# *Faculty of Science, Technology, Engineering and Mathematics*

## *I GENERAL FACULTY REGULATIONS*[1]

### *Degrees*

1 The faculty provides courses leading to the following degrees:

*(a)* COMPUTER SCIENCE AND STATISTICS

Bachelor in Arts (Moderatorships in Computer Science and Business, in Computer Science and Language, in Computer Science, Linguistics and a Language, and in Management Science and Information Systems Studies (B.A. with honours)), Bachelor in Arts (Moderatorship in Computer Science (B.A. with honours)) and Master in Computer Science (M.C.S.), see II below.

*(b)* ENGINEERING SCIENCE

Bachelor in Arts (B.A.), Bachelor in Engineering (B.A.I.) and Master in Engineering (Studies) (M.A.I. (St.)), Bachelor in Science (Engineering) (B.Sc. (Ing.)) and Master in Engineering (Studies) (M.A.I. (St.)) in Engineering with Management, see III below.

*(c)* MATHEMATICS

Bachelor in Arts (Moderatorships in Mathematics, and in Theoretical Physics (B.A. with honours)), Bachelor in Arts (Ordinary B.A. degree), see IV below.

*(d)* SCIENCE

Bachelor in Arts (Moderatorships in Science (in one of the following subjects: biochemistry, botany, chemistry, chemistry with biosciences, chemistry with molecular modelling, environmental sciences, genetics, geography, geoscience, human genetics, immunology, medicinal chemistry, microbiology, molecular medicine, nanoscience, neuroscience, physics, physics and astrophysics, physiology, zoology (B.A. with honours)), see V below.

*(e)* E3 ENVIRONMENTAL SCIENCE AND ENGINEERING

Bachelor in Science (Environmental Engineering)[2] and Master in Engineering (Studies) (M.A.I. (St.)), Bachelor in Science (Applied Environmental Science)[2] and Master in Applied Environmental Science[2], see VI below.

2 In addition to the above, the faculty provides programme pathways within the Trinity joint honours programme leading to Moderatorships in Computer Science, in Mathematics or in Geography, which may be combined with one other subject or, in the cases of Mathematics and in Geography, which may be conferred as single honours. For regulations see COMMON ARCHITECTURE and TRINITY JOINT HONOURS PROGRAMME. A minor degree pathway is provided in Statistics, see II and IV below.

## *II COURSES IN COMPUTER SCIENCE AND STATISTICS*

In addition to the programmes listed in this section, computer science may also be studied as a subject within the Trinity joint honours programme (see TRINITY JOINT HONOURS PROGRAMME) or as a constituent part of the Moderatorship in Computer Science, Linguistics and a Language (see FACULTY OF ARTS, HUMANITIES AND SOCIAL SCIENCES).

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[1]These regulations should be read in conjunction with GENERAL REGULATIONS AND INFORMATION.

[2]Degree titles to be approved.

## MODERATORSHIP IN COMPUTER SCIENCE AND BUSINESS[3]

*Introduction/overview*

1 The duration of the course is four years. The course aims to provide graduates with the knowledge and skills necessary for the technical field of computer science and the business management skills to understand markets and to manage business operations within organisations. The course will prepare students for challenging careers in either (or both) computer science and business.

*Regulations*

2 For assessment and academic progress regulations, please refer to GENERAL REGULATIONS AND INFORMATION.

3 Each course year carries 60 ECTS credits. The pass mark in each year is 40 per cent.

**Students who entered in 2019-20 and 2020-21**

*Moderatorship, Part I*

4 The results of the Junior Sophister year constitute Moderatorship, Part I and contribute 30 per cent toward the final award.

*Moderatorship, Part II*

5 The results of the Senior Sophister year constitute Moderatorship, Part II and contribute 70 per cent toward the final award.

6 Students who entered prior to 2019-20 and have repeated one or more years, or have spent time off-books, will normally have their degree result calculated as above.

*Award*

7 Depending upon student choices made within their programme of study it may be possible to be conferred with a Bachelor in Arts (Moderatorship) award in one of the following categories:

Joint honours in Computer Science and Business

Major in Computer Science with minor in Business

Major in Business with minor in Computer Science

## MODERATORSHIP IN COMPUTER SCIENCE AND MASTER IN COMPUTER SCIENCE (M.C.S.)

*Introduction/overview*

8 The programme will normally last for four or five years and will lead to the degrees of B.A. (Moderatorship) (after four years) and Master in Computer Science (after five years).

9 The programme is concerned with the study of the theoretical underpinnings and practical applications of computers. The first two years provide an introduction to fundamentals including mathematics, programming, computer systems, digital logic, telecommunications, information management and the relationship between computers and society. Later years provide specialisation in a broad range of topics through core and elective modules.

10 Students participating in the Master in Computer Science course will be required to engage in a one semester internship in industry or in a university research laboratory in fourth year. In the fifth year students will undertake a significant project with a substantial element of independent research leading to a dissertation.

11 Students on the four-year programme leading to the B.A. (Moderatorship) degree complete a substantial capstone project in fourth year.

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[3]The last entry to this course was in 2020-21. From 2021-22, entry to this combination of subjects is through the Trinity joint honours programme. See TRINITY JOINT HONOURS PROGRAMME.

*Regulations*

12 For assessment and academic progress regulations, please refer to GENERAL REGULATIONS AND INFORMATION. Each course year carries 60 ECTS credits .

13 The pass mark in the first, second, third and fourth years of this programme is 40 per cent. The pass mark in fifth year (the master's year) of this programme is 50 per cent.

14 Students must achieve an average of at least 60 per cent at the first attempt of their third year examinations to be eligible to participate in the master's internship in fourth year. Students who have passed the third year but who do not choose to proceed to the fourth year of the five-year master's programme, or are ineligible to participate in the master's internship, may instead proceed to the final year of the four-year programme, leading to the B.A. (Moderatorship) degree.

15 Students who pass the fourth year of the five year master's course, achieve an average of at least 60 per cent at the first attempt of their fourth year examinations (the taught component) and 60 per cent overall, and satisfy the requirements for the award of Moderatorship in Computer Science may progress to the fifth year or exit the course with a B.A. (Moderatorship) degree. Students who fail the fourth year of the master's course may repeat the fourth year as provided by the General Regulations but may only do so to exit the course with the B.A. (Moderatorship) degree, taking the modules required for students intending to exit after four years in place of the internship.

*Moderatorship degree*

16 Students who have passed fourth year may have the B.A. (Moderatorship) degree conferred if they do not choose, or are not allowed, to proceed to the fifth year of the course. Students who are eligible and choose to proceed to the fifth year of the programme will be awarded a classified B.A. (Moderatorship) degree on completion of fifth year.

*Moderatorship, Part I*

17 The results of the Junior Sophister year constitute Moderatorship, Part I and contribute 30 per cent toward the final award.

*Moderatorship, Part II*

18 The results of the Senior Sophister year constitute Moderatorship, Part II and contribute 70 per cent toward the final award.

19 Students who entered prior to 2019-20 and have repeated one or more years, or have spent time off-books, will normally have their degree result calculated as above.

