Faculty of Engineering and Systems Sciences

I GENERAL FACULTY REGULATIONS[1]

Degrees

1 The faculty provides courses leading to the following degrees:

(a) COMPUTER SCIENCE

Bachelor in Arts (Moderatorships in Computer Science, in Computer Science, Linguistics and a Language, and in Information and Communications Technology (B.A. with honors)), Bachelor in Science (B.Sc.(Comp.)) (evening course), Bachelor in Science (Information Systems) (B.Sc. (Syst. Inf.)) (evening course), Bachelor in Science (Business and Information Technology) (B.Sc. (Bus. and Inf. Tech.)) (evening course), see II below; Master in Science (M.Sc.), see PART 2 OF THE CALENDAR — GRADUATE STUDIES AND HIGHER DEGREES.

(b) ENGINEERING SCIENCE

Bachelor in Arts and Bachelor in Engineering (B.A., B.A.I.), Bachelor in Science (Engineering) (B.Sc. (Ing.)), see III below; Master in Engineering (M.A.I.), Master in Science (M.Sc.) and Master in Philosophy in Music and Media Technologies (M.Phil.), see PART 2 OF THE CALENDAR — GRADUATE STUDIES AND HIGHER DEGREES.

(c) SYSTEMS AND DATA STUDIES

Bachelor in Arts (Moderatorship in Management Science and Information Systems Studies (B.A. with honors)), see IV below; Master in Science (M.Sc.), see PART 2 OF THE CALENDAR — GRADUATE STUDIES AND HIGHER DEGREES.

The degrees of M.Sc. and Ph.D. may be awarded on the basis of research undertaken in any of the departments of the faculty. For regulations see PART 2 OF THE CALENDAR — GRADUATE STUDIES AND HIGHER DEGREES.

Diplomas

2 The following undergraduate diploma courses are available: information systems, and information studies, see V below.

The following postgraduate diploma courses are available: applied building repair and conservation; bioengineering; computers for engineers; construction law and contract administration; environmental engineering; fire safety practice (buildings and other structures); health and safety in construction; health informatics; highway and geotechnical engineering; music and media technologies; physical planning; project management; quality improvement; specialised technology; statistics, see PART 2 OF THE CALENDAR — GRADUATE STUDIES AND HIGHER DEGREES.

There is also a certificate course in French for applied scientists and a certificate course in German for applied scientists, see V below.

Admission

3 Applications for admission from E.U. applicants to the courses for these degrees (except for the evening B.Sc. degrees in Information Systems and Business and Information Technology and for higher degrees) should be made to the Central Applications Office (C.A.O.), Tower House, Eglinton Street, Galway. Applicants are referred to the C.A.O. handbook for details of application dates and

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

procedures. Applications for admission from non-E.U. applicants should be made to the Office of International Student Affairs, Trinity College, Dublin 2 by 1 February of year of proposed entry.

4 Applicants must satisfy the admission requirements of the University, together with any special requirements for entry into particular courses in the faculty; see ADMISSION REQUIREMENTS.

Abridgement of course

5 Students may be permitted to abridge any of the courses by admission to the Senior Freshman year if, in the opinion of the executive committee of the faculty, they are qualified by their knowledge and attainment to do so. They may be required to satisfy the examiners at the annual examination held at the end of the Junior Freshman year. They must pay a fee before presenting themselves for this examination; see COLLEGE CHARGES. Applications for permission to abridge the course should be made through the Admissions Office in the first instance.

Academic progress

6 To rise with their class, students must *(a)* attend satisfactorily the lectures given in the subjects of their course each term as required by the University Council and the faculty or school concerned, *(b)* perform satisfactorily the prescribed exercises (essay, tutorial or practical work), and *(c)* pass the required examinations in accordance with the prescribed regulations. Students will have been judged to have satisfied conditions *(a)* and *(b)* by the lecturer concerned who will report unsatisfactory students to the Dean of the Faculty in the first instance. Students who in any year have failed to satisfy any one or more of the conditions defined in this paragraph will not, except as provided in GENERAL REGULATIONS AND INFORMATION, receive credit for the year.

European Credit Transfer Scheme (ECTS)

7 The courses in this section are defined with a credit weighting which is designed to conform to the European Credit Transfer Scheme. While the European scheme works to a yearly norm of 60 credits, the Trinity College formula permits a credit variation between 55 and 65. In certain exceptional circumstances credits can exceed 65. The credit values of individual courses are given in parenthesis.

Repetition of year

8 Students who in any year have failed to fulfil any one or more of the conditions specified in §6 may be permitted to repeat the year or may be excluded from their course. Students have the right of appeal to the executive committee of the faculty.

Change of course

9 Students may apply through their tutor, using the standard form available, to the Senior Lecturer for permission to transfer to another course; see GENERAL REGULATIONS AND INFORMATION.

Foundation scholarship

10 Students intending to present themselves for this examination should see FOUNDATION SCHOLARSHIPS.

Gold medals and prizes

11 Gold medals are awarded by the Board to candidates of the first class who have shown exceptional merit at the annual degree examination in honor or professional courses. For prizes in the faculty see PRIZES AND OTHER AWARDS (see also MISCELLANEOUS AWARDS).

At the annual examinations a book prize (value €31.74) is awarded to each candidate obtaining a standard equivalent to an overall first class honors grade in an honor or professional course. These prizes are not awarded in the Senior Sophister year.

Book prizes must be claimed in the Examinations Office, West Theatre, by the award holder in person. These prizes are issued in the form of vouchers which can be exchanged by the students at designated booksellers.

II COURSES IN COMPUTER SCIENCE

Fees

1 See COLLEGE CHARGES.

MODERATORSHIP IN COMPUTER SCIENCE (DAY COURSE)

Admission

2 For admission requirements see section I, §§3, 4.

Course

3 The course is of four years' duration. In the first three years basic training in both computer hardware and software is given and in the final year students may select two options as well as taking two core courses and undertaking a substantial project. There will also be laboratory classes in each year. In the Freshman years students may opt to study computers and society or French for computer scientists or German for computer scientists.

Examinations

4 The annual examinations are held in Trinity term each year. There are supplemental examinations in Michaelmas term each year, except for the Senior Sophister year. Permission to take supplemental examinations will not normally be granted to students whom the court of examiners considers to have not made a serious attempt at the annual examinations unless an adequate explanation is furnished. Students must submit satisfactory course work in each year. Students who fail to do so may be refused permission to take all or part of the annual examinations for that year.

Students who have not passed in its entirety any examination within eighteen months from the date on which they first became eligible for it, are reported to the University Council as unsatisfactory with a recommendation for their exclusion from the course.

The names of successful candidates at the final degree examination are published in order of merit in the following classes: first class honors, second class honors (with two divisions, first and second), and third class honors.

Ordinary degree of B.A.

5 Students who have passed the Junior Sophister examination may have the ordinary B.A. degree conferred if they do not choose, or are not allowed, to proceed to the Senior Sophister year or if they fail to complete satisfactorily the Senior Sophister year of the course. Except by permission of the University Council, on the recommendation of the executive committee of the faculty, the ordinary degree of B.A. may be conferred only on candidates who have spent at least three years in the University.

