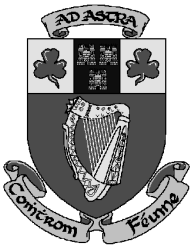
University College Dublin
An Coláiste Ollscoile Baile Átha Cliath

National University of Ireland, Dublin
Ollscoil na hÉireann, Baile Átha Cliath



Science

(Postgraduate Programmes)

Session 2004/05

Contents

Introduction

Professor Michael J. Kennedy

Dean, Faculty of Science

Research is an important part of the Faculty of Science's contribution to UCD. The Faculty accounts for nearly 60% of the total annual research income of the University and this is reflected by having over 400 students presently registered for the PhD and smaller numbers involved in research for the MSc. We also have significant numbers of postgraduate students on Taught Masters and Higher Diploma programmes. As the largest and most diverse Science faculty in Ireland, the Faculty of Science in UCD is proud of the breadth and quality of our taught postgraduate programmes and the excellence of our research and the research students who contribute to it. This research would not be possible without support from national and international funding agencies and from industry, all of which is gratefully acknowledged. Postgraduate Study in Science in UCD is a rewarding experience – ask anyone who has done it!

Professor Ciaran Regan

Associate Dean (Postgraduate)

Every field of human knowledge develops its own complexity of questions. A single molecule of water cannot boil, cannot freeze, but collectively water molecules can do both. Understanding science is a discussion of questions in the context of the complexity or hierarchy of concepts developed. That hierarchy goes from humanities, through the social sciences to biology, to chemistry, physics and mathematics. Be open-minded; knowledge of one other field will sharpen your ability to scrutinise more steadily, to appreciate more lovingly, your field of research. Now more than ever we need thinking individuals who will lead humanity towards technologies that will improve society, rather than technologies that simply improve technology itself. *'We cannot live for ourselves alone. Our lives are connected by a thousand invisible threads, and along these sympathetic fibres, our actions run as causes and return to us as results'* – Herman Melville.

Scholarships Awarded in the Faculty of Science

Government of Ireland Research Scholarships in Science, Engineering and Technology (IRCSET) Postgraduate Scholarships Award

This scheme offers opportunities for outstanding students to pursue a postgraduate degree by research supported by a scholarship awarded by the Irish Research Council for Science, Engineering and Technology. Scholarship awards are up to a maximum of €19,050 per annum. A formal call for submissions from interested students is advertised in the national newspapers in late January and the funding starts in the following academic year. Application forms and further information are available from: IRCSET, First Floor, Brooklawn House, Shelbourne Road, Ballsbridge, Dublin 4. Telephone: +353-1-231 5000. Website: www.ircset.ie, email: info@ircset.ie.

Open Postgraduate Scholarships

These scholarships are awarded on the basis of academic merit and are available equally to graduates of University College Dublin and other universities. They are tenable for one year of full-time postgraduate study at University College Dublin.

The Faculty of Science usually awards six Open Postgraduate Scholarships annually, each to the value of €1,270, to students registered for postgraduate research programmes with the Faculty.

Application forms are available from the Office of Postgraduate Studies, University College Dublin, Library Building, Belfield, Dublin 4. Telephone: +353-1-716 7632, email: pgstudy@ucd.ie.

Funding

Research Grants

Many postgraduate students are funded through grants to Supervisors. Opportunities for funding should be discussed with the relevant department.

Higher Education Grants

Grant holders who complete a primary degree course may have their grant renewed in order to undertake a full-time postgraduate course. To apply for renewal, final year students should inform the UCD Grants Office in June, and write to their Local Authority when they have completed their primary degree. The grant, which covers fees and possibly a contribution to subsistence, may be renewed in subsequent years. Further information is available from the

Fees and Grants Office,
Michael Tierney Building,
University College Dublin,
Belfield, Dublin 4
Website: www.ucd.ie/fees/
email: fees@ucd.ie
Telephone: +353-1-716 1439/1434.

Research Demonstratorships

Up to one hundred and sixty Research Demonstratorships may be awarded in the Faculty of Science to students registered for postgraduate research degree programmes. These Demonstratorships are awarded to EU Students only. Eligible students must therefore be EU nationals registered for a postgraduate research degree with at least an upper Second Class Honours Degree or equivalent. Students who have IRCSET scholarships and others who are being supported by research contracts or other substantial grants are not eligible for Research Demonstratorships. Research Demonstratorships are awarded for three years to PhD students and two years to MSc students. Recipients are required undertake six hours per week teaching/demonstration duties during term. In 2003/2004, the value of this demonstratorship was as follows:

Demonstrating Salary	€3,037 per annum
Scholarship Supplement	€5,363 per annum
Total	**€8,400**

Research Demonstratorships are awarded on the recommendations of individual departments to students who intend to register for postgraduate research programmes in that department.

Fees

All students admitted to University College Dublin will be assessed for fee status. Students are liable to pay programme fees to the University for each semester of any course they undertake until the course has been completed. Fees are payable from the commencement date of the semester in which the student registers. In addition to programme fees, students must budget for their own maintenance, including accommodation. University fees are fixed for each year and are subject to an annual increase. Non-EU students will pay a fixed PhD fee for the first three years, or a fixed MSc fee for the first two years.

A European Union passport, EU citizenship, or refugee status, does not grant automatic entitlement to European Union fees. European Union fee rates shall apply only to students whose principal residence for the purpose of taxation has been in a European Union member state for a minimum of three of the five years prior to entry to University College Dublin. Residence as a full-time student does not qualify a student for EU rates.

Any student who does not meet the residency regulation will be required to pay the non-European Union fee rates. Documentary evidence in relation to fee status will be sought where it is deemed necessary.

Further information and details of current postgraduate fees are available from the

Fees and Grants Office,
Michael Tierney Building,
University College Dublin,
Belfield, Dublin 4
Website: www.ucd.ie/fees/
email: fees@ucd.ie
Telephone: +353-1 716 1439/1434

University Services

New Students to UCD

Useful information for students coming to University College Dublin for the first time is available from the university's website at www.ucd.ie/newstudent

Accommodation Office

On-campus accommodation is available for over 1,200 students in Roebuck Hall and in the custom built Merville and Belgrove Residences. This accommodation consists mainly of fully equipped three and four-bedroomed apartments with 10% of accommodation reserved for postgraduate students. A computerised list of off-campus lodgings is available from the Accommodation Office together with information on a limited number of flats, houses, bed-sitters and owner-occupier accommodation. For further details telephone: +353-1-716 8755 or email: accommodation.office@ucd.ie.

Careers and Appointments Office

The Careers and Appointments Office has a well-developed careers and information library. It provides a careers advisory service to students in their final year and to postgraduate students. For further information telephone: +353-1-716 7573 or email: careers@ucd.ie.

Computing Services

UCD Computing Services provides personal computing facilities, computer networking and advice and technical support to students in the College. There are over 60 open access rooms, some of which are reserved exclusively for postgraduates. Additional information can be obtained from the website: www.ucd.ie/computing/support.

International Office

The International Office provides information and advice to international students on a range of issues including immigration procedures, accommodation and administration procedures in UCD. For further information visit the website: www.ucd.ie/global, telephone: +353-1-716 1701 or email: international@ucd.ie.

Libraries

All registered UCD students are entitled to use and borrow books from the College Libraries. UCD has the largest open access library in Ireland and students have free access to most of the books in stock. Library tours are available at the beginning of each academic year and staff are always available at the information desks.

Study Rooms

A limited number of single study rooms are available in the Main Library for postgraduates. Rooms are issued for two weeks.

Academic Libraries Co-operating in Dublin (ALCID)

The ALCID programme is designed to facilitate research and co-operation between academic libraries in Dublin. An ALCID card will give access to the libraries of Trinity College Dublin, Dublin City University, National University of Ireland Maynooth, Royal College of Surgeons, Royal Irish Academy, St. Patrick's College, and the Mater Dei Institute. Further information is available from the Library website: www.ucd.ie/library.

Postgraduate Studies Office

The Postgraduate Studies Office may be contacted as follows:

Website: www.ucd.ie/newstudent.
Telephone: +353-1-716 7632
Fax: +353-1-269 1963
Email: pgstudy@ucd.ie.