*Award*

20 Bachelor in Arts (Moderatorship).

*Master in Computer Science degree*

21 Successful candidates at the fifth year examinations will be awarded the degree of Master in Computer Science or Master in Computer Science with distinction. A distinction shall require at least 70 per cent in the dissertation and at least 70 per cent in the final credit-weighted average mark.

## MODERATORSHIP IN COMPUTER SCIENCE, LINGUISTICS AND A LANGUAGE[4]

22 For details see FACULTY OF ARTS, HUMANITIES AND SOCIAL SCIENCES.

[4]For entrants prior to 2021-22, this course is called Computer Science and Language.

## MODERATORSHIP IN MANAGEMENT SCIENCE AND INFORMATION SYSTEMS STUDIES

*Introduction/overview*

23 This is a four year programme and will lead to the degree of B.A. (Moderatorship) in Management Science and Information Systems Studies.

24 This course is concerned with the application of computers, mathematical techniques and information systems to problem-solving, decision-making and planning in the management of business and industry. Its aim is to provide a practical training founded on a solid theoretical base, which will enable its graduates to be immediately effective while remaining adaptable to new developments in business and information technology.

*Regulations*

25 Please refer to GENERAL REGULATIONS AND INFORMATION. Each course year carries 60 ECTS credits.

26 The pass mark in each year of the course is 40 per cent.

*Moderatorship, Part I*

27 The results of the Junior Sophister year constitute Moderatorship, Part I and contribute 30 per cent toward the final award.

*Moderatorship, Part II*

28 The results of the Senior Sophister year constitute Moderatorship, Part II and contribute 70 per cent toward the final award.

29 Students who entered prior to 2019-20 and have repeated one or more years, or have spent time off-books, will normally have their degree result calculated as above.

*Award*

30 Bachelor in Arts (Moderatorship).

## STATISTICS

*Introduction/overview*

31 The study of statistics leading to a minor degree award is available to students entering the second year of the moderatorship in mathematics. The minor pathway includes instruction in theoretical and applied statistics (Bayesian and frequentist methods, asymptotics, model building and fitting, clustering and classification, simulation) using mathematical and computational techniques.Material is delivered through lectures, tutorials and computing labs.

*Regulations*

32 See GENERAL REGULATIONS AND INFORMATION and handbook of the School of Computer Science and Statistics for information on regulations and available modules. The pass mark is 40 per cent.

*Award*

33 Depending upon student choices made within the mathematics programme, it may be possible to be conferred with a Bachelor in Arts (Moderatorship) award with a major in mathematics and a minor in statistics. See entry for the MODERATORSHIP IN MATHEMATICS.

## DEGREES OF BACHELOR IN ENGINEERING AND MASTER IN ENGINEERING (STUDIES) (B.A., B.A.I.) or (B.A., M.A.I. (St.))

*Introduction/overview*

1 Students complete a four-year course and may elect to complete an additional year of study leading to a M.A.I. (St.) degree. There is provision for an abridgement of the course to three years.

2 During the first two years a programme of basic modules in engineering is provided. Following completion of the first two years of the course, students elect to study specialised programmes in one of the following strands:

civil, structural and environmental engineering
mechanical and manufacturing engineering
biomedical engineering
electronic engineering
computer engineering
electronic and computer engineering (combined programme)

Following completion of the fourth year of the engineering degree course, eligible students may elect to complete one further year of study in their chosen strand leading to a M.A.I. (St.) degree.

3 While every effort is made to allow students to study the strand/specialism they choose, the Engineering School Curriculum Committee reserves the right to allocate the available places. In some departments the number of places for students of any one year may be limited. Timetable constraints may also reduce the number of module options available.

4 Outbound Trinity College students: Students who successfully complete the third year of their engineering course in Trinity College Dublin and meet the selection criteria may enrol on the 'double diploma' programme run jointly with the Institut National des Sciences Appliquées (I.N.S.A.) de Lyon. Selected candidates are admitted to the third year of the engineering course in I.N.S.A. de Lyon and take modules amounting to 60 credits from the third and fourth year curricula offered by the department corresponding to their chosen engineering specialty. This academic year is recognised as being equivalent to the fourth/B.A.I. year and, on its successful completion, students return to Trinity College Dublin to satisfactorily complete the fifth year of the M.A.I. degree course. Such students are eligible to be awarded with the B.A. and M.A.I. (St.) degrees. Subsequent to this students proceed directly to the fifth year of the engineering course in I.N.S.A. de Lyon returning to the department of their option to take a set of approved modules amounting to 60 credits. Upon successful completion of this additional year, students are eligible to be conferred with the Diplôme d'Ingénieur de l'I.N.S.A. de Lyon.

Inbound I.N.S.A. de Lyon students: A similar arrangement exists for engineering students of the I.N.S.A. de Lyon whereby suitably qualified candidates are admitted to the fourth year of the Trinity College Dublin engineering course and complete two years here taking modules from the engineering department corresponding to their chosen option in I.N.S.A. de Lyon. Following successful completion of these two years in Trinity College Dublin students are eligible to be awarded the M.A.I. degree. Such students return to the department of their option in I.N.S.A. de Lyon to satisfactorily complete the fifth year of their home course and to receive the Diplôme d'Ingénieur de l'I.N.S.A. de Lyon.

5 A number of additional options to study abroad with approved partner institutions are available as an integrated part of the teaching programme for students following the M.A.I. course. These options may be taken in the fourth year and include Erasmus (including CLUSTER), UNITECH (including internship) and non-E.U. exchange. Full details of available options are available from the Engineering School Office and on the website.

6 Students are encouraged to gain relevant industrial experience during the vacation periods. Formal industrial partnerships/internships with approved industry partners are also available as an integrated part of the teaching programme for students following the M.A.I. course. This option may be taken in the fourth year.

*Regulations*

7 As per College's GENERAL REGULATIONS AND INFORMATION, with the following additions for the Engineering and Engineering with Management courses:

Each year of the course carries 60 ECTS credits.

The pass mark in the first, second, third and fourth years of this programme is 40 per cent. The pass mark in fifth year (the master's year) of this programme is 50 per cent.

*(a)* Students must achieve a minimum of 60 per cent at the first attempt at the Junior Sophister assessment to be eligible to take the internship or study abroad in the Senior Sophister year.

*(b)* Senior Sophister students who are exiting with a B.A.I./B.Sc. degree must complete a capstone project. The internship project may be deemed to be equivalent to the capstone project upon consultation with the Director of Undergraduate Teaching and Learning and the relevant stream co-ordinator.

*(c)* Students who have failed at the first attempt of the Senior Sophister assessment may present at the reassessment session or, if they fail at the reassessment session, repeat the year in full in order to be eligible for the B.A.I./B.Sc. only.

*(d)* To be eligible to proceed to the fifth year of the M.A.I. programme, students in the Senior Sophister year must achieve a minimum overall B.A.I./B.Sc. mark of 60 per cent for the combined Junior Sophister and Senior Sophister years (on a 30:70[5] basis) at the first attempt at the annual assessment session of the B.A.I./B.Sc. degree year.