Syllabus

6 **Junior Freshmen**

1BA1/1ICT1 Mathematics (11 credits)
1BA2/1ICT2 Introduction to programming (11 credits)
1BA3/1ICT3 Introduction to computing (11 credits)
1BA4/1ICT4 Digital logic design (11 credits)

1BA5/1ICT5 Electrotechnology and telecommunications (11 credits)
1BA6 Computers and society (11 credits)
1ICT6 French for computer scientists (11 credits)
1ICT7 German for computer scientists (11 credits)

7 **Senior Freshmen**

2BA1 Mathematics (pure and discrete) (11 credits)
2BA2 Programming techniques (11 credits)
2BA3 Systems programming (11 credits)
2BA4 Computer architecture I (11 credits)
2BA5 Digital electronics (11 credits)
2BA6 Computers and society (5 credits)
2BA7 Programming project (5 credits)

8 **Junior Sophisters**

3BA1 Statistics and numerical analysis (10 credits)
3BA2 Artificial intelligence I (10 credits)
3BA3 Systems software (10 credits)
3BA4 Computer architecture II (10 credits)
3BA5 Computer engineering (10 credits)
3BA6 Computers and society (5 credits)
3BA7 Software engineering and compiler design (10 credits)

9 **Senior Sophisters**

4BA1 Information systems (12 credits)
4BA2 Systems modelling (12 credits)
4BA3 Project (12 credits)

and two options from the following list:[2]

4BA4 Artificial intelligence II (12 credits)
4BA5 Advanced databases and information systems (12 credits)
4BA6 Computer graphics (12 credits)
4BA7 Compiler design (12 credits)
4BA8 Distributed systems (12 credits)
4BA9 Advanced computer architecture (12 credits)
4BA10 Computer vision (12 credits)
4BA11 Integrated systems design (12 credits)
4BA12 Hardware compilation (12 credits)
Additional topics[3]

Some Senior Sophister Moderatorship in Information and Communications Technology options (p. N6, §18) will also be made available.

MODERATORSHIP IN COMPUTER SCIENCE, LINGUISTICS AND A LANGUAGE

10 For details see FACULTY OF ARTS (LETTERS).

[2]It may not be possible to offer all the options every year.

[3]Additional courses covering special topics may be added to this list subject to staff availability and time-tabling constraints.

MODERATORSHIP IN INFORMATION AND COMMUNICATIONS TECHNOLOGY

Admission

11 For admission requirements see section I, §§3, 4.

Course

12 The course is of four years' duration. During the two Freshman years of the degree programme students acquire a foundation knowledge of information management, communications systems, and computer science together with related mathematical and statistical topics. French or German is also studied during these years. The knowledge acquired in the Freshman years establishes the foundation necessary for students to study the development and use of the most modern information technologies in the two Sophister years. There are also laboratory classes in each year.

Examinations

13 The annual examinations are held in Trinity term each year. There are supplemental examinations in Michaelmas term each year, except for the Senior Sophister year. Permission to take supplemental examinations will not normally be granted to students whom the court of examiners considers to have not made a serious attempt at the annual examinations unless an adequate explanation is furnished. Students must submit satisfactory course work in each year. Students who fail to do so may be refused permission to take all or part of the annual examinations for that year.

Students who have not passed in its entirety any examination within eighteen months from the date on which they first became eligible for it, are reported to the University Council as unsatisfactory with a recommendation for their exclusion from the course.

The names of successful candidates at the final degree examination are published in order of merit in the following classes: first class honors, second class honors (with two divisions, first and second), and third class honors.

Ordinary degree of B.A.

14 Students who have passed the Junior Sophister examination may have the ordinary B.A. degree conferred if they do not choose, or are not allowed, to proceed to the Senior Sophister year or if they fail to complete satisfactorily the Senior Sophister year of the course. Except by permission of the University Council, on the recommendation of the executive committee of the faculty, the ordinary degree of B.A. may be conferred only on candidates who have spent at least three years in the University.

Syllabus

15 **Junior Freshmen**

1ICT1/1BA1	Mathematics (11 credits)
1ICT2/1BA2	Introduction to programming (11 credits)
1ICT3/1BA3	Introduction to computing (11 credits)
1ICT4/1BA4	Digital logic design (11 credits)
1ICT5/1BA5	Electrotechnology and telecommunications (11 credits)
1ICT6	French for computer scientists (11 credits)
1ICT7	German for computer scientists (11 credits)

16 **Senior Freshmen**

2ICT1	Communications II (11 credits)
2ICT2	Information management II (11 credits)
2ICT3	Computer science II (11 credits)

2ICT4 Computer technology II (11 credits)
2ICT5 Mathematics II (11 credits)
2ICT6 Modern languages II (11 credits)

17 **Junior Sophisters**

3ICT1 Communications III (13 credits)
3ICT2 Information management III (13 credits)
3ICT3 Computer science III (13 credits)
3ICT4 Software engineering (13 credits)
3ICT5 Mathematics III (13 credits)

18 **Senior Sophisters**

4ICT1 Communications IV (13 credits)
4ICT2 Information management IV (13 credits)
4ICT3 Project (13 credits)

and two options from the following list:[4]

4ICT4 Distributed systems (13 credits)
4ICT5 Mathematical modelling (13 credits)
4ICT6 Business process transformation (13 credits)
4ICT7 Distributed information systems and interoperability (13 credits)
4ICT8 System modelling and specification (13 credits)
4ICT9 Mobile communications (13 credits)
4ICT10 Graphics and virtual reality (13 credits)
4ICT11 Computer and internet security (13 credits)
4ICT12 Internet applications (13 credits)
4ICT13 Programming language theory and practice (13 credits)
4ICT14 Data mining (13 credits)
Additional topics[5]

Some Senior Sophister Moderatorship in Computer Science options (p. N4, §9) will also be made available.

B.Sc. DEGREE IN COMPUTER SCIENCE (EVENING COURSE)

Admission

19 Applications for admission from E.U. applicants to the course for this degree should be made to the Central Applications Office (C.A.O.), Tower House, Eglinton Street, Galway by 1 February. Applications for admission from non-E.U. applicants should be made to the Office of International Student Affairs, Trinity College, Dublin 2 by 1 February.

20 Applicants must satisfy the admission requirements of the University, together with any special requirements for entry into the course; see ADMISSION REQUIREMENTS.

Course

21 The course is of four years' duration. Instruction is provided on three evenings and Saturday morning each week during the three teaching terms.

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[4]It may not be possible to offer all the options every year.

[5]Additional courses covering special topics may be added to this list subject to staff availability and time-tabling constraints.

Examinations

22 Annual examinations are held in Trinity term of each year with supplemental examinations in Michaelmas term. Students who have not passed in its entirety any examination within eighteen months from the date on which they first became eligible for it, are reported to the University Council as unsatisfactory with a recommendation for their exclusion from the course.

The names of successful candidates at the annual degree examination are published in order of merit in the following classes: first class honors, second class honors (with two divisions, first and second), and third class honors. Students who fail the annual degree examination may sit a supplemental examination in September and will be awarded a pass degree if successful.