Sports Facilities

The sports facilities at Belfield are among the best in the country. There are twenty pitches, five floodlit training areas, eleven tennis courts, an athletics track, two synthetic grass floodlit pitches and a modern Sports Centre. The Sports Centre has two large sports halls, squash courts, handball/racquetball alleys, a climbing wall, a sports injuries clinic, sauna, sports bar, barber shop and a sports shop. Off campus facilities include a modern boathouse at Islandbridge. Further information is available from the Department of Sport Website: www.ucd.ie/sport/.

Student Health Service

This confidential service is provided free of charge by the University and is available to all students. Information regarding medical cards and other health entitlements is also provided. Medical Officers (both male and female doctors are available), Psychologist/Psychotherapist and Consultant Psychiatrist are available by appointment.

Disability Support Service

The aim of the Disability Support Service (DSS) in University College Dublin is to support students with a disability in their studies at UCD. Specific needs of each student are dealt with on an individual basis. Further details are available from the website: www.ucd.ie/disability/, email: dss@ucd.ie. Telephone: +353-1-716 7565.

Dates for Academic Session 2004/2005

First Semester

Michaelmas Lecture Term 16 September 2004 – 8 December 2004

Second Semester

Hilary Lecture Term 10 January 2005 – 12 March 2005
Trinity Lecture Term 4 April 2005 – 23 April 2005

With a small number of exceptions, postgraduate programmes begin in the last week in September each year. Please refer to the information on Fees on page 7.

Postgraduate Programmes

The following postgraduate programmes are offered in the Faculty of Science:

Certificate

Diploma

Higher Diploma

Degree of Master of Science (MSc):

Mode I by research and thesis. Offered by all departments.

Mode II by course and examination.

Mode III by research and examination.

Degree of Master of Applied Science (MApplSc) by course and examination.

Degree of Doctor of Philosophy (PhD) by research and thesis. Offered by all Departments.

Duration of Courses

The duration of degree and diploma courses are normally as follows:

Diploma courses	One year
Master's Degree by course and examination (Mode II)	Normally one year
Master's Degree by research	Two years
MApplSc Degree	Normally one year
PhD Degree	Three years

Proficiency in English

Since the basic language of instruction at UCD is English, competence in both written and spoken English is essential. If the student's first language is not English, or if secondary education has not been taken through English, the student will need to have passed an approved test before registering for a course. The current minimum requirements are a score of 550 TOEFL points, 6 IELTS points or a pass in the Cambridge Advanced Examination, although individual departments may require a higher level. Other evidence of proficiency in English may be accepted. Advice and full details may be obtained from the Admissions Office admissions@ucd.ie, telephone: +353-1-716 1425.

Research Supervision

The supervision of the advanced research study commences at the beginning of the student's programme of studies. One or more supervisors are appointed to act as the main point of contact for the student and in some departments a doctoral committee will be set up to oversee the project. The supervisor and/or doctoral committee provide

advice and technical expertise to guide all aspects of the research study from the identification of the research question to the development of a feasible and satisfactory research proposal. Advice is also provided on the choice of appropriate methods of data gathering and analysis. The supervisor is responsible for monitoring the progress of the student and provides on-going advice on the progress of the research leading to the PhD.

Regulations for the PhD Degree

A PhD by research may be obtained in any department within the Faculty of Science at University College Dublin. Detailed regulations apply as follows:

1. The degree of Doctor of Philosophy (PhD) may be awarded on the basis of research carried out by the candidate, under the supervision of a Professor or Lecturer, the results of which are submitted to the University in a thesis.

2. Entry requirements and application procedure

2.1 To be eligible to register for the degree of PhD in University College Dublin, a candidate must have obtained a high honours standard at the examination for a primary degree of the National University of Ireland or another university, or must present such other evidence of academic standing as will satisfy the Head of Department and the Faculty. Normally Second Class Honours Grade I or equivalent would be expected.

2.2 An application to enter on a course of study and research leading to the degree of PhD shall be considered by the relevant Faculty, on the nomination of the Head of Department, or on the nomination of a Professor with the consent of the Head of the Department in which the proposed research is to be carried out. The title of the thesis, or a short description of the proposed research must be provided.

2.3 If approved by the Faculty, the application shall be submitted to the Academic Council for approval. If approved by the Academic Council, the applicant must register as a PhD student, normally for a minimum of nine terms. In exceptional circumstances, the Academic Council may, on the recommendation of the Faculty, permit registration for a minimum of six terms.

3. Supervision of Research and Preparation of the Thesis

3.1 The Academic Council, on the nomination of the Professor or the Head of Department, and the recommendation of the Faculty, will assign a full-time, permanent member of staff to supervise the candidate's research; the nominator may also act as the supervisor. The Academic Council may approve joint supervision of the research; in such case, at least one of the supervisors must be a full-time, permanent member of the staff of the University.

3.2 Where the supervisor retires or resigns from the full-time staff of the University, or for any other reason is unable to continue to supervise the research, the nominator shall inform the Academic Council and, on the recommendation of the Faculty, the Academic Council shall assign another member of staff to supervise the research. Where the nominator ceases to hold office as Professor or as

Head of Department, the Dean shall inform the Academic Council and, on the recommendation of the Faculty, the Academic Council shall appoint a suitable member of the academic staff to act as nominator.

3.3 The candidate shall pursue research and shall follow such programme of study as may, with the approval of the Faculty and the Academic Council, be prescribed by the nominator or supervisor(s).

3.4 Before commencing the programme of study and research, a candidate for the PhD must register as a student of the University. A candidate may not complete registration until the Academic Council has been informed of all relevant details concerning the nominator, the supervisor(s) and the title of the proposed thesis, or a short description of the research.

3.5 The research for the PhD Degree shall be carried out in the relevant Department, unless the Academic Council has given permission for some or all of the research to be carried out elsewhere under the general supervision of the supervisor(s). Where the research is interdisciplinary, and more than one Department is involved, all Departments concerned shall cooperate to provide the resources required by the candidate. In all cases, the nominator shall ensure that such resources are made available to the candidate.

3.6 The candidate's research must be carried out, and the thesis prepared, under the direction of the supervisor(s). The supervisor(s) shall regularly monitor the progress of the research. Where the supervisor(s) form the view that the candidate is unlikely to complete the research, the Faculty and Academic Council should be so informed. The Academic Council, having considered reports from the supervisor(s), the nominator and the Faculty, may decide to withdraw approval for the student's continued registration as a candidate for the PhD Degree.

3.7 Candidates are allowed six years in which to complete the degree from the date of first registration. If they do not complete the requirements for the PhD within six years, candidates must re-apply to the Faculty, presenting justification, for permission to extend their registration. The Academic Council may extend a candidate's registration on the recommendation of the Faculty.

4. Submission of the Thesis for Examination

4.1 Upon completion of the research, the candidate should prepare a thesis with the advice of the supervisor(s) and in accordance with the guidelines published by the Examinations Office, and should submit the thesis for examination. The candidate must be a registered student at the time when the thesis is submitted for examination.

4.2 Three copies of the thesis, bound in accordance with the guidelines published by the Examinations Office, each accompanied by a document containing a summary of the contents of the thesis not exceeding 300 words, should be submitted, with the examination fee, to the Examinations Office, University College Dublin.

4.3 The thesis will not be accepted by the Supervisor of Examinations unless it is accompanied by a statement (on the appropriate form) from the supervisor(s) that the research has been carried out and the final draft of the thesis, as submitted, has been prepared for examining under their supervision. Where such a statement is, in the opinion of the candidate, unreasonably withheld, the candidate may appeal to the Academic Council Standing Committee on Examinations.

4.4 Research work on the basis of which a degree of the National University of Ireland, or any other university, has been obtained will not be accepted as the main work for a PhD Degree. A confirmatory statement to this effect, signed by the candidate must be submitted with the thesis.

4.5 A PhD thesis may be submitted to the Examinations Office at any time during an academic session for which the candidate is registered.

5. Examination of the Thesis

5.1 The Examination Board shall consist of an extern examiner and two intern examiners: (i) the nominator or the nominator's nominee or (ii) such other intern as may be approved by the Faculty and Academic Council.

5.2 Where the nominator is also the supervisor, the nominator shall nominate another intern examiner who must be a full-time, permanent member of the academic staff.

5.3 Where the candidate for the PhD is a full-time member of the academic staff of the University, or another constituent university or Recognised College of the National University of Ireland, one of the intern examiners shall be replaced by a second extern examiner.

5.4 The intern examiners shall be appointed by the Academic Council, on the recommendation of the Faculty. The extern examiner(s) shall be nominated by the Academic Council on the recommendation of the Faculty and shall be appointed by the National University of Ireland.

5.5 The Supervisor of Examinations shall forward a copy of the thesis together with the summary of contents to each member of the Examination Board.

5.6 The members of the Examination Board, having examined the thesis and before making their report to the Academic Council, shall consult with one another, and, unless they recommend otherwise, they should conduct an oral examination of the candidate.

5.7 Where the examiners are in agreement, they shall submit a joint report to the Academic Council indicating their opinion on the quality of the thesis and of the research on which it is based, and recommending whether the degree should, or should not, be awarded. The examiners should also indicate whether in their opinion the thesis, in whole or in part, is worthy of publication. Award of the PhD should not be recommended by the examiners unless they consider that the thesis, in whole or in part, is worthy of publication as a work of serious scholarship. The report may also indicate whether, in the opinion of the

examiners, major or minor corrections to the thesis are required, and shall assign responsibility to one of the intern examiners to ensure that such corrections have been made to the thesis before award of the PhD is approved by the Academic Council.

5.8 Where the examiners unanimously recommend award of the degree, the Academic Council, following consideration of their report, may approve the award of the degree.

5.9 Where the Examination Board or an individual examiner recommends that the degree of PhD be not awarded, the report should indicate areas of weakness and may include advice to the candidate on ways in which the thesis, or the research on which it is based, could be improved to a standard which might merit the award of the degree.

5.10 Where the Examination Board or an individual examiner recommends that the degree of PhD be not awarded, the report(s) should in the first instance be considered by the Academic Council Standing Committee on Examinations.

5.11 Where two examiners recommend that the degree be awarded, the Standing Committee shall consider the reports of the examiners and shall submit a recommendation to the Academic Council on the award of the degree. The Academic Council, having considered the reports of the examiners and the recommendation of the Standing Committee, may approve the award of the degree. Where an extern examiner has recommended that the degree be not awarded a decision by the Academic Council to award the degree shall require the consent of two-thirds of those present and voting.

5.12 Where all or a majority of the examiners recommend that the degree be not awarded, the Standing Committee should not report to the Academic Council and should inform the candidate that the Examination Board has not recommended award of the degree.

5.13 Where the Examination Board has not recommended the award of the PhD, the candidate may request the Supervisor of Examinations to bring the examiners' report(s) to the Academic Council for consideration and for a decision on whether the degree should be awarded.

5.14 A candidate may appeal a decision of the Academic Council on the award of a PhD to the Examinations Appeals Committee.

5.15 Where the Examination Board has not recommended the award of the PhD the candidate may submit a revised thesis. Submission of a revised thesis requires a statement from the supervisor(s) that the thesis has been revised under their supervision and that any weaknesses identified by the examiners have been addressed.

5.16 Unless a candidate indicates otherwise, a copy of each thesis on the basis of which the degree of PhD has been awarded shall be lodged with the library of University College Dublin. Candidates shall be invited to give permission for the thesis to be consulted in the library. All theses remain the property of

University College Dublin. Note that all students must be registered (and have paid the appropriate fee) in the year in which they present for examination. Fees for the PhD Degree do not include the examination fee; this fee is payable directly to University College Dublin.

5.17 All theses remain the property of University College Dublin.

Admission and Entry Requirements for MSc and MApplSc Degrees

1. Application for admission to the MSc Degree programmes should be made to the Head of the relevant department.
2. Application for admission to the MApplSc Degree programmes should be made to the Director of the relevant programme.
3. Candidates for the MSc Degree and MApplSc Degree must have the permission of the Faculty and the Department concerned to enter a course. Except by permission of the Faculty, they cannot at the same time engage in any other course.
4. Only those candidates who have obtained at least a Second Class Honours primary degree, or equivalent, will be permitted to proceed directly to an MSc Degree Mode I. Entry requirements for the MSc Mode II or an MApplSc are determined by individual Departments.
5. Candidates who hold a Third Class Honours primary degree, the BSc General Degree with Distinction, or the BSc General Degree followed by two years approved postgraduate experience, may be admitted to the MSc Mode I on the recommendation of the Faculty and the Department concerned. Such candidates would normally be required to pass a qualifying examination during their first year and attend the University for at least six terms.
6. The MSc Degree (Mode I) by thesis is an Honours degree. Candidates must attend for at least three terms and carry out research, under the direction of the Professor or Lecturer, in the subject concerned. The thesis presented by the candidate is to embody the results of this research. Candidates may be required to pass an examination in the subject matter of the thesis if the Examiners so decide. Three copies of the thesis must be lodged with the Supervisor of Examinations, University College Dublin, on or before the date fixed by the University.
7. The Degree of Master of Science (MSc) may be awarded in any one of the following subjects: Anatomy, Biochemistry, Botany, Chemistry, Computer Science, Experimental Physics, Geology, Industrial Microbiology, Mathematical Physics, Mathematical Science, Mathematics, Medical Microbiology, Pathology, Pharmacology, Physiology, Psychology, Statistics, Zoology.
8. Students who pass the Higher Diploma in Mathematical Science with distinction may be admitted to the MSc Degree course in Mathematical Physics or Mathematics.
9. Students who pass the Diploma in Statistics with distinction may be admitted to the MSc Degree in Statistics.

10. The MSc Degree (Mode II) by examination and the MApplSc Degree may be awarded with First or Second Class Honours. (The regulations governing these examinations are contained in Marks and Standards, available for consultation in the Library or on the web: www.ucd.ie/exams/).

11. Candidates must attend a postgraduate course for three terms. An examination will be held in the subject-matter of the course selected. Candidates may be required to submit a dissertation on a project undertaken as part of their course and this dissertation will be taken into account by the Examiners in making their recommendations.

    Courses leading to the MSc Degree are offered in the Departments of Botany, Computer Science, Mathematics, Mathematical Physics, Psychology and Statistics.

12. Candidates for the MSc Degree (Mode I Research) will be allowed a maximum of four years from the date of registration in which to complete their degree. If they have not done so within that period, they must reapply to Faculty for registration.

13. Candidates for the MSc Degrees (Mode II Examination) and MApplSc will be allowed a maximum of three years from the date of registration in which to complete their degree. If they have not done so within that time period, they must reapply to Faculty for registration.

14. The MSc Degree (Mode III) in Mathematics may be awarded with First or Second Class Honours. Candidates must attend for at least three terms, be examined in four postgraduate courses in Mathematics, and carry out research under the direction of a Professor or Lecturer in the subject. The thesis arising from this research carries 50% of the total marks, and candidates may be required to pass an oral examination in its subject matter. Three copies of the thesis must be lodged with the Supervisor of Examiners, University College Dublin, on or before the dated fixed by the University.

Application Procedure

Applications for all postgraduate programmes are made directly to the Department or Academic Centre. The following documentation is required:

1. Official transcript(s) giving date of award and standard of your primary degree and any other degrees or diplomas.

2. Copy of birth certificate.

3. Academic recommendation from the relevant professor in your own university.

4. The language of instruction at UCD is English and competence in both written and spoken English is essential. If the student's first language is not English, or if secondary education has not been taken through English, the student will need to have passed an approved test before registering for a course. The current minimum requirements are a score of 550 TOEFL points or 6 IELTS points or a pass in the Cambridge Advanced Examination, however individual departments may require a higher level. (See page 10: Proficiency in English)

5. Applicants for research degrees should provide details of topic and research programme.
6. Applicants are required to complete an application form available from Departments or the Faculty Office.
7. Applicants for taught courses from non-EU students must be submitted early in the year prior to commencement of study to allow sufficient time for processing study visas. Further details are available from the Postgraduate Studies Office.

Registration

All applicants for postgraduate study must be approved by Faculty prior to registration.

Summary of Postgraduate Courses

Masters (Taught)	Advanced Software Engineering	SCMXP0027	32
	Botany	SCMXF0001	32
	Cognitive Science	SCMXF0011	32
	Computational Science	SCMXF0025	34
	Mathematical Physics	SCMXF0007	35
	Mathematical Science	SCMXF0010	36
	Mathematics (Mode II)	SCMXF0006	37
	Meteorology	SCMXF0028	38
	Plant Molecular Biology	SCMXF0002	39
	Radiological Sciences	SCMXF0003	39
	Statistics	SCMXF0008	40
	Statistics (part-time)	SCMXP0008	40
	Ubiquitous & Multimedia Systems	SCMXF0026	41
	Mathematics (Mode III)	SCMXF0027	42
	MApplSc Computer Science	SCMXF0015	44
	MApplSc Environmental Science	SCMXF0014	44
	MApplSc Food Science	SCMXP0012	45
	MApplSc Safety Health & Welfare at Work	SCMXF0016	45
	MApplSc Safety Health & Welfare at Work (part-time)	SCMXP0017	45
PhD (Research)	All Departments in the Faculty of Science offer PhD Degrees by research. For full details, contact the appropriate department.		
	PhD Science (Non-experimental)	SCDRF0001	
	PhD Science	SCDRF0022	

Recently Introduced Postgraduate Programmes

Higher Diploma in Actuarial Science

See page 23 or contact the Department of Statistics and Actuarial Science for further details.

Degree of Master of Science in Mathematics (Mode III)

See page 42 or contact the Department of Mathematics for further details.

Degree of Master of Science in Meteorology

See page 38 or contact the Department of Mathematical Physics for further details.

Degree of PhD in Meteorological Science

Training is provided in research in meteorological science resulting in the presentation of a thesis containing original findings in a particular aspect of the field. Prior knowledge of meteorology is not essential. A First or Upper Second Class Degree in Mathematics, Mathematical Physics or a closely related physical or environmental science is required.

As many research students have little prior knowledge in meteorological science, the first two terms will involve the student taking a selection of MSc lectures.

Contact the Department of Mathematical Physics for further details.

Course Details for College Certificates, Diplomas and Higher Diplomas

Candidates for the Higher Diploma in the Faculty of Science will be allowed a maximum of two years from the date of registration in which to complete their diploma. If they have not done so within that period, they must reapply to Faculty for registration.

Certificate in Safety and Health at Work

(SCCTP0001/SCCTP0002)

This one-year, part-time course provides an introduction to all aspects of occupational safety and health; theoretical and scientific aspects are introduced as well as practical applications of risk management and hazard control. The course is designed as an extra-mural course which can be offered at UCD and/or other centres throughout Ireland. Candidates would normally be required to have Leaving Certificate or equivalent. Further information may be obtained from the

Centre for Safety and Health at Work,
NovaUCD, University College Dublin,
Belfield, Dublin 4.
Telephone No: +353-1-7163500,
email: cshw@ucd.ie.

Postgraduate Certificate in Research Methods

(SCCTP0003)

The Department of Statistics and Actuarial Science runs a postgraduate course in Research Methods aimed at students engaging in research in the Biological, Agricultural and Veterinary Sciences, particularly those who are at the beginning of their research. It comprises about 75 contact hours of lectures and practical statistical computing. Successful participants are awarded a certificate by the Department.

Course Topics:

- Statistics, the Scientific Method and Research
- Sources of Information and Review Methods
- Experimental Protocol, Recording and Data Capture
- Analysis of Variance, Oneway Classification, Block and Factorial Designs
- Introduction to Survey Sampling
- Regression and Correlation
- Growth Models in the Biological Sciences
- Categorical Data Analysis
- Linear Mixed Models and Repeated Measures
- Report Writing and Discussion

Diploma in Safety, Health and Welfare at Work

(SCDPP0001/SCDPP0002)

This is a two-year, part-time course intended for persons with a professional interest in safety and health in the workplace. It comprises the following units:

- Safety and Health Legislation
- Health and Safety Management
- Occupational Health
- Occupational Hygiene
- Chemical Safety and Toxicology
- Human and Organisational Behaviour at Work
- Safety Technology
- Statistics in Health and Safety
- Projects
- Industrial Placements

Admission to the course is not restricted to graduates. Preference is given to applicants with relevant experience. Further information may be obtained from the

Centre for Safety and Health at Work,
NovaUCD, University College Dublin,
Belfield, Dublin 4
Telephone: +353-1-716 3500.
Email: cshw@ucd.ie.

Higher Diploma in Actuarial Science

(Full-time: SCHDF0001/ Part-time: SCHDP0001)

The Higher Diploma in Actuarial Science will enable graduates from quantitative disciplines (other than Actuarial Science) to study for and obtain exemptions from many of the core technical professional exams of the Institute/Faculty of Actuaries. This Higher Diploma will appeal to those with a solid quantitative background who now have the intention of entering the actuarial profession, and who wish to expedite the qualification time necessary to become an Actuary. Students will select subject to previous study and approval of the programme director, various subject in Actuarial Statistics, Mathematics, Finance and Economics.

Duration

The Higher Diploma in Actuarial Science is a one-year full-time diploma or a two-year part-time diploma. The course begins in early September. Exams are taken at the end of each semester. Each student, depending on background and subject to approval by the programme director, selects (at least) 5 of the following 8 subjects (a subject may be composed of more than one course):

1. Financial Mathematics
2. Finance and Financial Reporting
3. Probability and Mathematical Statistics
4. Actuarial Models
5. Actuarial Contingencies
6. Applied Actuarial Statistical Methods
7. Economics
8. Financial Economics

ECTS units

Total 60 units. Each course is worth 12 units.

Admission Requirements

Academic applicants will normally be expected to have a good foundation in mathematics and/or statistics, and at least a Second Class Honours Grade II Degree in a quantitative subject such as Mathematics, Statistics, Computer Science, Engineering or Economics and/or Finance.

Application procedure

Applications should be made to

Programme Director,
Higher Diploma in Actuarial Science,
Department of Statistics and Actuarial Science,
Faculty of Science, UCD,
Belfield, Dublin 4
Telephone: +353-1-716 7153

Closing date for receipt of applications: 30th June in proposed year of study.

Higher Diploma in Advanced Software Engineering

(SCHDP0027)

In recent years Software Engineering has undergone a shift in emphasis from the traditional, process-oriented approach to more lightweight approaches where the emphasis is on the programmer and the development of flexible, maintainable code. This course aims to provide the industrial software engineer with the foundational skills necessary to apply these new developments in their own work.

This two-year, part-time degree is aimed primarily at software engineers working in industry, and the course structure reflects this. Six intensive modules are offered, initially at a rate of three a year. Each module is one week in duration, with a written examination occurring in the subsequent examination period (Summer/Autumn). The course is heavily funded under the HEA Information Technology Investment Fund (2001-2006) providing some twenty funded positions for EU students.

The course comprises a set of six examinable modules leading to the award of a Higher Diploma. If an honours standard is achieved, a dissertation component may be undertaken to achieve the MSc qualification. Each module will be run as a full-time, intensive unit over five days in order to facilitate the participation of industrial software engineers in the course. Three modules will run in each academic year.

The modules currently on offer are: Agile Processes; Meta-Programming, Reflection and Aspect-Oriented Programming; Design Patterns; Refactoring; Knowledge-Based Issues in Industrial Software; Agent-Oriented Software. More Details are provided at www.cs.ucd.ie/courses/AdvSwEng/.

Higher Diploma in Computational Science

(Full-time: SCHDF0025/ Part-time: SCHDP0025)

Computational Science is a new rapidly emerging field involving the collaboration of applied mathematicians, computer scientists and researchers from many areas of applied science. Computational Science uses the techniques of Applied Mathematics and Computer Science for the development of problem solving methodologies and robust application tools. The techniques are used in many application areas, including science, engineering and finance/economics. The programme is run jointly by the Departments of Mathematical Physics and Computer Science.

Entry Requirements

A First or Second Class Honours Degree (or equivalent) in a Science or Engineering subject with a strong mathematical content is required. The offer of a place on the course may be conditional on meeting certain requirements such as standard of the degree (for those who have yet to graduate), funding, study visa and English proficiency.

Part-time Registration

In addition to the full-time courses, students can apply to take a Higher Diploma in Computational Science on a modular basis over a longer period of time.

Course Outline
Students intending to submit for the Higher Diploma must take twelve courses with choices subject to the agreement of the course coordinators.

ECTS Credits
Each course carries 3 ECTS credits, and a Higher Diploma student must accumulate 36 credits.

Module Outlines
The courses offered will vary from year to year, and examinations in any given year will normally only be offered on courses given in that year. Recent modules include: High Performance Programming, Numerical Algorithms, Visualisation Mathematical Modelling, Parallel Algorithms, Data Mining, Computational Finance, Meteorology, Bioinformatics, Digital Signal Processing.

Course coordinator in Mathematical Physics: Dr Ted Cox.

Course coordinator in Computer Science: Dr. Neil Hurley.

Email: computational.science@ucd.ie

Higher Diploma in Computational Science (Secondary Curriculum)

(SCHDF0125)

PhD students enrolled in cognate subjects can take, subject to the agreement of their supervisor, the Higher Diploma in Computational Science on a modular basis concurrent with their PhD. See course details as for Higher Diploma in Computational Science (SCHDF0025).

Higher Diploma in Computer Science

(SCHDF0018)

The diploma course is full-time for one year and the course content consists of subject matter from the Honours Degree course in Computer Science. Further information can be obtained from the Faculty of Science Undergraduate Programmes booklet, or from the Department of Computer Science (see page 60). Admission will normally be restricted to graduates of disciplines other than Computer Science. The course is designed to give graduates of other disciplines a sound theoretical foundation and practical exposure to Computer Science.

Higher Diploma in Mathematical Science

(SCHDF0020)

This programme is aimed at graduates whose level of mathematical training is high, but below that of the BSc Degree Honours in Mathematics or Mathematical Physics, and who have demonstrated mathematical flair. It enables them to reach in one year a level of mathematical knowledge equivalent to that of BSc Honours graduates and thus, in particular, qualifies them to enter the MSc Degree in Mathematics, Mathematical Physics or Mathematical Science.

Awards

The Higher Diploma is awarded at two levels: *Pass* and *Pass with Distinction*:

- To gain a Pass, a mark of at least 40% is required in both Part I and Part II, separately.
- To gain a Pass with Distinction, a mark of at least 40% in Part I and of at least 60% in Part II is required.

To gain entry to the MSc programme in Mathematics, Mathematical Physics or Mathematical Science via this route, a Pass with Distinction is required.

There are two streams:

- Mathematics stream
- Mathematical Physics stream

Mathematics Stream

Entry requirements

Entry to the programme is automatically granted to:

1. BA graduates with at least Second Class Honours Grade I in Mathematical Studies;
2. Engineering graduates with at least Second Class Grade I Honours, who have scored highly in their Mathematics courses;
3. Actuarial and Financial Studies graduates with at least Second Class Grade I Honours;
4. Economics and Finance graduates with at least Second Class Grade I Honours, who have taken a sufficient number of advanced Mathematics courses in their programme and have gained high scores in them.

Other graduates who believe that their mathematical training provides sufficient background to cope with the programme may apply for entry to the Head of Department. Each application is considered on its merits.

Structure of the programme

This is a full year programme. Lectures are held from mid-September to the end of April. Part I examinations take place in the April-May examination period and Part II examinations take place in August.

Students take a total of ten courses, six in Part I and four in Part II. Four of the Part I courses are examined orally and two by written examinations. The four Part II examinations are written ones.

Courses

Part I:	MATH 2101, 2104, 2105, 2106 (examined orally) MATH 3109, 3110 (written examinations).
Part II:	MATH 3102, 3104, 4101 and either MATH 4105 or 4106.

ECTS units

Total 60 units. Each course is worth 6 units.

Course Outlines

Vector spaces and linear transformations **MATH 2101**

The internal structure of a vector space. Vector spaces homomorphisms. Matrices and linear transformations.

Functions of several variables **MATH 2104**

Partial and directional derivatives. Taylor series. Critical points and Lagrange multipliers. Implicit function theorem. Line integrals and multiple integrals.

Number Theory and Group Theory **MATH 2105**

Euclid's algorithm. The algebra of congruences. Groups, subgroups and homomorphisms. Lagrange's theorem. The Euler-Fermat theorem.

Introduction to Analysis **MATH 2106**

The supremum axiom. Sequences and Series. Properties of continuous functions. Power series.

Field Theory **MATH 3102**

Review of ring theory. Construction of fields. Roots of polynomials. Finite fields. Galois theory.

Functions of One Complex Variable **MATH 3104**

Cauchy-Riemann equations, Cauchy's integral theorems, Taylor and Laurent expansions, identity theorem for analytic functions, residues, applications to evaluation of integrals and summation of series, maximum-modulus principle, Schwarz's lemma, principle of the argument.

Advanced Linear Algebra **MATH 3109**

Endomorphism algebras, matrix algebras, characteristic and minimal polynomials, direct sums, canonical forms of matrices.

Metric Spaces **MATH 3110**
Euclidean spaces, metrics, normed linear spaces, convergence, continuity and uniform continuity, compactness, completeness, Banach fixed point theorem, connectedness, examples.

Ring Theory **MATH 4101**
Rings and modules. Noetherian rings. Hilbert's Nullstellensatz. Simple Rings. Semi-simple rings. Artin-Wedderburn theory. Burnside's theorem.

Differential Geometry **MATH 4105**
Differentiable atlases. Manifolds and sub-manifolds. Tangent bundles and vector fields. Riemannian manifolds. Curvature and torsion. Dynamical systems.

Functional Analysis **MATH 4106**
Topological vector spaces and linear mappings. Hahn-Banach theorem. Banach-Steinhaus theorem. Hilbert spaces. Riesz-Fischer theorem. Geometry of Banach spaces.

Mathematical Physics Stream

The Higher Diploma in Mathematical Science is available as a means of qualifying for entry to the MSc Degree courses for students whose first degree contains insufficient Mathematical background.

Entry Requirements

Entry to the course is restricted to graduates who obtain the permission of the Head of the Department. Permission will normally be given to university graduates who have attained a sufficiently high standard in Mathematics or Mathematical Physics.

The examination may be taken once only and must be taken in the academic year of registration. (Exceptions to this rule may be granted by the Faculty but only for grave reasons). Students who pass with distinction will qualify for admission to the MSc course in Mathematical Science, Mathematics or Mathematical Physics. A student's choice of options must be approved by the Departments concerned.

Structure of Programme

The diploma course is full-time for one year and the course content consists of subject matter from the Honours Degree course in Mathematical Physics.

The programme is divided in two parts:

Part I:
MAPH 3111 Methods B
MAPH 3120 Methods C
MAPH 3130 Thermal & Statistical Physics
MAPH 3161 Quantum Mechanics
MAPH 2171 Fluid Mechanics

Part II: Students take four courses from the Fourth Year courses in Mathematical Physics:
MAPH 4120 Differential Geometry
MAPH 4130 Mathematical Foundations of Quantum Mechanics
MAPH 4141 Quantum Mechanics

MAPH 4151 Statistical Mechanics
MAPH 4161 Computational Physics
MAPH 4171 General Relativity
MAPH 4181 Electromagnetic Theory
MAPH 4190 Theoretical Astrophysics
MAPH 4192 Special Topics in Mathematical Physics I
MAPH 4193 Special Topics in Mathematical Physics II
MAPH 4194 Viscous Flow
MAPH 4211 Numerical Analysis

See Department website for full course descriptions: www.ucd.ie/math-phy.

ECTS Credits

Each course in Part I carries 5 ECTS credits, while each course in Part II carries 10 ECTS credits.

Higher Diploma in Statistics (full or part-time)

(Full-time: SCHDF0021/ Part-time: SCHDP0021)

This postgraduate course provides students with a good background in statistical theory and methods, which can be used in a variety of areas of application. In general, those who successfully complete this program have excellent employment prospects. Those who wish to proceed to the Master's Degree in Statistics must attain a distinction in the HDipStat. examination.

Duration

This degree may be taken full-time over one year or part-time over two years. The programme commences in early September and finishes in May each year.

Courses

Stat P105/6/7	Statistical Theory
Stat P108	Introduction to Statistical Methods
Stat P134	Regression and Analysis of Variance
Stat P116/17	Actuarial Statistics
Stat P118	Survey Sampling
Stat P113	Categorical Data Analysis
Stat P110	Data Analysis and Statistical Computing

ECTS units

Total 60 units. Each course is worth 5.5 units

Admission Requirements

Applicants must be graduates who are familiar with the basics of the statistical approach.

Assessment

The course is examined in Summer. Examinations may be taken once only and must be taken in the academic year of registration.

Standards:	Pass	40%
	Honours	50%
	Distinction	60%

Higher Diploma in Ubiquitous and Multimedia Systems

(SCHDF0026)

The Department of Computer Science, in association with the Centre for Film Studies at University College Dublin offers this Higher Diploma course in Ubiquitous and Multimedia Systems. The course is heavily funded under the HEA Information Technology Investment Fund (2001-2006) providing some twenty funded positions for EU students.

Computing, as a discipline, is in the midst of a radical shift from the traditional desktop metaphor to the palmtop and ultimately wearable devices. This course will provide a small, highly skilled cohort of approximately twenty students with a range of skills and competencies that are ultimately needed within the context of this evolving mobile, ubiquitous, rich-media computing paradigm. Specific topics of study will include: digital media and digital motion-picture production, digital rights management, service delivery architectures, personalization, wireless and cellular technologies, distributed and agent-based systems.

The course commences from mid-September, runs for nine months, and leads successful candidates directly to the Higher Diploma qualification. Students who obtain an honours standard in their summer examination will be invited to complete, and achieve a passing grade in, a substantial dissertation over the summer months in order to obtain the MSc qualification. Students who obtain a pass standard in the examinations will obtain the Higher Diploma qualification.

Current Modules include: Context Sensitive Service Delivery; Multimedia, Graphics and Visualization; Graphics and Multimedia; Adaptive Personalization; Foundations of Film Production I; Foundations of Film Production II; Further details are available at www.cs.ucd.ie/courses/ums or from the Department of Computer Science (see page 60).

Course Details for MSc Degrees (Mode I)

All Departments in the Faculty of Science offer Masters Degrees by Research. For full details, please contact the appropriate Department. Information and contact details commence on page 47.

Course Details for Taught MSc Degrees (Mode II)

Master of Science in Advanced Software Engineering

(SCMXP0027)

In recent years Software Engineering has undergone a shift in emphasis from the traditional, process-oriented approach to more lightweight approaches where the emphasis is on the programmer, and the development of flexible, maintainable code. This course aims to provide the industrial software engineer with the foundational skills necessary to apply these new developments in their own work.

This two-year, part-time degree is aimed primarily at software engineers working in industry, and the course structure reflects this. Six intensive modules are offered, initially at a rate of three a year. Each module is one week in duration, with a written examination occurring in the subsequent examination period (Summer/Autumn). The course is heavily funded under the HEA Information Technology Investment Fund (2001-2006) providing some twenty funded positions for EU students.

The course comprises a set of six examinable modules leading to the award of a Higher Diploma. If an honours standard is achieved, a dissertation component may be undertaken to achieve the MSc qualification. Each module will be run as a full-time, intensive unit over five days in order to facilitate the participation of industrial software engineers in the course. Three modules will run in each academic year.

The modules currently on offer are: Agile Processes; Meta-Programming, Reflection and Aspect-Oriented Programming; Design Patterns; Refactoring; Knowledge-Based Issues in Industrial Software; Agent-Oriented Software. More Details are provided at www.cs.ucd.ie/courses/AdvSwEng/

Master of Science in Botany

(SCMXF0001)

This course is tailored to the individual requirements of the student. For further information contact the Department of Botany (see page 51 for details).

Master of Science in Cognitive Science

(SCMXF0011)

This interdisciplinary programme provides a one year (twelve month) taught course in Cognitive Science. Students entering the course bring a background in one of the component disciplines (Computer Science, Linguistics, Psychology or Philosophy) and are encouraged to broaden their knowledge base in the other disciplines. After a year, they are well prepared to pursue postgraduate level research in Cognitive Science. The

programme offers two semesters of taught courses which provide a solid foundation in Cognitive Psychology, Philosophy of Mind, Linguistics and Computational Modelling, as well as an in-depth study of selected research topics. Students also complete a substantial research project which is supervised by staff with active research interests. The project culminates in a minor dissertation.

General Information

This is a one-year (twelve month) course taught at the Postgraduate level. Students take courses (full-time) during the academic year. They also complete a substantial research project which leads to a minor dissertation. The project is decided upon in the first semester, and carried out in the second and during the summer.

The degree comprises courses in three main content areas, as well as a course on modelling methodologies.

The content areas are Cognitive Psychology, Philosophy of Mind, and Language. All courses are obligatory. Students who already have a substantial background in the topics covered by a given course may, at the instructor's discretion, be required to opt for guided reading in the area. The first semester provides a grounding in modelling methodologies and the three content areas, while the second semester focuses on specific computational models in the various content domains. Students will be expected to use research from at least two of the three content strands in researching and executing their project.

Participating Faculty

Courses are taught by faculty from the Departments of Computer Science, Philosophy, Linguistics and Psychology. Projects may be supervised by any participating faculty member. A full listing of current faculty is maintained on the programme website: cspeech.ucd.ie/cogsci/.

Courses

Course offerings change somewhat from year to year due to natural variability in available faculty and constant internal monitoring of course content and coverage. Individual codes are not provided for the courses, as they are grouped together collectively as COSC 3008.

The following courses are available every year:

Introduction to Cognitive Psychology

This is a 12-week (24 lecture hours) course taught in the first semester. Evaluation is by examination in the summer.

Philosophy of Mind

A 12-week (24 lecture hours) course in the first semester. Evaluation is by essay.

Introduction to Linguistics

A 12-week (24 lecture hours) course in the first semester. There are typically four modules, one each devoted to Logic, Phonology, Syntax and Semantics.

Evaluation of each module is by continuous assessment and take-home exercise.

Cognitive Modelling

This is a 12-week (24 lecture hours + 24 lab hours) course taught in the second semester. The course teaches the basics of model building using a functional programming language. Evaluation is based on practical work.

Models and Statistics

This is a 6-week (12 lecture hours + 12 lab hours) course taught in the first semester. An introduction to the experimental method and basic statistical testing are provided. Evaluation is by set exercises.

Connectionism

This is a 6-week (12 lecture hours + 12 lab hours) course taught in the first semester. Students are introduced to connectionist modelling, with an emphasis on practical work. Evaluation is by set exercises and an essay.

Neuropsychology

This is a 6-week (12 lecture hours) course, which may be taught in either semester. It introduces students to basic Neuroscience, with an emphasis on bridging the gap between Nervous Systems and Psychology. Evaluation is by essay.

Natural Language Processing

This is a 6-week (12 lecture hours + 12 lab hours) course taught in the second semester. The course covers techniques and theory of natural Language Processing. Evaluation is by summer examination. (Suggested ECTS: 2 credits) In any given year, several smaller modules may be offered. These are typically of 4 week duration. ECTS recommendations for individual modules will be provided on request (typically 2 credits/module).

Master of Science in Computational Science

(SCMXF0025)

Computational Science is a new rapidly emerging field involving the collaboration of applied mathematicians, computer scientists and researchers from many areas of applied science. Computational Science uses the techniques of Applied Mathematics and Computer Science for the development of problem solving methodologies and robust application tools. The techniques are used in many application areas, including science, engineering and finance/economics. The programme is run jointly by the Departments of Mathematical Physics and Computer Science. The course is funded under the HEA Information Technology Investment Fund (2001-2006) providing some support for EU students. Further details are available at: www.ucd.ie/computationalscience

Entry Requirements

A First or Second Class Honours Degree (or equivalent) in a Science or Engineering subject with a strong mathematical content is required. The offer of a place on the course

may be conditional on meeting certain requirements such as standard of the degree (for those who have yet to graduate), funding, study visa and English proficiency.

Course Outline

Students intending to submit for an MSc do twelve core courses and five option courses. In addition, they must prepare a written dissertation to be presented for examination by the end of August. The dissertation project is a major component of the MSc course. Its aim is to enable the student to acquire the skills needed for scientific scholarship; it enables the student to develop specific interests in the general field of computational science and may in many cases be a preparation for further research work in a particular field.

ECTS Credits

Each course carries 3 ECTS credits, while the thesis carries 9 ECTS credits. Thus MSc students must accumulate 60 credits.

Module Outlines

The courses offered will vary from year to year, and examinations in any given year will normally only be offered on courses given in that year.

Recent Core Modules include: High Performance Programming, Numerical Algorithms, Visualisation Mathematical Modelling, Parallel Algorithms.

Recent Optional Modules include: Data Mining, Computational Finance, Meteorology, Bioinformatics, Digital Signal Processing.

Course coordinator in Mathematical Physics: Dr Ted Cox.

Course coordinator in Computer Science: Dr Neil Hurley.

Email: computational.science@ucd.ie

Master of Science in Mathematical Physics

(SCMXF0007)

This is a one-year full-time taught MSc Degree by examination (Mode II) and may be awarded with First or Second Class Honours.

Candidates for the MSc in Mathematical Physics must attend postgraduate lectures on branches of Mathematical Physics (Applied Mathematics and Theoretical Physics) approved by the Department and must submit a dissertation which will be taken into account by the examiners.

The courses offered will vary from year to year, and examinations in any given year will normally only be offered on courses given in that year.

Entry Requirements

A First or Second Class Honours Degree (or equivalent) in Mathematical Science, Mathematics, Mathematical Physics or a cognate subject. The offer of a place on the

course may be conditional on meeting certain requirements such as standard of the degree (for those who have yet to graduate), funding, study visa and English proficiency. The Higher Diploma in Mathematical Science provides a route of qualifying for entry to the MA/MSc Degree courses for students whose first degree contains insufficient Mathematical background. Students who pass the Higher Diploma in Mathematical Science with distinction may be admitted to the MSc Degree programme in Mathematical Physics or Mathematical Science.

ECTS Credits:

Students are expected to take four modules and to present a dissertation. Each module and the dissertation carry 12 ECTS credits.

Course coordinator in Mathematical Physics: Professor Adrian Ottewill, email: adrian.ottewill@ucd.ie.

Course coordinator in Mathematics: Professor Tom Laffey, email: thomas.laffey@ucd.ie.

Recent Modules: Dynamical Systems, Quantum Field Theory, Quantum Statistical Mechanics, Advanced General Relativity, Quantum Theory and Gravitation, Advanced Fluid Mechanics, Theoretical Astrophysics.

Master of Science in Mathematical Science

(SCMXF0010)

This is a one-year full-time taught MSc Degree by examination and minor dissertation (Mode II) and it may be awarded with First or Second Class Honours.

Candidates for the MSc in Mathematical Science must attend postgraduate lectures on branches of Mathematical Science (Mathematical Physics and Mathematics) approved by the Departments of Mathematical Physics and Mathematics and must submit a dissertation, which will be taken into account by the examiners.

The courses offered vary from year to year and examinations in any given year will normally only be offered on courses given in that year.

Entry Requirements

A First or Second Class Honours Degree (or equivalent) in Mathematical Science, Mathematics, Mathematical Physics or a cognate subject. The offer of a place on the course may be conditional on meeting certain requirements, such as the standard of the degree (for those who have yet to graduate), funding, study visa and proficiency in English. The Higher Diploma in Mathematical Science provides a route for qualifying for entry to the MSc programme for students whose first degree contains insufficient mathematical background. Students who hold a Pass with Distinction in the Higher Diploma in Mathematical Science qualify for admission to the MSc Degree programme in Mathematical Physics, Mathematics or Mathematical Science.

ECTS Credits: Total 60 credits.
For students taking only Mathematical Physics modules or only Mathematics modules, the requirements and credits are the same as those for the MSc Degree in Mathematical Physics (SCMXF0007) or Mathematics (SCMXF0006), respectively. For students splitting their lecture programme equally between Mathematical Physics and Mathematics, the modules in Mathematical Physics and the modules in Mathematics each carry a total of 24 credits, and the dissertation carries 12 credits.

Course coordinator in Mathematical Physics: Professor Adrian Ottewill, email: adrian.ottewill@ucd.ie.

Course coordinator in Mathematics: Professor Tom Laffey, email: thomas.laffey@ucd.ie.

Recent modules: Dynamical Systems, Quantum Field Theory, Quantum Statistical Mechanics, Advanced General Relativity, Quantum Theory and Gravitation, Advanced Fluid Mechanics, Theoretical Astrophysics, Number Theory, Finite Group Theory, Representation Theory of Groups, Commutative Algebra, Quadratic Forms, Geometry of Banach Spaces, Topology, Measure Theory, Several Complex Variables, Operator Theory.

Master of Science in Mathematics

(SCMXF0006)

Entry Requirements
Graduates are required to hold a degree in Mathematics with a grade of Second Class Honours or better, and for which the course requirements are of comparable content and standard to that of the UCD Honours BSc Degree programme in Mathematics. Holders of the Higher Diploma in Mathematical Science with Distinction are eligible for entry.

Structure of the programme
Students are required to attend six courses, each containing thirty six formal lectures, and to sit written examinations in them. In addition, students are required to write, under the supervision of a member of the department, a minor thesis on a topic of current research interest in Mathematics. An expository thesis of high quality is normally acceptable, even though it does not contain significant new research results. In terms of allocation of study time, the thesis represents approximately one quarter of the year's work.

The courses, three in Algebra and three in Analysis, aim to bring a student's knowledge in the designated subjects to the level required to read and comprehend research papers. Courses are offered on a two year cyclical basis and, in their first year, PhD students are normally required to take a complementary set to those which they took in their Masters Degree course and sit "preliminary examinations" in them.

The six courses being offered in 2004-5 are:

Algebra:

MATH P310	Finite Group Theory
MATH P311	Quadratic Forms
MATH P312	Number Theory

Analysis:

MATH P315	Topology
MATH P316	Geometry of Banach Spaces
MATH P317	Several Complex Variables

An outline syllabus for each course is provided in the entry for the Masters Degree in Mathematical Science Mode III.

Each course is examined by a three hour written examination. Two courses will be examined during the December examination period, two in April-May and the remaining two in August. The minor thesis must be completed and submitted for examination on or before 30 June, 2005.

ECTS units

Total 60. Each of the six courses is worth 7.5 units and the thesis is worth 15 units.

Master of Science in Meteorology

(SCMXF0028)

This course aims to provide the scientific background needed for work in all branches of Meteorology. It will provide a solid foundation in general, synoptic and dynamic Meteorology and in numerical weather prediction. It will also provide students with the basic training required for a research career in Meteorology.

Entry Requirements

A First or Second Class Honours Degree (or equivalent) in a Science or Engineering subject with a strong mathematical content is required. No previous knowledge of Meteorology is required. The offer of a place on the course may be conditional on meeting certain requirements such as standard of the degree (for those who have yet to graduate), funding, study visa and English proficiency.

Course Outline

Students are expected to take four modules (which may be taken over one or two years) and in addition, they must prepare a written dissertation to be presented for examination by the end of August. The dissertation project is a major component of the MSc course. Its aim is to enable the student to acquire the skills needed for scientific scholarship; it enables the student to develop specific interests in the general field of meteorology and may in many cases be a preparation for further research work. In addition students undertake a short field-trip to a Met Éireann weather station.

Modules:
General and Physical Meteorology, Synoptic Meteorology and Forecasting, Dynamic Meteorology, Numerical Weather Prediction.

ECTS Credits
Students are expected to take four courses and to present a dissertation. Each course and the dissertation carry 12 ECTS credits.

Course coordinator: Met Éireann Professor of Meteorology. See page 76 for details of the Department of Mathematical Physics.

Master of Science in Plant Molecular Biology

(SCMXF0002)

Advanced theoretical and practical training in a wide range of modern techniques in Molecular Biology as applied to Plant Science is provided in a one-year full-time course. There is a strong emphasis on laboratory-based training to complement the theoretical aspects of molecular biology. A practical research project forms an essential part of the year's programme.

Candidates should possess an Honours Degree in a biological subject, a BSc General with Distinction or equivalent by practical experience. An Examination will be held in the subject matter of the course; marks will also be awarded for the year's practical and for the research project. Candidates must pass separately the written papers, the year's practical work and the minor thesis. Contact the Department of Botany (see page 51) for further details.

Master of Science in Radiological Sciences

(SCMXF0003)

Advanced academic, practical and radiological training in all branches of diagnostic imaging is provided by a one-year, full-time course in collaboration with the Institute of Radiological Sciences at the Mater Misericordiae Hospital and the Diagnostic Imaging and Nuclear Medicine Departments at St. Vincent's Hospital.

Candidates should be graduates in Medicine who have passed their fellowship examination in Radiology or equivalent (i.e. MD in Radiology) and actively engaged in diagnostic radiology. Contact the Department of Experimental Physics (see page 65) for further details.

Master of Science in Statistics

(Full-time: SCMXF0008/ Part-time: SCMXP0008)

MA/MSc in Statistics by course work and minor research thesis.

Duration

This degree may be taken over one year or part-time over two years. The programme commences in early September and finishes in August each year.

Courses: (Total of 60 ECTS)

Students select eight courses from the following:

STAT P416/7	Actuarial Statistics I & II
STAT P413	Categorical Data Analysis
STAT P418	Survey Sampling
STAT P412	Experimental Design
STAT P431	Linear Models with Complex Structure
STAT P450	Mathematical Statistics*
STAT P433	Nonparametric Statistics
STAT P434	Regression*
STAT P435	Survival Analysis
STAT P422	Stochastic Processes
STAT P414	Time Series Analysis

Courses marked with an * are compulsory unless the student has already taken equivalent courses. If necessary, additional courses will be offered to students who have already studied some of the above topics in sufficient detail. Each student's choice of courses must be approved by the postgraduate studies committee.

Thesis

In addition to the course work, students undertake a research project supervised by a member of staff. During the year students make oral presentations on their research project and write a minor thesis describing their work and results.

Entry requirements

At least a Second Class Honours Degree (or equivalent) in Statistics or a cognate subject area is required for entry. Interested students who do not qualify for direct entry to this programme may qualify by taking the Higher Diploma in Statistics (a distinction is required for entry to the MA/MSc programme).

Funding

Some funding for students participating in this programme is available in the form of a limited number of research grants and scholarships. In addition, students are paid for giving tutorials to undergraduate classes. The types and sources of funding along with the tutorial payments are as follows:

Type	Source	Amount (euro) Per annum	Tutorials (euro) Per annum	Fee Remission*
Research Demonstrator	UCD	5,363**	3,037 **	50%
Scholarship	Dept of Statistics	2,000	Up to 3,037	50% *
Tutor	UCD		Up to 3,037	50% *

It is not necessary to apply separately for funding, all applications to the programme will be automatically considered for funding. Contact the Department of Statistics and Actuarial Science (see page 88) for further details.

Master of Science in Ubiquitous and Multimedia Systems

(SCMXF0026)

The Department of Computer Science, in association with the Centre Film Studies, University College Dublin offers this Master of Science course in Ubiquitous and Multimedia Systems. The course is heavily funded under the HEA Information Technology Investment Fund (2001-2006) providing some twenty funded positions for EU students.

Computing, as a discipline, is in the midst of a radical shift from the traditional desktop metaphor to the palmtop and ultimately wearable devices. This course will provide a small, highly skilled cohort of approximately twenty students with a range of skills and competencies that are ultimately needed within the context of this evolving mobile, ubiquitous, rich-media computing paradigm. Specific topics of study will include: digital media and digital motion-picture production, digital rights management, service delivery architectures, personalization, wireless and cellular technologies, distributed and agent-based systems.

The MSc qualification is achieved in conjunction with the Higher Diploma in Ubiquitous and Multimedia Systems. To qualify for the MSc, students must achieve an Honours standard in the summer examinations of the Higher Diploma in Ubiquitous and Multimedia Systems. The MSc qualification is based on the completion of a substantial dissertation over the summer months.

Current modules include: Context Sensitive Service Delivery; Multimedia, Graphics and Visualization; Graphics and Multimedia; Adaptive Personalization; Foundations of Film Production I; Foundations of Film Production II; Further details are available at www.cs.ucd.ie/courses/ums, or contact the Department of Computer Science (see page 60)

* 50% fee remission applies to those who give at least 6 tutorial hours per week during term.
** Restricted to EU citizens

Course Details for MSc Research Degrees (Mode III)

Master of Science in Mathematics

(SCMXF0027)

This programme is being offered for the first time this year.

Entry Requirements
These are the same as for the MSc Mode II (page 37). In making a decision on which programme is appropriate for them, students should take into consideration the greater emphasis on research in the Mode III programme, and the requirement to be able to report significant original results in their thesis, in that stream.

Structure of the programme
Students take four courses, two in Algebra and two in Analysis from the six listed below.

Each course will be examined by a three hour written examination. Two of the courses will be examined in December and the remaining two in April/May 2005. Students are required to write, under the supervision of a member of the department, a major thesis. The thesis must contain some significant new research results. In terms of allocation of study time, the carrying out of the requisite research and production of the thesis is to be viewed as constituting just over 50% of the total year's work. The thesis must be completed and submitted for examination on or before August 31, 2005.

ECTS units
Total 60. Each of the four courses is worth 7.5 units and the thesis is worth 30 units.

Course Outlines

Finite Group Theory **MATH P310**
Finite p-groups. Nilpotence. Frattini subgroups. Minimum number of generators. Normal structure. Automorphisms. Results of Burnside, Hall, Alperin. Sylow theory. Existence of complements. Schur-Zassenhaus theorem. Transfer. Normal p-complement theorems of Burnside and Frobenius. Finite solvable groups and Hall subgroups.

Quadratic Forms **MATH P311**
The isometry classification of forms. Introduction to Witt rings. Quaternion algebras. Cyclic algebras. Central simple algebras. The Brauer group. Clifford algebras.

Number Theory **MATH P312**
The law of quadratic reciprocity. Rings of algebraic integers. Integral bases. Quadratic and cyclotomic extensions. Unique factorisation of ideals in rings of integers. The ideal class group of a Dedekind domain. The group of units of a number field. The decomposition of primes in number fields.

Topology **MATH P315**

Point-set topology. Separation axioms. Compactifications. Arzela-Ascoli theorem. Spaces of continuous functions. Homotopy. Connectedness. Strong deformation retracts.

Geometry of Banach Spaces **MATH P316**

Banach spaces. Open mapping and closed graph theorem. Hahn-Banach theorem. Duality theory. Weak topology. Reflexivity. Representation of the classical Banach spaces. Krein-Milman theorem. Special topics.

Several Complex Variables **MATH P317**

Holomorphic mappings. Cauchy-Riemann equations. Cauchy's formula for a polydisc. Maximum principle. Identity principle. The complex rank theorem. Schwarz lemma. Domains of holomorphy. Pseudoconvexity and plurisubharmonic functions. Symmetric domains. Invariant metrics.

Contact the Department of Mathematics or Mathematical Physics for further details. (see pages 79 and 76)

Course Details for Master of Applied Science Degrees

Courses leading to the Degree of Master of Applied Science are offered in the following areas:

Master of Applied Science in Computer Science

(SCMXF0015)

This is a one-year course open to those who have achieved a good Second Class Honours in the Higher Diploma in Computer Science or equivalent and to suitably qualified Science graduates. The course has been designed with a specific emphasis on practical applications of relevance to the internet and e-commerce sector. The course will comprise six modules as prescribed by the Department of Computer Science. Students will be required to undertake a substantial project to be written up as a thesis to be submitted by the end of the academic year. Contact the Department of Computer Science for further details (see page 60).

Master of Applied Science in Environmental Science

(SCMXF0014)

Overview of Course Structure and Objectives

This is a one year course which is open to both EU and non-EU nationals. It is designed for recent graduates in Science, Engineering or Architecture or graduates employed by Local Authorities, State or Semi-state agencies, Industry and Environmental Consultants. The programme aims to provide graduates with a thorough understanding of environmental science and its application in solving environmental problems. It is the only environmental science course in Ireland to include a major input (25%) from the Department of Civil Engineering relating particularly to water quality, hydrology and waste treatment processes. The other parts of the course are taught by members of the Departments of Zoology, Botany, Geology and the Environmental Institute, UCD.

Students take all of the following units:

- Applied Chemistry and Microbiology, Solid Wastes and Hydrology
- Environmental Impact Assessment
- Experimental Design & Statistics
- Freshwater Ecology and Biological Assessment of Water Quality
- Global Change Ecology
- Wildlife Management/ Conservation Science
- Marine/Coastal Ecology
- Geology

- Ecotoxicology
- