module, and

(ii) passing the taught modules of the course, outright or by compensation as outlined above.

A student who passes the taught component of the course but fails the project planning module will be required to submit a revised research project proposal prior to being permitted to commence the individual research project leading to a dissertation. If the revised proposal remains unsatisfactory, the student may apply to be awarded the Postgraduate Diploma in Environmental Sciences provided that s/he has an overall mark of at least 50%, has passed modules amounting to at least 50 credits and has a mark of at least 40% in the failed module(s).

To obtain a Masters degree with Distinction, a candidate must satisfy the examiners by:

(i) passing all taught modules and achieving an overall average mark for the course of 70% or above and,

(ii) achieving a mark of 70% or above for the dissertation relating to the individual research project.

A Distinction cannot be awarded if a candidate has failed any assessment during the course.

5. **Course Director:** Professor Carlos Rocha