*(e)* The B.A.I./B.Sc. degree result, where awarded, will be calculated as a weighted average of the overall result achieved in the Junior Sophister year, contributing 30 per cent, and the Senior Sophister year, contributing 70 per cent.[5]

*(f)* Successful candidates at the M.A.I. examinations are awarded the degree of M.A.I. (St.) or of M.A.I. (St.) with distinction. A distinction shall require at least 70 per cent in both the examinations and the dissertation and at least 70 per cent in the final credit-weighted average mark.

*(g)* Students who have failed at the first attempt of the M.A.I. assessments may present at the reassessment session, or if they fail at the reassessment session, repeat the year in full.

*Conferring of degrees*

8 Students who exit the course having obtained credit for years one to four are entitled to the degrees of ordinary B.A. and B.A.I. Students admitted in 2016-17 onwards and who have obtained credit for all five years of the course are entitled to the degrees of ordinary B.A. and M.A.I. (St.). Students admitted prior to 2016-17 who have obtained credit for all five years of the course are entitled to be conferred with the degrees of ordinary B.A., B.A.I. and M.A.I. (St.). The degrees in each instance must be conferred at the same Commencements.

[5]For entrants prior to 2018-19 the combined mark from the Junior Sophister and Senior Sophister years was calculated on a 20:80 basis. Students who are required to repeat one or more years, or go off-books for one or more years, will normally have this mark calculated as a weighted average of the result of the Junior Sophister year, contributing 30 per cent, and the Senior Sophister year, contributing 70 per cent. This calculation is similarly applicable to the B.A.I./B.Sc. degree result, where awarded.

## DEGREES IN ENGINEERING WITH MANAGEMENT (B.Sc. (Ing.) or M.A.I. (St.))

*Introduction/overview*

9 Students complete a four-year course leading to a B.Sc. (Ing.) degree, and may elect to complete an additional year of study leading to a M.A.I. (St.) degree. There is provision for an abridgement of the course to three years.

10 Following completion of the fourth year of the engineering with management degree course, eligible students may elect to complete one further year of study leading to a M.A.I. (St.) degree.

11 Outbound Trinity College students: Students who successfully complete the third year of their engineering with management course in Trinity College Dublin and meet the selection criteria may enrol on the 'double diploma' programme run jointly with the Institut National des Sciences Appliquées (I.N.S.A.) de Lyon. Selected candidates are admitted to the third year of the engineering course in I.N.S.A. de Lyon and take modules amounting to 60 credits from relevant third and fourth year curricula. This academic year is recognised as being equivalent to the fourth/B.Sc. (Ing.) year and, on its successful completion, students return to Trinity College Dublin to satisfactorily complete the fifth year of the M.A.I. degree course. Such students are eligible to be awarded with the B.Sc. (Ing.) and M.A.I. (St.) degrees. Subsequent to this students proceed directly to the fifth year of the engineering course in I.N.S.A. de Lyon returning to the department of their option to take a set of approved modules amounting to 60 credits. Upon successful completion of this additional year, students are eligible to be conferred with the Diplôme d'Ingénieur de l'I.N.S.A. de Lyon.

12 Inbound I.N.S.A. de Lyon students: A similar arrangement exists for engineering students of the I.N.S.A. de Lyon, whereby suitably qualified candidates are admitted to the fourth year of the Trinity College Dublin engineering course and complete two years here taking modules from the engineering with management course. Following successful completion of these two years in Trinity College Dublin students are eligible to be awarded the M.A.I. degree. Such students return to the department of their option in I.N.S.A. de Lyon to satisfactorily complete the fifth year of their home course and to receive the Diplôme d'Ingénieur de l'I.N.S.A. de Lyon.

13 A number of additional options to study abroad with approved partner institutions are available as an integrated part of the teaching programme for students following the M.A.I. course. These options may be taken in the fourth year and include Erasmus (including CLUSTER), UNITECH (including internship) and non-E.U. exchange. Full details of available options are available from the Course Director and the website.

14 Students are encouraged to gain relevant industrial experience during vacation periods. Formal project internships with approved industry partners may also be available as an integrated part of the teaching programme for students following the M.A.I. course. This option may be taken in the fourth year.

*Regulations*

15 As §7 above.

16 Successful candidates at the M.A.I. examinations are awarded the degree of M.A.I. (St.) or of M.A.I. (St.) with distinction. Except by special recommendation of the court of examiners, the M.A.I. (St.) degree is awarded on the results of a student's end-of-semester fifth year M.A.I. examinations only. A distinction shall require at least 70 per cent in both the examinations and the dissertation and at least 70 per cent in the final credit-weighted average mark.

*Conferring of degrees*

17 Students who have obtained credit for years one to four are entitled to the degree of B.Sc. (Ing.). Students who have obtained credit for the fifth year are additionally entitled to the degree of M.A.I. (St.). All degrees must be conferred at the same Commencements.

## INTERNATIONAL ENGINEERING PROGRAMME (IN PARTNERSHIP WITH THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY)

18 Students admitted to the International Engineering Programme (IEP) will have successfully completed two years undergraduate study in Civil, Mechanical, Electronic and Electrical, Computer Engineering, or Electronic and Computer Engineering disciplines at the Thapar Institute of Engineering and Technology (TIET). Students follow the Junior Sophister and Senior Sophister degree years as prescribed in the School of Engineering undergraduate handbook. Progression rules for students in the Sophister years of the degree programme are the same as for students who enter the programme via the TR032 entry stream. On passing the Junior and Senior Sophister years, students will receive a B.A.I. in Engineering. Upon successful completion of this four year course of study, students may be eligible to pursue the fifth year integrated pathway and receive an M.A.I. degree, provided they meet the strict entry eligibility requirements.

### *Admission*

19 Students enrolled in the engineering degree course at TIET who have successfully completed the first two years of study and satisfied other requirements are eligible to apply for admission. The application procedure and all entry requirements stipulated by the articulation agreement between TIET and Trinity College Dublin are described in the School of Engineering undergraduate handbook and on its website.

## PARTNERSHIP WITH UNIVERSITY OF MICHIGAN-SHANGHAI JIAO TONG UNIVERSITY JOINT INSTITUTE (UM-SJTU JOINT INSTITUTE)

20 UM-SJTU Joint Institute students who have successfully completed three years in UM-SJTU Joint Institute, have completed specified pre-requisites, and have secured a CGPA of at least 3.3 or equivalent over three years, and have an IELTS score of at least 6.5, with no individual band of less than 6.0, or TOEFL IBT scores: 88 internet-based, 570 paper-based, 230 computer-based or equivalent, are eligible for consideration for advanced entry into the Senior Sophister year of the mechanical and manufacturing or electronic/computer engineering streams.

Students follow the Senior Sophister and M.A.I. degree years as prescribed in the School of Engineering undergraduate handbook, returning to UM-SJTU Joint Institute for a semester in the summer preceeding the M.A.I. The M.A.I. progression rules for UM-SJTU Joint Institute students are the same as for students who enter the programme via the TR032 entry stream.

On successful completion of the Senior Sophister and M.A.I. years, the student will be awarded the M.A.I. (St.). Students will also be awarded the B.Sc. in Mechanical Engineering or the B.Sc. in Electrical and Computer Engineering, as appropriate, provided they successfully complete all requirements of the UM-SJTU Joint Institute programme (the B.Sc. award is solely the responsibility of UM-SJTU Joint Institute).

### *Admission*

21 Students who have successfully completed three years in UM-SJTU Joint Institute and have satisfied other requirements are eligible to apply for admission. The application procedure and all entry requirements stipulated by the articulation agreement between UM-SJTU Joint Institute and Trinity College Dublin are described in the School of Engineering undergraduate handbook and on its website.

## PARTNERSHIP WITH MANIPAL UNIVERSITY, INTERNATIONAL CENTRE FOR APPLIED SCIENCES

22 Manipal University, International Centre for Applied Sciences (ICAS) students who have successfully completed two years in ICAS, have completed specified pre-requisites, and have secured a CGPA of at least 3.2 or equivalent over two years are eligible for consideration for advanced entry into the engineering programme at Trinity College Dublin. English language requirements are waived for ICAS students. Students who are deemed eligible under the terms of

this agreement will enter into year 3 of the civil, structural and environmental engineering or mechanical and manufacturing engineering or electronic engineering or electronic and computer engineering or computer engineering strands of the engineering programme at Trinity College Dublin. On successful completion of years 3 and 4 of the Trinity engineering programme, students will be eligible for the ordinary B.A. and B.A.I. awards from Trinity College Dublin, The University of Dublin, if they leave at that point. On successful progression into and completion of year 5 of the Trinity engineering programme, the student will instead be eligible for the ordinary B.A. and M.A.I. (St.) awards from Trinity College Dublin, The University of Dublin. Those awarded the M.A.I. (St.) are not eligible to receive the B.A.I. All ICAS students who gain entry to year 3 of the programme are subject to the progression requirements and the general regulations of Trinity College Dublin, the University of Dublin, as standard.

*Admission*

23 Students who have successfully completed the first two years of study in ICAS and have satisfied other requirements are eligible to apply for admission. The application procedure and all entry requirements stipulated by the articulation agreement between ICAS and Trinity College Dublin are described in the School of Engineering undergraduate handbook and on its website.

## *IV SCHOOL OF MATHEMATICS*

1 The School of Mathematics offers a degree course in mathematics. This programme consists of lectures and tutorials in mathematics and its applications.

2 The School of Mathematics in conjunction with the School of Physics offers a degree course in theoretical physics. This is an integrated programme of study consisting of lectures and tutorials in mathematics and physics together with experimental work in physics.

3 For students entering prior to 2019-20, mathematics may also be studied as a component of a two-subject moderatorship course in combination with another subject.

4 For students entering from 2019-20, mathematics may also be studied as a component of the Trinity joint honours programme.

*Rowe Fund Library*

5 Members of the Dublin University Mathematical Society have the use of a mathematical library in the society's rooms in addition to the College library.

### MODERATORSHIP IN MATHEMATICS

*Introduction/overview*

6 The moderatorship in mathematics offers instruction in pure mathematics (algebra, analysis, geometry) and applications of mathematics, including those to theoretical physics and statistics. The material is delivered through lectures and tutorials. In the Freshman years, students are taught core topics in mathematics and its applications. In the Sophister years, students take modules in advanced topics, and also undertake an independent research project.

*Regulations*

7 See GENERAL REGULATIONS AND INFORMATION and handbook of the School of Mathematics for information on regulations and available modules. Each course year carries 60 ECTS credits. The pass mark for this course is 40 per cent.

*Moderatorship, Part I*

8 The results of the Junior Sophister year constitute Moderatorship, Part I and contribute 30 per cent toward the final award.

*Moderatorship, Part II*

9 The results of the Senior Sophister year constitute Moderatorship, Part II and contribute 70 per cent toward the final award.

10 Students who entered prior to 2019-20 and have repeated one or more years, or have spent time off-books, will normally have their degree result calculated as above.

*Award*

11 Depending upon student choices made within their programme of study it is possible to confer with a Bachelor in Arts (Moderatorship) award in one of the following categories:

Single honours

Major with minor

## MODERATORSHIP IN THEORETICAL PHYSICS

*Introduction/overview*

12 The moderatorship in theoretical physics is taught jointly by the School of Mathematics and the School of Physics, and is professionally accredited by the Institute of Physics. Students study the core concepts of physics and mathematics, including mechanics, quantum physics, electrodynamics, elementary particle physics, and gravitation. The programme consists of classroom lectures, tutorials and laboratory work.

In Junior Freshman year, students are taught some of the core topics of the course; they take 40 credits of modules taught by the School of Mathematics and 20 credits of modules taught by the School of Physics. In Senior Freshman year, students take further modules in core topics of theoretical physics. In Sophister years, students take modules in advanced topics, and also undertake an independent research project in one of the schools.

*Regulations*

13 See GENERAL REGULATIONS AND INFORMATION and handbooks of the School of Mathematics and the School of Physics for information on regulations and available modules. Each course year carries 60 ECTS credits. The pass mark for this course is 40 per cent.

*Moderatorship, Part I*

14 The results of the Junior Sophister year constitute Moderatorship, Part I and contribute 30 per cent toward the final award.

*Moderatorship, Part II*

15 The results of the Senior Sophister year constitute Moderatorship, Part II and contribute 70 per cent toward the final award.

16 Students who entered prior to 2019-20 and have repeated one or more years, or have spent time off-books, will normally have their degree result calculated as above.

*Award*

17 Bachelor in Arts (Moderatorship).

*Transfer of course*

18 Students may apply through their tutor to transfer from the honour course in theoretical physics to the honour course in mathematics not later than the beginning of the Senior Sophister year.

Sophister students in theoretical physics may apply through their tutor to transfer to the honour course in physics (see COURSES IN SCIENCE, section V), not later than the beginning of the Senior Sophister year.

Each request to transfer is considered by the heads of school concerned, who will then make recommendations to the Senior Lecturer. All transfers are subject to general College regulations (see GENERAL REGULATIONS AND INFORMATION).

## MODERATORSHIP IN MATHEMATICS
## (DUAL B.A. DEGREE PROGRAMME WITH COLUMBIA UNIVERSITY)

*Introduction/overview*

19 The dual degree programme combines the course in mathematics with the liberal arts programme offered by the School of General Studies at Columbia University. The Junior and Senior Freshman years are taught in Trinity College, and students study the two Sophister years at Columbia University, New York. In the Freshman years students are taught core topics in mathematics such as algebra and analysis as well as applied topics such as mechanics, statistics and programming. Junior Freshman students take modules to the value of 50 credits in mathematics, and the remaining 10 credits are taken in humanities, social science or modern language modules. Senior Freshman students take modules worth 40 credits in mathematics, with the remaining 20 credits comprised of 10 credits in modern language modules and 10 credits taken from electives. In the final two years at Columbia, students are offered a range of modules, determined by their declared major at Columbia.

In addition, students must continue to take modules in other subjects, according to the requirements of Columbia University. During the Sophister years students will additionally take 30 credits of Trinity modules including a 20 credit capstone project in the Senior Sophister year.

20 Students in the dual degree course will have the possibility of declaring a major at Columbia in any one of the following programmes: (i) Mathematics, (ii) Applied Mathematics, (iii) Computer Science-Mathematics, (iv) Mathematics-Statistics, (v) Economics-Mathematics.

*Admission*

21 For E.U. students, the C.A.O. requirements for the standard mathematics course apply. Additional application materials are required and each applicant is interviewed. For non-E.U. students, minimum College requirements apply, plus applicants must submit additional application materials and undergo an interview.

*Regulations*

22 Students register with both institutions in all four years of the course. In the first two years students are bound by Trinity's regulations, policies and procedures and in the final two years by those applicable in Columbia. Trinity's regulations, policies and procedures will also apply to the additional modules required by Trinity (30 credits) in the final two years. Students are required to familiarise themselves with both institutions' regulations. See GENERAL REGULATIONS AND INFORMATION for further information.

*Credits and assessment*

23 The ECTS value of each year of the course is as follows: Junior Freshman 60 credits; Senior Freshman 60 credits; Junior Sophister and Senior Sophister 30 credits from Trinity as well as a minimum of 64 credits from Columbia.

To meet Columbia's degree requirements, students must attain a minimum of 40 per cent in each module taken at Freshman level in order for these to count as credit towards the Columbia core. The range of subjects to be studied in the Sophister years of study at Columbia depends on the student's selection of a 'major' subject of study. The Senior Sophister year allows students to develop their research skills by carrying out a significant capstone project. Students must take any remaining elements of the 'Columbia core' not completed during their Freshman years at Trinity within their final two years at Columbia. Students must pass a minimum of 64 credit points for Columbia during their final two years, complete the requirements of the 'Columbia core' and complete the requirements of their 'major' subject of study.

*Moderatorship*

24 Moderatorship is calculated by combining the aggregate mark from the final year at Columbia (best 32 Columbia credits) with the aggregate mark from the additional modules required by Trinity (30 ECTS) on an equal basis.

*Award*

25 Bachelor in Arts (Moderatorship) will be conferred with:

Single honours

## *V COURSES IN SCIENCE*

1 The following courses are available:

TR060 Biological and biomedical sciences
TR061 Chemical sciences
TR062 Geography and geoscience
TR063 Physical sciences
TR031 Mathematics (see SCHOOL OF MATHEMATICS, section IV, §6)
TR035 Theoretical physics (see SCHOOL OF MATHEMATICS, section IV, §12)

### TR060 Biological and biomedical sciences

*Introduction/overview*

2 This course is the pathway for entry into the biological and biomedical sciences, leading to moderatorships in biochemistry, botany, environmental sciences, genetics, human genetics, immunology, microbiology, molecular medicine, neuroscience, physiology and zoology.

### TR061 Chemical sciences

*Introduction/overview*

3 In the chemical sciences course, students will study the core concepts that are fundamental to all of chemistry including topics in physical, organic and inorganic chemistry. Moderatorship subjects will be available in chemistry, chemistry with biosciences, chemistry with molecular modelling, medicinal chemistry and nanoscience.

### TR062 Geography and geoscience

*Introduction/overview*

4 The geography and geoscience degree programme is the pathway for entry to the study of geography, geology and geoscience (geology and physical geography). Moderatorships subjects will be available in geography and geoscience.

### TR063 Physical sciences

*Introduction/overview*

5 In the physical sciences course, students will study the core concepts that are fundamental to all of physics with the opportunity to choose between the available moderatorship subjects of physics, physics and astrophysics, and nanoscience. Students wishing to specialise in nanoscience are required to select chemistry (20 credits) as approved options.

6 Moderatorship options in TR060 are as listed in §2 above; in TR061 are as listed in §3 above, in TR062 as listed in §4 above and in TR063 are as listed in §5 above.

7 The Freshman modules are intended to provide both a training in general science and an introduction to the moderatorship subject. In the Junior Sophister year students will work primarily in the moderatorship subject but can take a selection of related modules offered by other schools or departments. All students wishing to proceed to moderatorship in any one of the subjects specified in §2, §3, §4 and §5 above are required to complete satisfactorily the Freshman modules in science except by decision of the Associate Dean of Undergraduate Science Education.[6]

*Regulations*

8 See GENERAL REGULATIONS AND INFORMATION. Each course year carries 60 ECTS credits. The pass mark for these courses is 40 per cent.

9 After the publication of Senior Freshman examination results each year, all successful students compete for moderatorship places. Admission to each moderatorship is based on overall examination results in rank order and are limited by a quota established annually by reference to the teaching resources available to each school or department. To be qualified for a given moderatorship, students must have completed satisfactorily both Freshman years and must have read the stated prerequisite modules as set out in in the programme handbook for any moderatorship for which they wish to be considered. Students who have not completed the prerequisites for a given moderatorship may still be considered for that moderatorship if places are available.

*Moderatorship examination*

10 The Junior and Senior Sophister examinations constitute part I and part II of the moderatorship examination.

11 The final moderatorship result is calculated by aggregating the Junior and Senior Sophister examination results as per Table I.

**TABLE I** — CALCULATION OF MODERATORSHIP RESULTS

| **TR060** | **Biological and biomedical sciences** |
|---|---|
| **Moderatorship** | |
| Biochemistry | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Botany | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Environmental sciences | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Genetics | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Human genetics | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Immunology | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Microbiology | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Molecular medicine | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Neuroscience | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Physiology | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Zoology | Junior Sophister 30 per cent, Senior Sophister 70 per cent |

[6]See GENERAL REGULATIONS AND INFORMATION, 'Advanced entry'.

| TR061 | Chemical sciences |
|---|---|
| **Moderatorship** | |
| Chemistry | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Chemistry with biosciences | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Chemistry with molecular modelling | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Medicinal chemistry | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Nanoscience | Junior Sophister 30 per cent, Senior Sophister 70 per cent |

| TR062 | Geography and geoscience |
|---|---|
| **Moderatorship** | |
| Geography | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Geoscience | Junior Sophister 30 per cent, Senior Sophister 70 per cent |

| TR063 | Physical sciences |
|---|---|
| **Moderatorship** | |
| Nanoscience | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Physics | Junior Sophister 30 per cent, Senior Sophister 70 per cent |
| Physics and astrophysics | Junior Sophister 30 per cent, Senior Sophister 70 per cent |

Students who entered prior to 2018-19 and have repeated one or more years, or have spent time off-books, will normally have their degree result calculated as above.

**Sophister courses**

12 Sophister courses in science are organised so that students follow a continuous programme of study over two years leading to a moderatorship in a particular subject. Students will be required to take modules carrying 60 credits in each year.

A *'Sophister course programme'* is published annually and is available to students in Hilary term each year from the Science Course Office.

**TR060 moderatorships**

BIOCHEMISTRY

Biochemistry is a moderatorship course offered by the School of Biochemistry and Immunology. The focus is on understanding how living cells function at a molecular and cellular level. It encompasses a wide range of topics such as cancer biology, stem cell biology, immunology, neurobiology, developmental biology and drug discovery.

BOTANY

Teaching in botany is research led and focuses on the areas of ecology, systematics and conservation and whole plant physiology. Extensive use is made of the notable departmental herbarium and the College Botanic Garden. In the Junior Sophister year, subject to resources being available, one of the field courses will take place in the Canary Islands. The moderatorship aims to produce graduates equipped with a range of subject-specific and transferable skills

## ENVIRONMENTAL SCIENCES

Environmental sciences is a multidisciplinary subject which focuses on understanding and mitigating the impact of human populations on natural systems and processes. This requires the integration of physical and life sciences, engineering, economics and social sciences. The moderatorship course at Trinity College Dublin adopts this multidisciplinary ethos. The course is delivered through the collaboration of all disciplines in the School of Natural Sciences (Botany, Geography, Geology, and Zoology), the School of Engineering and other participating disciplines.

## GENETICS

The teaching and research activities of the Genetics Department are in the areas of molecular, human, population and quantitative genetics and evolution. The Junior Sophister modules are designed to prepare for, and to introduce, advanced material from these and other related areas of genetics. Central genetics modules cover the basic processes of inheritance and gene expression, and genome structure and evolution, in man and other animals, plants, bacteria and viruses. The modules in molecular genetics depend heavily on the theory and techniques of genetic engineering while those in molecular evolution, population and quantitative genetics introduce students to computing and computer programming.

## HUMAN GENETICS

Students may opt to take a moderatorship in human genetics offered by the School of Genetics and Microbiology. Human genetics is a rapidly growing field that has been revolutionised by genetic engineering, genome sequencing, transgenic techniques and gene editing, among other technologies. Data emerging from the Human Genome Project and other large initiatives has resulted in an explosion in knowledge of medical genetics including the molecular basis of many inherited disorders, the explanation of some cancers as acquired genetic diseases, study of molecular evolution and the genetic history of humans, and application of DNA identification in forensic science, among others. Modules cover core concepts required for human genetics.

## IMMUNOLOGY

Students may opt to take a moderatorship in immunology offered by the School of Biochemistry and Immunology. The immunology modules in the Junior Sophister year are core concepts in immunology, and immunology and disease (including bacterial, viral and parasitic diseases, autoimmune diseases, allergy and asthma, cancer and transplantation).

## MICROBIOLOGY

Microbiology is the branch of biological science that deals with microorganisms – bacteria, protozoa, fungi (moulds and yeasts), and viruses. Microbiology is central to modern biomedical science, the agri-food industry and to studies of the environment. It is also an emerging force in bioenergy and systems biology. Students are introduced to the microbial sciences in their Freshman microbiology modules before specialising in microbiology in the Sophister years.

## MOLECULAR MEDICINE

Molecular medicine is a moderatorship run jointly by the School of Biochemistry and Immunology and the School of Medicine. This option has been introduced to recognise the revolutionary advances in disease diagnosis, therapy and prevention brought about by bio-molecular research and aims to demonstrate how basic science is translated into clinical treatment.

## NEUROSCIENCE

Neuroscience is a discipline devoted to the scientific study of the nervous system in health and disease, and is at the interface between neurobiology and cognitive science. It includes study of the nature and functioning of the nervous system at all levels, from the molecules that make up

individual nerve cells, to the complexities of how behaviour, thoughts and emotions are produced. Neuroscience is a multidisciplinary area of investigation that makes use of a variety of methods and investigations from a wide range of traditional disciplines.

PHYSIOLOGY

Physiology is the study of how cells work, how they co-operate in organs like the heart or brain and how the operation of these organs is integrated. The moderatorship in physiology provides students with an in-depth understanding of mammalian body function from the molecular level to that of the whole organism, with especial emphasis on human physiology in health and disease.

To be eligible to enter the physiology moderatorship, students must have successfully completed the prerequisite Senior Freshman modules, which provide an introduction to the nervous (brain and spinal cord), cardiovascular (blood circulation), respiratory (lungs), gastrointestinal (digestion), excretory (kidneys) and endocrine (hormones) systems, as well as fundamentals of biochemistry and genetics. The Sophister years build on this introduction to provide a detailed functional understanding of cells and of organ systems, together with training in scientific methodology, experimental design and data analysis. Areas of physiology which reflect major research interests of the department include cell physiology, neuroscience and exercise physiology.

ZOOLOGY

Zoology offers Sophister students training in many areas of the biology of animal systems emphasising particularly those aspects that relate to ecology, conservation and wildlife biology, parasitology, marine biology, developmental biology and behaviour. The Junior Sophister course highlights the major concerns of modern zoology and introduces the student to the full range of zoological interests, from the evolutionary origins of biodiversity and ecological system services to the genetic basis of development in embryos. The Senior Sophister course offers choices of tutorial module topics to allow the student to tailor their course to their interests and complement their research project.

**TR061 moderatorships**

CHEMISTRY

Junior Sophisters take modules in organic, inorganic, physical, analytical and biological/polymer chemistry and those on the chemistry with biosciences course will also take several relevant biosciences modules. Further topics, including computational and medicinal chemistry may be provided in an optional module. The modules provided cover topics such as organic mechanisms and synthetic methods, heterocyclics, organometallic C-C couplings, pericyclic reactions, organoheteroatom chemistry, physical organic chemistry, retrosynthesis, bio-organic chemistry including natural products, amino acids and peptides, organic and inorganic polymers, group theory, spectroscopy and other physical methods, quantum chemistry and statistical mechanics, advanced thermodynamics and kinetics, coordination chemistry, solid state chemistry, structural inorganic chemistry and related characterisation techniques, properties of soft matter, bio-inorganic chemistry, organometallics, catalysis and surface chemistry, electrochemistry, analytical chemistry, metal compounds in the environment, drug design and clusters. Lectures are complemented by practical classes in inorganic, organic, physical and computational chemistry; and by an introduction to advanced preparative methods and instrumental techniques, including computer-controlled equipment.

CHEMISTRY WITH BIOSCIENCES

The moderatorship in chemistry with biosciences allows students to obtain a core chemistry degree with a solid grounding in biology, allowing them to work at the interface of these disciplines addressing global issues in areas such as drug development and safety, biomedicine, biotechnology and clinical operations. Graduates of this moderatorship will be prepared for careers as professional chemists, or in the biological sciences, including the biomedical,

biotechnology, and pharmaceutical industries. Biologics, including antibody-drug conjugates, peptide, protein and siRNA therapies have increased steadily to forty per cent of new drug approvals in recent years. Students with a deep understanding of chemistry and knowledge of biosciences will be ideally placed to work in this key growth industry. This unique multidisciplinary moderatorship will also prepare students excellently for postgraduate studies in frontier areas of chemistry and biology and careers in teaching in chemistry and biology. The degree is awarded under the regulations of the science course.

#### CHEMISTRY WITH MOLECULAR MODELLING

The moderatorship in chemistry with molecular modelling allows students to obtain a core chemistry degree while specialising in the theoretical and applied aspects of molecular modelling, from materials chemistry to computational drug design. The degree is awarded under the regulations of the science course.

#### MEDICINAL CHEMISTRY

The moderatorship in medicinal chemistry is especially attuned to the development of the creative talent needed by the major enterprise that is the modern pharmaceutical industry, one of the largest and fastest-growing business sectors in the modern world. The medicinal chemistry degree provides a sound general grounding in chemistry but focuses on, and extends into, topics of relevance to the design, synthesis and biological evaluation of new medicinal compounds. The degree is awarded under the regulations of the science course.

#### NANOSCIENCE

The moderatorship course in nanoscience allows students to specialise in nanoscience at an advanced level during their undergraduate careers due to the combination of modules and practical experience offered by the Schools of Physics and Chemistry.

The course shares many lectures with those given for the moderatorships in chemistry and in physics, and also provides some specialist advanced nanoscience and materials laboratory practicals that emphasise nanoscience. Students with this combination are ideally placed for careers in the nano- and information-technology sectors and are well placed for higher degrees in nanomaterials research. The degree is awarded under the regulations of the science course.

Nanotechnology is being used to develop smaller and more powerful electronic devices, lasers and other photonic devices, medical diagnostics and materials with new properties. The interdisciplinary nature of the moderatorship in nanoscience, which involves both the physics and chemistry of advanced materials, gives graduates a broad scientific education that is ideal for careers in the nano- and information-technology sectors as well as an excellent starting point for higher degrees in nanomaterials research.

### TR062 moderatorships

#### GEOGRAPHY

Geography explores the natural world and our place within it. Interdisciplinary by nature, geography students investigate how natural systems function, how they change through time, how a changing environment impacts on communities and societies and how the latter, in turn, impact on the environment. Geographers integrate the wider natural sciences to explore the causes and consequences of phenomena such as climate change, natural hazards, shifting land use, and changing sea levels, critical topics in a fast-changing world. The geography moderatorship provides students with a wide array of practical skills, strengthening their ability to think critically and to apply their experiences to solve real-world problems.

#### GEOSCIENCE

Geoscience is the science of how the Earth works. It combines topics in physical geography and geology to develop a holistic understanding of the processes that have shaped our planet from its formation to the present day. Sophister students study subjects drawn from across the

School of Natural Sciences including: biogeoscience; climate (past, present and future); energy and resources; geomorphology; geochemistry, mineralogy, petrology and volcanology; natural hazards; ocean science; stratigraphy, sedimentology and palaeontology; soil system science; tectonics and structural geology. In addition to classroom lectures, students receive hands-on practical experience in the laboratory, as well as participating in residential field courses. Full details of the Junior Sophister and Senior Sophister years can be found in the TR062 sophister course handbook.

**TR063 moderatorships**

PHYSICS

The moderatorship in physics is taught within the School of Physics and is professionally accredited by the Institute of Physics. Students study the core concepts of physics, as well as advanced physics topics drawn from research areas within the School. Tuition will consist of lectures, practical work, tutorials and seminars in advanced physics and includes a capstone research project in the Senior Sophister year.

Full details of the Junior Sophister and Senior Sophister years can be found in the Physical Sciences course handbook and/or the School of Physics undergraduate handbook.

PHYSICS AND ASTROPHYSICS

The moderatorship in physics and astrophysics is taught within the School of Physics and is professionally accredited by the Institute of Physics. Students study the core concepts of physics and astrophysics, covering the basic physics curriculum as well as advanced topics in astrophysics. Tuition will consist of lectures, practical work, tutorials and seminars in advanced physics and astrophysics and includes a capstone research project in the Senior Sophister year.

Full details of the Junior Sophister and Senior Sophister years can be found in the Physical Sciences course handbook and/or the School of Physics undergraduate handbook.

NANOSCIENCE

The moderatorship course in nanoscience allows students to specialise in nanoscience at an advanced level during their undergraduate careers due to the combination of modules and practical experience offered by the Schools of Physics and Chemistry.

The course shares many lectures with those given for the moderatorships in chemistry and in physics, and also provides some specialist advanced nanoscience and materials laboratory practicals that emphasise nanoscience. Students with this combination are ideally placed for careers in the nano- and information-technology sectors and are well placed for higher degrees in nanomaterials research.The degree is awarded under the regulations of the science course.

Nanotechnology is being used to develop smaller and more powerful electronic devices, lasers and other photonic devices, medical diagnostics and materials with new properties. The interdisciplinary nature of the moderatorship in nanoscience, which involves both the physics and chemistry of advanced materials, gives graduates a broad scientific education that is ideal for careers in the nano- and information-technology sectors as well as an excellent starting point for higher degrees in nanomaterials research.

MODERATORSHIP IN PHYSICS
(IN CONJUNCTION WITH THE UNIVERSITY OF SCIENCE AND TECHNOLOGY BEIJING)

13 Students admitted to this degree programme will have successfully completed the first two years of undergraduate study in physics at the University of Science and Technology Beijing (USTB) and enter the Junior Sophister year of the physics degree programme in Trinity College Dublin. Students follow the Junior and Senior Sophister years of the physics degree as prescribed in the School of Physics undergraduate handbook. Progression rules for students in the Sophister years of the degree programme are the same as for students who enter the programme via the TR063 entry stream.

*Moderatorship, Part I*

14 The results of the Junior Sophister year constitute Moderatorship, Part I and contribute 30 per cent toward the final award.

*Moderatorship, Part II*

15 The results of the Senior Sophister year constitute Moderatorship, Part II and contribute 70 per cent toward the final award.

*Award*

16 Bachelor in Arts (Moderatorship).

## MODERATORSHIP IN GEOSCIENCE (DUAL B.A. DEGREE PROGRAMME WITH COLUMBIA UNIVERSITY)

17 The Junior and Senior Freshman years are taught in Trinity College, and students study the two Sophister years at Columbia University, New York. In the Freshman years, students are offered a range of modules in geography and geoscience.

18 Each of the first two years of the course carries 60 ECTS credits. In the last two years of the course students must take a minimum of 64 Columbia credit points, across the two years (equivalent to 120 ECTS), and a total of an additional 30 ECTS credits of Trinity modules.

19 Students register with both institutions in all four years of the course. In the first two years students are bound by Trinity's regulations, policies and procedures and in the final two years by those applicable in Columbia. Trinity's regulations, policies and procedures will also apply to the additional modules required by Trinity (30 ECTS). Students are required to familiarise themselves with both institutions' regulations.

20 Students at all levels must attend all the lectures, tutorial and laboratory classes.

21 Trinity's progression regulations are applicable in the first two years of the programme. The pass mark for Trinity elements of the course is 40 per cent. For modules to be recognised by Columbia towards its degree requirements, students must achieve a mark of at least 40 per cent in each module.

22 For the award of dual degrees, students must satisfy the regulations of both Columbia University and Trinity College. For Trinity's purposes the moderatorship is calculated by combining the aggregate mark from the final year at Columbia (best 32 credits) with the aggregate mark from the additional Sophister modules, required by Trinity (30 ECTS), on an equal basis.

23 Assessed coursework forms a component of the examinations for students at Freshman and Sophister levels. Each element of coursework for a Trinity module must conform to the requirements set out in the course handbook and must be submitted electronically by the date specified therein. No coursework will be accepted for the moderatorship examination unless credit has been obtained for the preceding coursework required for the module concerned. The late submission of assessed work will be penalised. Details of penalties for late submission are given in the relevant course handbook. Columbia modules are regulated by Columbia University.

*Award*

24 Bachelor in Arts (Moderatorship).

## MODERATORSHIP IN NEUROSCIENCE (DUAL B.A. DEGREE PROGRAMME WITH COLUMBIA UNIVERSITY)

25 The Junior and Senior Freshman years are taught in Trinity College, and students study the two Sophister years at Columbia University, New York.

26 Each of the first two years of the course carries 60 ECTS credits. In the last two years of the course students must take a minimum of 64 Columbia credit points across the two years, and a total of an additional 30 ECTS credits of Trinity modules.

27 Students register with both institutions in all four years of the course. In the first two years students are bound by Trinity's regulations, policies and procedures and in the final two years by those applicable in Columbia. Trinity's regulations, policies and procedures will also apply to the additional modules required by Trinity (30 ECTS). Students are required to familiarise themselves with both institutions' regulations.

28 Students at all levels must attend all the lectures, tutorial and laboratory classes.

29 Trinity's progression regulations are applicable in the first two years of the programme. The pass mark for Trinity elements of the course is 40 per cent. For modules to be recognised by Columbia towards its degree requirements, students must achieve a mark of at least 40 per cent in each module.

30 For the award of dual degrees, students must satisfy the regulations of both Columbia University and Trinity College. For Trinity's purposes the moderatorship is calculated by combining the aggregate mark from the final year at Columbia (best 32 credits) with the aggregate mark from the additional Sophister modules, required by Trinity (30 ECTS), on an equal basis.

31 Assessed coursework forms a component of the examinations for students at Freshman and Sophister levels. Each element of coursework for a Trinity module must conform to the requirements set out in the course handbook and must be submitted electronically by the date specified therein. No coursework will be accepted for the moderatorship examination unless credit has been obtained for the preceding coursework required for the module concerned. The late submission of assessed work will be penalised. Details of penalties for late submission are given in the relevant course handbook. Columbia modules are regulated by Columbia University.

*Award*

32 Bachelor in Arts (Moderatorship).

MODERATORSHIP IN POLITICAL SCIENCE AND GEOGRAPHY

33 For details see FACULTY OF ARTS, HUMANITIES AND SOCIAL SCIENCES.

BACHELOR IN SCIENCE (HUMAN HEALTH AND DISEASE)

34 For details see FACULTY OF HEALTH SCIENCES.

## *VI E3[7] COURSE IN ENVIRONMENTAL SCIENCE AND ENGINEERING*

DEGREES OF BACHELOR IN SCIENCE (ENVIRONMENTAL ENGINEERING)[8] AND MASTER IN ENGINEERING (STUDIES) (M.A.I. (St.)) or BACHELOR IN SCIENCE (APPLIED ENVIRONMENTAL SCIENCE)[8] and MASTER IN APPLIED ENVIRONMENTAL SCIENCE[8]

*Introduction/overview*

1 Environmental science and engineering is an inter-disciplinary course that bridges the disciplines of engineering and the natural sciences (botany, geology, geography and zoology). It provides a critical foundation for understanding environmental challenges from the global to local scale and focuses on developing solutions which will enable human populations to live and use Earth's resources more sustainably. The environmental science and engineering course

[7]Engineering, Environment and Emerging Technologies.

[8]Degree titles to be approved.

integrates modules from the Schools of Natural Sciences and Engineering. It includes laboratory, lecture and field teaching.

2 Students complete an integrated five-year course consisting of four years leading to the appropriate B.Sc. degree plus an additional year of study leading to a M.A.I. (St.) or Master in Applied Environmental Science.

3 During the first three years a balanced and integrated programme of modules in environmental science and engineering is provided. Following completion of the first three years of the course, students elect to study specialised programmes in one of the following strands:

Environmental engineering

This strand of the environmental science and engineering course places stronger emphasis on modules and project work in the discipline of engineering in years 4 and 5.

Applied environmental science

This strand of the environmental science and engineering course places stronger emphasis on modules and project work in the discipline of environmental sciences in years 4 and 5.

Following completion of the fourth year of the environmental science and engineering degree course, eligible students may elect to complete one further year of study in their chosen strand leading to a M.A.I. (St.) or Master in Applied Environmental Science degree.

4 While every effort is made to allow students to study the strand/specialism they choose, the course committee reserves the right to allocate the available places. Timetable constraints may also reduce the number of module options available.

The rules for streaming (into environmental engineering or applied environmental science) are as follows:

In year 3: two out of the three optional modules available must be modules associated with the student's chosen stream.

In year 4: if taking the 30 ECTS credit industry internship or international exchange, this must be in the chosen stream. If spending the full year in Trinity, students must take the capstone project module which aligns with their chosen stream, in addition to at least two optional modules associated with their chosen stream.

Year 5: students must take the independent research project module which aligns with their chosen stream in addition to at least three optional modules associated with their chosen stream.

5 Outbound Trinity College students: Students who successfully complete the third year of their environmental science and engineering course in Trinity College Dublin and meet the selection criteria may enroll to study abroad with approved partner institutions as an integrated part of the teaching programme for students who are following the full five-year course. These options may be taken in the fourth year and include Erasmus, UNITECH (as a paid industrial partnership) and CLUSTER. Full details of available options are available from the School of Engineering and School of Natural Sciences offices and on their websites.

6 Students are encouraged to gain relevant work experience during the vacation periods. Formal industrial partnerships/internships with approved industry, government and environmental policy partners are also available as an integrated part of the teaching programme for students who are following the full five-year course. This option may be taken in the fourth year.

7 A capstone project is undertaken by all students who spend all of year 4 in Trinity College.

8 An independent research project is conducted in year 5 by all students.

*Regulations*

9 As per College's GENERAL REGULATIONS AND INFORMATION, with the following additions for the environmental science and engineering course:

*(a)* Students must achieve a minimum of 60 per cent at the first attempt at the Junior Sophister assessment in order to be eligible to take the internship or study abroad in the Senior Sophister year.

*(b)* Senior Sophister students who are exiting with a B.Sc. degree must complete a capstone project.

*(c)* Students who have failed at the first attempt of the Senior Sophister assessment may present at the reassessment session or, if they fail at the reassessment session, repeat the year in order to be eligible for the relevant B.Sc degree.

*(d)* To be eligible to proceed to the fifth year of the programme, students must achieve a minimum overall mark of 60 per cent for the combined Junior Sophister and Senior Sophister years (on a 30:70 basis) at the annual assessment session of the Senior Sophister year.

*(e)* Successful candidates at the end of the fifth year are awarded the degree of M.A.I. (St.)/ Master in Applied Environmental Science or of M.A.I. (St.)/Master in Applied Environmental Science with distinction, as applicable. The M.A.I. (St.)/Master in Applied Environmnetal Science degree is awarded on the results of a student's end-of-semester fifth year continuous assessment and examinations. A distinction shall require at least 70 per cent in both the examinations and the dissertation and at least 70 per cent in the final credit-weighted average mark.