Syllabus

23 **First year**

1.1 Quantitative methods 1 (20 credits)
1.2 Computer science 1 (20 credits)
1.3 Organisation 1 (20 credits)

24 **Second year**

2.1 Quantitative methods 2 (20 credits)
2.2 Computer science 2 (20 credits)
2.3 Organisation 2 (20 credits)

25 **Third year**

3.1 Quantitative methods 3 (20 credits)
3.2 Computer science 3 (20 credits)
3.3 Organisation 3 (20 credits)

26 **Fourth year**

4.1 Computer science 4 (15 credits)
4.2 Computer science 5 (15 credits)
4.3 Computer science 6 (15 credits)
4.4 Individual project (15 credits)

B.Sc. DEGREE IN INFORMATION SYSTEMS (EVENING COURSE)

Admission

27 Application for admission to the course for this degree should be made to the Admissions Office, Trinity College, Dublin 2 by 30 June.

28 Applicants must have completed the Diploma in Information Systems (see section V — DIPLOMA AND CERTIFICATE COURSES) at a satisfactory level or have equivalent, recognised qualifications.

Course

29 In addition to completing the Diploma in Information Systems, the course consists of two further years of study.

Examinations

30 Annual examinations are held in Trinity term of each year with supplemental examinations in Michaelmas term. Students who have not passed in its entirety any examination within eighteen months from the date on which they first became eligible for it are reported to the University Council as unsatisfactory with a recommendation for their exclusion from the course.

Degree award

31 The names of successful candidates at the annual degree examination are published in order of merit in the following classes: first class honors, second class honors (with two divisions, first and second), and third class honors. Students who fail the annual degree examination may sit a supplemental examination in September and will be awarded a pass degree if successful.

Syllabus

32 **Third year**

1.1 Information systems and technology III (15 credits)
1.2 Software design and development III (15 credits)
1.3 Business management and IT III (15 credits)
1.4 Systems design and development III (15 credits)

33 **Fourth year**

2.1 Information systems and technology IV (12 credits)
2.2 Software design and development IV (12 credits)
2.3 Business management and IT IV (12 credits)
2.4 Systems design and development IV (12 credits)
2.5 Research, management or development project (12 credits)

B.Sc. DEGREE IN BUSINESS AND INFORMATION TECHNOLOGY

34 For details see FACULTY OF BUSINESS, ECONOMIC AND SOCIAL STUDIES.

CERTIFICATE IN COMPUTER SCIENCE
(This course will not be offered in 2004-05)

Admission

35 The course is open to all students of the University with the following exceptions: *(a)* students in the Faculty of Engineering and Systems Sciences, *(b)* students reading business studies or mathematics and *(c)* students reading the science moderatorship programme who are specialising in physics.

Course

36 The course, which lasts for ten weeks, starts in the second half of Michaelmas term. It includes discussion of computer configuration, applications of the computer in industry and an introduction to programming in PL/1. A certificate is awarded to successful candidates in the examination which takes place at the end of Hilary term.

III COURSES IN ENGINEERING SCIENCE

Fees

1 See COLLEGE CHARGES.

DEGREES OF BACHELOR IN ARTS AND BACHELOR IN ENGINEERING (B.A., B.A.I.)

2 The course for these degrees normally lasts four years, but there is provision for an abridgement of the course to three years, see section I, §5.

3 During the first two years a programme of basic courses in engineering is provided. Following completion of the first two years of the engineering degree programme, students may elect to study

specialised programmes within one of the following streams:

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

4 Following successful completion of the first two years of the engineering degree programme, students may apply to enrol on the double qualification programme, run jointly with the Institut National des Sciences Appliquées (I.N.S.A.) de Lyon. Applications must comply with the deadlines set by the International Student Affairs Office. A set number of places will be available each year, determined by each engineering department. Applicants to the programme will be selected on the basis of their academic record and language proficiency. Successful applicants will be admitted to the third year of the engineering course with I.N.S.A. de Lyon, where they will follow a set of courses taken from the third and fourth year curricula in the department of the option they have chosen and which amount to 60 E.C.T.S. This is recognised as equivalent to the Junior Sophister year of the Trinity College Dublin engineering degree course. Students then return to Trinity College Dublin to complete their Senior Sophister year. On successful completion of the B.A.I. programme in Trinity College Dublin, they may then proceed to the fifth year of their chosen option in the I.N.S.A. de Lyon, where the Senior Sophister year of the B.A.I. is counted as equivalent to the fourth year. On successful completion of the fifth year at I.N.S.A., they qualify for the award of the Diplôme de l'I.N.S.A. de Lyon, which confers full professional accreditation in France.

5 While every effort is made to allow students to study the course they choose, the Engineering School 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. Time-table difficulties may also reduce the number of options available.

6 Students are strongly encouraged to gain relevant industrial experience during the vacation periods, particularly between their Junior and Senior Sophister years.

7 Holders of the B.A.I. degree are exempted from the appropriate parts of the professional examinations of the relevant engineering institutions.

Courses

8 **First year**

1E1 Engineering mathematics I (8 credits)
1E2 Engineering mathematics II (8 credits)
1E3 Computer science I (8 credits)
1E4 Physics (8 credits)
1E5 Chemistry (8 credits)
1E6 Engineering science (8 credits)
1E7 Graphics and computer aided engineering (8 credits)
1E8 Introduction to engineering (8 credits)

9 **Second year**

2E1 Engineering mathematics III (8 credits)
2E2 Engineering mathematics IV (8 credits)
2E3 Computer science II (8 credits)
2E4 Solids and structures (8 credits)
2E5 Thermo-fluids (8 credits)
2E6 Electronics (8 credits)

2E7 Engineering science (8 credits)
2E8 Materials (8 credits)
2E9 Engineering design

An associated programme of laboratory work, appropriate to these courses, will be provided.

Language options:
Certificate in French for Applied Scientists, see p. N25
Certificate in German for Applied Scientists, see p. N26

10 **Third year**

3E1 Engineering mathematics V (10 credits)
3E2 Engineering mathematics VI (10 credits)
3E3 Management for engineers (10 credits)
Language options:
Certificate in French for Applied Scientists, see p. N25
Certificate in German for Applied Scientists, see p. N26

and admissible combinations from the following:[6]

3A1 Engineering surveying (5 credits)
3A2 Structural design (5 credits)
3A3 Hydraulics (5 credits)
3A4 Structural analysis (5 credits)
3A5 Soil mechanics (5 credits)
3A6 Construction technology (5 credits)
3A7 Transportation and highway engineering (5 credits)
3A8 Geology for engineers (5 credits)
3A9 Group design project
3B1 Thermodynamics (4 credits)
3B2 Fluid mechanics (4 credits)
3B3 Mechanics of solids (4 credits)
3B4 Mechanical engineering materials (4 credits)
3B5 Mechanics of machines (4 credits)
3B6 Mechatronics (instrumentation and control) (4 credits)
3B7 Manufacturing technology and systems (4 credits)
3B8 Computer aided engineering and design (4 credits)
3C1 Signals and systems (5 credits)
3C2 Electronic engineering 1 (5 credits)
3C3 Electronic engineering 2 (5 credits)
3C4 Electromagnetism and optoelectronics: an introduction (5 credits)
3C5 Telecommunications (5 credits)
3C6 Electronic systems design and implementation
3D1 Microprocessor systems 1 (5 credits)
3D2 Microprocessor systems 2 (5 credits)
3D3 Concurrent systems (5 credits)
3D4 Computer aided design (5 credits)
3D5 Software design and implementation

Associated courses of laboratory work, design projects and fieldwork, appropriate to the courses selected, will be provided.

[6]It may not be possible to offer all the options every year.

11 **Fourth year**

4E1 Management for engineers (8 credits)
4E2 Project (12 credits)

and admissible combinations from the following:[7]

4A1 Civil engineering materials (5 credits)
4A2 Hydrogeology and engineering geology (5 credits)
4A3 Environmental engineering (5 credits each for parts 1 and 2)
4A4 Hydraulics (5 credits)
4A5 Geotechnical engineering (5 credits each for parts 1 and 2)
4A6 Structures (5 credits each for parts 1, 2 and 3)
4A7 Design of the built environment (5 credits)
4A8 Transportation (5 credits)
4A9 Coastal and offshore engineering (5 credits)
4B1 Mechanics of solids and materials (7 credits)
4B2 Thermodynamics and heat transfer (7 credits)
4B3 Manufacturing technology and systems (7 credits)
4B4 Mechatronics and systems (7 credits)
4B5 Vibrations and acoustics (7 credits)
4B6 Fluid mechanics (7 credits)
4B7 Biomechanics (7 credits)
4B8 Tribology (7 credits)
4C1 Applied electromagnetics (5 credits)
4C2 Microelectronic circuits 1 (5 credits)
4C3 Digital control systems (5 credits)
4C4 Telecommunications (5 credits)
4C5 Digital signal processing 1 (5 credits)
4C6 Microelectronic technology (5 credits)
4C7 Microelectronic circuits 2 (5 credits)
4C8 Digital signal processing 2 (5 credits)
4C9 Electronic engineering materials (5 credits)
4C10 Digital communications (5 credits)
4C11 Optoelectronics (5 credits)
4D1 Networking and advanced microprocessor systems (10 credits)
4D2 Knowledge and data engineering (10 credits)
4D3 Operating systems and distributed systems (10 credits)
4D4 Computer aided design (10 credits)
4S1 Integrated systems design (10 credits)

In addition, students may elect to take the following course. This course is not included in the assessment for the award of the B.A.I. degree.

4F1 Advanced engineering mathematics

Examinations

12 The students are examined in the work of each year. Supplemental examinations, where appropriate, are held each year at the beginning of Michaelmas term, except for the Senior Sophister year. Students whose attendance or work is unsatisfactory in any year may be refused permission to take all or part of the annual examinations for that year.

[7] It may not be possible to offer all the options every year.

13 During the first three years of the course, students who have failed the annual examination held in Trinity term may be permitted to take a supplemental examination. To gain a pass in the annual examinations of these years students must normally pass in all subjects. However, compensation is permitted at the annual examinations but the court of examiners will not normally allow small deficiencies in more than a maximum of two subjects to be compensated for by the answering in the others. Compensation is permitted at the supplemental examinations but the court of examiners will not normally allow small deficiencies in more than one subject to be compensated for by the answering in the other supplemental subjects.

14 To rise with their year, students must successfully complete the prescribed set of examinations, subject to the variations as provided for by the compensation regulations.

15 Students who do not obtain credit for the year owing to their failure to comply with the requirements under section I, §6 above, are not permitted to repeat the year except at the discretion of the Engineering School Committee. Students repeating any year do not retain credits gained in the previous year.

16 Students who have not passed in its entirety any examination within eighteen months from the date on which they first became eligible for it are reported to the University Council as unsatisfactory students, with a recommendation for their exclusion from the school.

17 Students are required to make a serious attempt at their examinations. Students who have not made a serious attempt at the examinations will normally be refused permission to take supplemental examinations or to repeat the year.

18 Students who are absent from an examination, or examinations, must furnish the Senior Lecturer, through their tutor, with an acceptable reason for their absence. Students who have been absent from an examination and have not presented the Senior Lecturer with an appropriate explanation will normally be refused permission to take supplemental examinations or to repeat the year.

19 The names of successful candidates at the degree examinations for the B.A.I. specialisms are published in order of merit within three classes: first class honors, second class honors (with two divisions, first and second), third class honors, and pass.

Except by special recommendation of the examiners, honors are awarded on either *(a)* the results of the annual B.A.I. examination of a student's Senior Sophister year or, alternatively, on *(b)* the results of a student's annual Junior Sophister examinations and subsequent annual B.A.I. examinations, taken together but with the Junior Sophister examinations not contributing more than 20 per cent to the combined mark.

Students in the following streams are assessed in accordance with *(a)* above:

computer engineering
electronic engineering
electronic/computer engineering (combined programme)

Students in the following streams are assessed in accordance with *(b)* above:

civil, structural and environmental engineering
mechanical and manufacturing engineering

Students who fail to pass the B.A.I. degree examination of their year may present themselves for re-examination at the examination in the following year when they may compete for the degree at pass level only.

20 Exemption from these requirements may be granted in exceptional circumstances after written application has been made by the student to the school committee.

Conferring of degrees

21 Students who have obtained credit for the four years' course are entitled to the degrees of B.A. and B.A.I. Both degrees must be conferred at the same Commencements.

Students who complete the Junior Sophister year by examination and who choose not to proceed to or fail to complete satisfactorily the Senior Sophister year of the engineering course may elect to be conferred with the ordinary degree of B.A.

Except by special permission of the University Council, on the recommendation of the executive committee of the faculty, the ordinary degree of B.A. may be conferred only on candidates who have spent at least three years in the University.

Syllabus for B.A. and B.A.I. degrees

22 Syllabuses are continually being updated and the content of each of the courses listed below is therefore subject to change.

1E1 ENGINEERING MATHEMATICS I

Series and limits; differentiation; integration; ordinary differential equations

1E2 ENGINEERING MATHEMATICS II

Vectors; linear algebra; complex numbers; introduction to probability and inference

1E3 COMPUTER SCIENCE I

Introduction to programming; application programs

1E4 PHYSICS

Mechanics; sound; heat; electricity and magnetism; light; modern physics; laboratory work

1E5 CHEMISTRY

General chemistry; physical chemistry; organic chemistry; laboratory work

1E6 ENGINEERING SCIENCE

Mechanics

Statics; elementary stress analysis; kinematics; dynamics

Electricity and magnetism

Basic electricity; time varying electricity; magnetic devices and machines

1E7 GRAPHICS AND COMPUTER AIDED ENGINEERING

Basic principles of engineering drawing and graphics; drawing office work; introduction to the use and practical application of computer aided engineering packages

1E8 INTRODUCTION TO ENGINEERING

Introduction to civil, mechanical, electronic and computer engineering; experiments and reports

2E1 ENGINEERING MATHEMATICS III

Multivariable calculus; linear algebra; engineering applications of linear algebra; Fourier series; Fourier transform

2E2 ENGINEERING MATHEMATICS IV

Laplace transform; Z-transform; systems of differential equations; further differential equations; vector calculus; introduction to partial differential equations; solution of some partial differential equations

2E3 COMPUTER SCIENCE II

Basic concepts of computer programming; fundamental concepts of object orientation; object-oriented programming; classic data structures, representation and algorithms; object-oriented software techniques; complex data structures

2E4 SOLIDS AND STRUCTURES

Mechanics of solids

Properties of solids, stress and strain; failure criteria; applications

Structures

Pin-jointed structures; analysis of beams; design of beams

2E5 THERMO-FLUIDS

Fluid mechanics

Principles of fluid motion; momentum equation; laminar and turbulent flows; pipe flows; free surface flows; boundary layers and wakes

Thermodynamics

Mechanical work processes of closed systems; mass and energy conservation; heat engines; the second law of thermodynamics; entropy; cycles

2E6 ELECTRONICS

Analogue electronics

Introduction and framework; discrete analogue electronics; linear integrated circuits; analogue/digital conversions

Digital electronics

Combinational logic; sequential logic; digital circuits

2E7 ENGINEERING SCIENCE

Electrical engineering

Electricity and magnetism; AC circuits; electrical machines; DC power supplies

Dynamical systems

Introduction; analysis tools; time domain response; frequency domain response; control systems

Environmental engineering

Environmental chemistry and microbiology; transport processes; heat and energy balances; application to contamination and pollution in the natural environment

2E8 MATERIALS

Electrical

Atomic structure; semiconductors; conduction processes; p-n junction; semiconductor fabrication

Mechanical

Engineering materials and properties; manufacture of materials; microstructure and heat treatment of steel and alloys

Civil

Concrete technology; reinforced and prestressed concrete; timber technology; use of aluminium and glass

2E9 ENGINEERING DESIGN

Introduction to the design of engineering systems; use of computer aided design software tools; project work

3E1 ENGINEERING MATHEMATICS V

Fourier analysis; partial differential equations; analytic functions and complex analytic methods; introduction to linear optimisation; introduction to graph theoretic algorithms

3E2 ENGINEERING MATHEMATICS VI

Part A: Numerical methods

From the following: errors; roots of equations; differential equations; finite difference methods; numerical integration; interpolation and curve fitting; numerical linear algebra; iterative solution techniques; eigenvalue analysis

Part B: Statistics and data analysis

Statistical variation in engineering data; statistical models for engineering data; quality improvement methods; design and analysis of industrial experiments; regression analysis

3E3 MANAGEMENT FOR ENGINEERS

Communication skills. Professional ethics. Law and the engineer. Financial management. Marketing. Quality assurance

3A1 ENGINEERING SURVEYING

Principles of surveying; height measurement; angle measurement; distance measurement; measurements and errors; control surveys; detail surveys; circular, transition and vertical curves; earthwork quantities; setting out; GPS and GIS

3A2 STRUCTURAL DESIGN

Principles of limit state design; preliminary design of structures: methods of providing stability, preliminary sizing. Design of structural elements in bending, compression and torsion

3A3 HYDRAULICS

Measurement and analysis of flow in rivers and open channels; flow in pipes; pumps; water supply and distribution; sewerage

3A4 STRUCTURAL ANALYSIS

Statically indeterminate beams, virtual work, qualitative analysis, influence lines, flexibility method, moment distribution. The stiffness method

3A5 SOIL MECHANICS

Geological origins, description and classification, index properties, phase relationships, compaction, seepage in isotropic materials, effective stress concept, shear strength, bearing capacity, consolidation, lateral earth pressures

3A6 CONSTRUCTION TECHNOLOGY

Building materials and their use, construction detailing, thermal insulation, building regulations, services, concrete technology and construction methods, introduction to contract law and conditions of contract, bills of quantities

3A7 TRANSPORTATION AND HIGHWAY ENGINEERING

Transportation systems; transportation psychology; highway route location and geometric design; highway construction materials; design of flexible and rigid pavements; highway drainage; traffic engineering

3A8 GEOLOGY FOR ENGINEERS

Introduction to geology; geomorphology; soils; rocks and minerals; structural geology; stratigraphy; geological maps; engineering properties of rocks and soils; hydrogeology

3A9 GROUP DESIGN PROJECT

Application of conceptual, environmental and engineering principles to a specific design project; also embracing communication skills and elements of architecture, planning, transportation and economics

3B1 THERMODYNAMICS

Review of fundamental concepts; gas power cycles and compressors; reciprocating internal combustion engines; refrigeration; compressible flow; fundamentals of turbine design; heat transfer; conduction

3B2 FLUID MECHANICS

Generalised equations of fluid motion; theory of lubrication; dimensional analysis and modelling; pipe network analysis; fluid machinery; turbulence; boundary layer analysis; experimental methods

3B3 MECHANICS OF SOLIDS

Relationships between stress and strain; two dimensional stress analysis; torsion of general section; buckling of struts; energy methods; analysis of composites; strain gauges; Mohr's circle; shells under pressure

3B4 MECHANICAL ENGINEERING MATERIALS

Mechanical properties and microstructure of materials used in mechanical engineering applications; the application of mechanical property data to design and materials selection; elastic and plastic deformation; strength, toughness, fatigue, creep, wear and corrosion; microstructure and thermomechanical treatment of metals, polymers and composites

3B5 MECHANICS OF MACHINES

Balancing; friction, clutches, brakes; kinematics and relative motion; gears, cams and linkages; kinetics; Lagrangian analysis; vibration and simple harmonic motion; computer simulation of dynamic systems

3B6 MECHATRONICS (INSTRUMENTATION AND CONTROL)

Time domain modelling and system response; reduction of multiple subsystems; steady-state errors; frequency response techniques; instrumentation systems; electrical machines and actuation

3B7 MANUFACTURING TECHNOLOGY AND SYSTEMS

Production processes, casting, joining, forming, shaping; machine tools; polymer processing; analysis of manufacturing environments; materials management; manufacturing plant layout

3B8 COMPUTER AIDED ENGINEERING AND DESIGN

Systematic design techniques; design of engineering components; design for manufacture and assembly; introduction to CAD techniques; curves and surfaces for CAD/CAM; introduction to finite element analysis

3C1 SIGNALS AND SYSTEMS

Signal and system categorisation; linear time invariant systems; convolution; Laplace transforms; S-plane analysis: poles, zeros and system response; Fourier series; Fourier transforms; introduction to probability; conditional probability; Bayes theorem; probability distribution and density functions; introduction to random processes

3C2 ELECTRONIC ENGINEERING 1

Bipolar transistor; bipolar logic families; logic timing and hazards; finite state machines; logic testing and testability

3C3 ELECTRONIC ENGINEERING 2

Small signal analysis; RF amplifiers; oscillators; operational amplifiers; analogue-digital/digital-analogue conversion; active filters

3C4 ELECTROMAGNETISM AND OPTOELECTRONICS: AN INTRODUCTION

Vector analysis; static electric and magnetic fields; Maxwell's equations; free-space and guided waves; Fresnel's equations; Snell's law; interference; diffraction; quantum mechanics; band structure; emission and absorption of light; photonic and optoelectronic devices

3C5 TELECOMMUNICATIONS

Amplitude modulation/demodulation, frequency modulation/demodulation, digital encoding/decoding, digital modulation/demodulation, noise, introduction to information theory, introduction to radio communications

3C6 ELECTRONIC SYSTEMS DESIGN AND IMPLEMENTATION

The design, construction and testing of the hardware to implement a substantial electronic application

3D1 MICROPROCESSOR SYSTEMS 1

Microprocessor architecture, assembly language programming, interfacing principles and practice, input/output, exception handling, advanced input/output, bus operation, instruction timing

3D2 MICROPROCESSOR SYSTEMS 2

Review of TTL/MOS logic; PALs and GALs; m68008 microprocessor; interfacing RAMs, EPROMs and ACIAs; interrupt driven serial I/O; m68008 monitor (C and assembly language); breakpoint implementation; group project to design and construct a simple m68008 system; use of logic analysers

3D3 CONCURRENT SYSTEMS

High level language representation, concurrent programming, processes and threads; synchronisation and mutual exclusion, concurrent system examples

3D4 COMPUTER AIDED DESIGN

Introduction to computer graphics, generation of curves and surfaces, CAD applications, introduction to intelligent CAD systems

3D5 SOFTWARE DESIGN AND IMPLEMENTATION

Design and implementation of a substantial piece of software; including designing, planning, implementing and testing the software

4E1 MANAGEMENT FOR ENGINEERS

Michaelmas term

Project management

Hilary term

Multi-dimensional study (technical/economical/social and political) of mobile communication systems (*electronic/computer*); financial management and accountancy for engineering projects (*mechanical*); aspects of health and safety, office management, office accounting, and law for civil engineers (*civil*). The guest lecture programme will involve speakers from industry, banking and Government bodies.

4E2 PROJECT

Each Senior Sophister student is required to complete a project under the supervision of a member of staff of the appropriate department. The nature of the project must have the prior approval of the department concerned. The project report forms a major part of the overall assessment for the degree.

4A1 CIVIL ENGINEERING MATERIALS

Origin, decay and preservation of stone, mortar and block; clay and cementatious brick; concrete investigation, durability, repair, and new materials; fatigue, corrosion and fire resistance of steel; defects, decay and preservatives for Irish timber; new bituminous materials; properties of aluminium and structural glass; geosynthetics, grouts and grouting; site visits

4A2 HYDROGEOLOGY AND ENGINEERING GEOLOGY

Analysis of groundwater flow in confined and unconfined aquifers; radial flow to wells; groundwater exploration and development; geophysical applications in hydrogeology and engineering geology; drilling methods; formation identification; properties of rock and rock mass; rock slope stability

4A3 ENVIRONMENTAL ENGINEERING

Environmental engineering 1 (core subject)

Water characteristics, water pollution, waste water treatment, potable water treatment, water demand, water distribution systems, hydrology, water sources, landfill theory and options. Air pollution. Site visits. Videos on environmental issues

Environmental engineering 2 (option)

Contaminant transport processes in surface water and groundwater; water resources engineering, especially in developing countries; hydrology of solid waste management, including landfill engineering, leachate and gas control

4A4 HYDRAULICS

Hydrology; gravity networks; dimensional analysis; open channel flow; free and forced vortex; turbines; river protection

4A5 GEOTECHNICAL ENGINEERING

Geotechnical engineering 1 (core subject)

Seepage in anisotropic and non-homogeneous soils; soil strength and its determination, slope stability, bearing capacity, earth pressures and retaining walls, soil stiffness parameters and determination of foundation settlement

Geotechnical engineering 2 (option)

Stress paths and stress invariants; design for consolidation; soil stress-strain behaviour and critical state theory; upper and lower bound solutions; limit state geotechnical design; basement design; dewatering and ground improvement; ground investigations

4A6 STRUCTURES

Structures 1 (core subject)

Reinforced concrete design for serviceability and ultimate limit state conditions. Structural steel: introduction to plastic theory, limit state design, rigid, semi-rigid and simple design; design of welded and bolted connections between members; design of laterally restrained beams, local buckling and section classification, web stresses and design of web stiffeners, members under axial load

Advanced design of structures (structures 2 option)

Reinforced concrete in flexure: crack propagation; ultimate resistance; modes of failure. Columns; interaction diagrams; biaxial bending. Modes of shear failure; post-cracking behaviour. R.C. slabs: yield line theory, lower bound methods, elastic methods. Prestressed concrete. Structural steel: design of laterally unrestrained beams, compound beams, beam columns; multi-storey design, sway and non-sway frames, plastic theory of frame analysis, masonry as a structural material

Advanced theory of structures (structures 3 option)

Stress and strain in three dimensions. Plates with in-plane and out-of-plane loading. Non-linear analysis of structures and design of tall buildings. Finite element theory: matrix assembly; transformation of forces/displacements; constant strain triangle; rectangular bending element; dynamic analysis of single and multidegree of freedom structures

4A7 DESIGN OF THE BUILT ENVIRONMENT

Fire engineering — causes, prevention and design against. Architecture — Egyptian, Greek, Roman, medieval and renaissance building types; industrial revolution, new materials, emergence of modern building forms; architectural principles (aesthetic design, composition, scale, proportion, harmony and punctuation); landscape, visual and siting considerations, energy efficient building forms; effects of pollution on building materials. Planning — history and development; legal framework in Ireland; development plans; planning of towns; urban renewal; aesthetics; housing estate layout and design; landscaping principles; land use; utility services; demographic studies. Archaeology and the civil engineer

4A8 TRANSPORTATION

Transportation engineering, transportation modelling, environmental issues related to transportation, transportation planning, highway engineering, transportation systems

4A9 COASTAL AND OFFSHORE ENGINEERING

Wave mechanics; wave climate analysis; coastal erosion and sediment transport; solute transport; design of breakwaters, jetties and quay walls; coastal zone management; sewage outfall design; wave energy; forces on offshore structures; coastal protection; port/harbour layout and design; tidal harmonic analysis

4B1 MECHANICS OF SOLIDS AND MATERIALS

Three-dimensional stress and strain analysis; theory of elasticity and stress functions; elastoplastic analysis; thin plates and shells; fracture mechanics; advanced topics on the structure and mechanical properties of materials, focusing on the avoidance of failure in engineering design; ductile yielding; brittle crack propagation; fatigue; creep; environmentally-assisted failure

4B2 THERMODYNAMICS AND HEAT TRANSFER

Vapour and combined cycles; combustion of fuel and dissociation; radiative heat transfer; forced convection – fundamentals, internal and external flows; free convection; boiling and condensation; heat exchanger performance and design

4B3 MANUFACTURING TECHNOLOGY AND SYSTEMS

Analytical methods for manufacturing processes; traditional and non-traditional machining; joining processes; CIM techniques; computer aided process planning (parts decomposition and coding); production planning and control; quality systems

4B4 MECHATRONICS AND SYSTEMS

Process control; statistical quality control; fuzzy systems; programmable logic control; industrial control systems and data acquisition; microprocessor programming; digital control theory

4B5 VIBRATIONS AND ACOUSTICS

Vibration isolation and measurement; multi-degree of freedom systems; modal methods; vibration testing; vibration of continuous systems; fundamentals of acoustics; sound sources; plane wave propagation; noise measurement and perception; finite element analysis in vibration and acoustics

4B6 FLUID MECHANICS

Two-dimensional aerodynamics; theoretical, numerical and experimental treatment of the aerofoil; introduction of CFD for viscous flow; turbulence modelling; unsteady flows; fluid machinery applications

4B7 BIOMECHANICS

Cell physiology; tissue differentiation, growth, adaptation and repair; tissue engineering; mechanical properties of bone and soft tissues; metallic, ceramic and polymeric biomaterials; biocompatability; musculoskeletal biomechanics, design of joint replacements and orthopaedic devices; cardiovascular and respiratory biomechanics, basic biortheology; gait analysis; biomechanics of man-machine interaction; regulatory affairs

4B8 TRIBOLOGY

Physical and chemical properties of lubricants; design of hydrodynamic bearings; mechanics and lubrication of concentrated contacts; boundary lubrication and friction; surface roughness and wear; materials for rolling and sliding contact; dry bearings; failure mechanisms in tribology

4C1 APPLIED ELECTROMAGNETICS

Fundamentals of electromagnetic theory with applications to free and guided propagation; resonant cavities; electromagnetic fields in matter; antennas

4C2 MICROELECTRONIC CIRCUITS 1

MOS transistor principles and models; basic MOS and CMOS logic circuits; pass transistor and transmission gate logic; MOS transistor capacitances; static characterisation of CMOS circuits; inverter delays and transition times; power dissipation

4C3 DIGITAL CONTROL SYSTEMS

Digital control theory; controller design methods, topics in computer control of processes

4C4 TELECOMMUNICATIONS

Antennas and propagation; modulation; source coding; channel coding; detection and decoding

4C5 DIGITAL SIGNAL PROCESSING 1

Sampling and reconstruction of signals; the z-transform and discrete-time Fourier transform; discrete-time systems; FIR and IIR filter design; decimation and interpolation

4C6 MICROELECTRONIC TECHNOLOGY

Silicon wafer fabrication techniques; fabrication technology for MOS and bipolar circuits; thick and thin film circuits

4C7 MICROELECTRONIC CIRCUITS 2

Device modelling and CAD software; static and dynamic non-linear circuit analysis and simulation. Characterisation of CMOS for system design; interconnect delays; buffer design. Introduction to VLSI system design. Analogue circuit design techniques

4C8 DIGITAL SIGNAL PROCESSING 2

Characterisation of discrete-time systems; realisation of discrete-time systems; computer implementation of discrete-time systems; the DFT and FFT; adaptive discrete-time systems; applications of discrete-time signal processing

4C9 ELECTRONIC ENGINEERING MATERIALS

Study of materials for IC fabrication including silicon, compound semiconductors and advanced silicon-on-insulator structures. Introduction to liquid crystals; electronic displays using liquid crystals; magnetic materials for information storage

4C10 DIGITAL COMMUNICATIONS

Stochastic signal analysis; modulation and detection; coding; synchronisation; multiple access

4C11 OPTOELECTRONICS

Electro-optic modulators; quantum devices; switching devices; non-linear optics; basic laser theory; waveguides; optical communication systems

4D1 NETWORKING AND ADVANCED MICROPROCESSOR SYSTEMS

ISO reference model, high level data link control (HDLC), local area networks, TCP/IP networking and Unix sockets, high speed networks (FDDI, ISDN, ATM), applications

RISC vs CISC; RISCs (RISC-I, SPARC, Alpha, MIPs); pipelines; branch prediction; memory management; cache organisation and analysis; multiprocessor cache coherency; multi-threaded programming; spin-lock implementations; DRAM interfacing; error correction; VRAMS; graphics hardware; disc I/O (SCSI, RAID)

4D2 KNOWLEDGE AND DATA ENGINEERING

File and database management. Programming. Design and operation of rule-based systems, expert system applications, neural networks theory and applications, case-based reasoning

4D3 OPERATING SYSTEMS AND DISTRIBUTED SYSTEMS

Traditional operating systems. Internetworking with TCP/IP: principles, protocols and architecture. Distributed system models, file servers, naming, recovery from failure, advanced topics and case studies

4D4 COMPUTER AIDED DESIGN

Finite elements, modelling and simulation, solid modelling, industrial vision and robotics, CAD applications

4S1 INTEGRATED SYSTEMS DESIGN

Introduction to ASICs, functional elements and architectures; hardware description languages; logic synthesis and simulation; testing

4F1 ADVANCED ENGINEERING MATHEMATICS

Eigen function expansions and Sturm-Liouville problems with applications to special functions: differential equations of control theory: conformal mapping applied to boundary value problems in heat flow, electrostatics etc.; applications of Fourier and Laplace transforms to engineering problems

DEGREE COURSE IN MANUFACTURING ENGINEERING WITH MANAGEMENT SCIENCE (B.Sc. (Ing.))

23 The course for this degree normally lasts four years.

24 Students are encouraged to gain relevant industrial experience during vacation periods, particularly between the third and fourth years.

25 Holders of the B.Sc. (Ing.) degree may be exempted from the appropriate parts of the professional examinations of the relevant engineering institutions.

Courses

26 **First year**

Introduction to manufacturing technology (8 credits)
Computer science I (8 credits)
Introduction to management science (8 credits)
Engineering mathematics I (8 credits)
Engineering mathematics II (8 credits)
Physics (8 credits)
Chemistry (8 credits)
Engineering science (8 credits)

27 **Second year**

Introduction to finance (4 credits)
Manufacturing engineering design I (8 credits)
Manufacturing and materials (8 credits)
Introduction to statistical analysis (8 credits)
Mechanics of solids (8 credits)
Engineering mathematics III (8 credits)
Engineering mathematics IV (8 credits)
Analogue and digital electronics (8 credits)
Thermodynamics and fluid mechanics (8 credits)
Engineering science (8 credits)

28 **Third year**

Manufacturing technology II (6 credits)
Computational methods in manufacturing (6 credits)
Design II (8 credits)
Mechanics of machines (4 credits)
Human resource management (6 credits)
Operations strategy (6 credits)
Statistics for quality improvement (6 credits)
Operations management (6 credits)
Mechanics of solids (4 credits)
Mechanical engineering materials (6 credits)
Mechatronics (4 credits)

29 **Fourth year**

Advanced manufacturing (7 credits)
Management information systems (7 credits)
Engineering elective 1 (7 credits)
Engineering elective 2 (7 credits)
Management elective l (7 credits)
Management elective 2 (7 credits)
Engineering/management elective (7 credits)
Project (14 credits)

30 The choice of electives in the fourth year is subject to availability and time-tabling constraints. Subjects with a prerequisite course will not normally be available as electives unless the student has satisfied this requirement.

Examinations

31 As §§12-18 above.

32 The names of the successful candidates at the degree examinations for the B.Sc. (Ing.) degree are published in order of merit within three classes: first class honors, second class honors (with two divisions, first and second), third class honors, and pass.

Except by special recommendation of the examiners, honors are awarded on the basis of the final degree mark comprising the student's annual Junior Sophister and Senior Sophister examination results, taken together but with the Junior Sophister examinations not contributing more than 20 per cent to the combined mark.

Students who fail to pass the B.Sc. (Ing.) degree examination of their year may present themselves for re-examination at the examination in the following year when they may compete for the award of the degree at pass level only.

Course syllabus

33 Syllabuses are continually being updated and the content of each course listed is subject to change. There is an associated laboratory programme in addition to the courses listed.

Conferring of degrees

34 Students who have obtained credit for the four years' course are entitled to the degree of B.Sc. (Ing.).

Students who have passed the Junior Sophister examination may have the ordinary degree of B.A. conferred if they do not choose to proceed to the Senior Sophister year.

Students who have passed the Junior Sophister examination but have failed to pass the Senior Sophister examination may have the ordinary degree of B.A. conferred.

Except by special permission of the University Council, on the recommendation of the executive committee of the faculty, the ordinary degree of B.A. may be conferred only on candidates who have spent at least three years in the University.

IV PROGRAMME IN SYSTEMS AND DATA STUDIES

MODERATORSHIP IN MANAGEMENT SCIENCE AND INFORMATION SYSTEMS STUDIES

1 This programme 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.

Fees

2 See COLLEGE CHARGES.

Courses

3 **Junior Freshmen**

Computer science 1 (8 credits)
Introduction to economics (10 credits)
Introduction to management science (8 credits)
Software laboratories 1 (8 credits)
Statistical analysis (8 credits)
Engineering mathematics 1 (8 credits)

Engineering mathematics 2 (8 credits)
Introduction to organisation and management (10 credits)
Optional language course (9 credits)

4 **Senior Freshmen**

Computer science 2 (8 credits)
Management science methods (9 credits)
Software laboratories 2 (9 credits)
Applied probability (9 credits)
Applied statistics (9 credits)
Management 2 (9 credits)
Engineering mathematics 3 (8 credits)
Optional language course (9 credits)

5 **Junior and Senior Sophisters**

Mandatory courses must be taken in a number of areas including information systems, statistics and management science. Elective courses are offered in the areas of business studies, computer science, information systems, economics, manufacturing engineering, statistics, operations research and mathematics. In the Senior Sophister year all students carry out a project based on a real industrial or organisational problem.

6 The choice of elective courses in the Sophister years is subject to availability and time-tabling constraints. Information concerning elective courses available may be obtained from the Director of Studies, Management Science and Information Systems Studies Programme. Each student's choice of elective courses and of research project must be approved by the Director of Studies. (Typically a Junior Sophister year amounts to approximately 63 credits and a Senior Sophister year to approximately 64 credits.)

7 The language courses are optional. They may lead to the award of a certification in the appropriate language for applied scientists. See pp. N25-26. Students are strongly encouraged to avail of the opportunity to acquire proficiency in languages, through the facilities provided by the Centre for Language and Communication Studies.

Assessment

8 Students are assessed by assignments and tests during the year, formal written examinations normally at the end of Trinity term in each year and examination of a thesis based on the practical project. There are supplemental written examinations in Michaelmas term each year, except for the Senior Sophister year. Students unavoidably absent from the written examination in the Senior Sophister year may apply to the Senior Lecturer for permission to present themselves for this examination in the following year. In cases where such permission is granted, students may be required to repeat the lectures and assessments during the year except that students who have passed the practical project examination will not be required to repeat that examination.

The names of successful candidates at the final degree examination are published in order of merit in the following classes: first class honors, second class honors (with two divisions, first and second), and third class honors. These honors are based on a student's overall performance within the Sophister years.

DEGREE OF BACHELOR IN ARTS

9 Students who have passed the Junior Sophister examination may have the ordinary B.A. degree conferred if they do not choose, or are not allowed, to proceed to the Senior Sophister year, or if they fail to achieve honors standard in the moderatorship examination. Except by permission of the

University Council, on the recommendation of the executive committee, the ordinary degree of B.A. may be conferred only on candidates who have spent at least three years in the University.

V DIPLOMA AND CERTIFICATE COURSES

1 Applications for admission to the diploma course in information systems should be made to the Admissions Office, Trinity College, Dublin 2 by 30 June and for the diploma course in information studies by 1 September.

DIPLOMA IN INFORMATION SYSTEMS

2 Instruction is given for two years in the evenings throughout teaching term. Examinations are held in May/June of each year. Suitably qualified students may be admitted to the second year of the course.

Syllabus

3 **First year**

Information systems and technology I (15 credits)
Software design and development I (15 credits)
Business management and IT I (15 credits)
Systems design and development I (15 credits)

4 **Second year**

Information systems and technology II (12 credits)
Software design and development II (12 credits)
Business management and IT II (12 credits)
Systems design and development II (12 credits)
Information systems development project (12 credits)

Fees

5 See COLLEGE CHARGES.

DIPLOMA IN INFORMATION STUDIES
(This course will not be offered in 2004-05)

6 Instruction is given in the evenings throughout teaching term for two years. The course is designed for people whose occupation involves acquisition, organisation and dissemination of information of a commercial or technical nature and who have at least one year's experience of such work.

Fees

7 See COLLEGE CHARGES.

CERTIFICATE IN FRENCH FOR APPLIED SCIENTISTS

8 An optional course of two years' duration is available to engineering science undergraduates (starting in their Senior Freshman year) or those with equivalent qualifications. The course continues over two years and aims to give a knowledge of basic French grammar and some relevant technical vocabulary.

Fees

9 See COLLEGE CHARGES.

CERTIFICATE IN GERMAN FOR APPLIED SCIENTISTS

10 Preparation for this certificate is by a programme of supported self-instruction that the Centre for Language and Communication Studies provides for undergraduates in the Faculty of Engineering and Systems Sciences in the Senior Freshman and Junior Sophister years. The aim of the programme is to equip students with an ability to communicate through German in everyday situations and to extend their knowledge of the language to areas related to their developing academic and professional interests. In the two weeks immediately preceding Michaelmas teaching term students who have not learned German before attend an eight-day intensive beginners course and all students attend a two-day introduction to self-instructional language learning.

VI THE STATISTICS AND OPERATIONS RESEARCH LABORATORY

1 The research activities of the Department of Statistics are coordinated through the Statistics and Operations Research Laboratory which undertakes the analysis and execution of research projects for departments of the College and also for outside institutions. The laboratory was established to assist in the dissemination and application of statistical and operations research techniques in Ireland.

2 The statistical work of the laboratory is concerned primarily with the collection, analysis and interpretation of data. The tasks of data collection involve statistical problems of design and sampling and computer techniques of data handling. The operations research side of the laboratory's work involves the construction of mathematical models of the particular organisation under investigation. The systems studied are as diverse as breweries, hospitals, airlines and manufacturing industry.

3 The resources of the laboratory are available for use by staff and students from other College departments. It is strongly advisable to seek statistical advice at the initial stage of a project before embarking on the fieldwork.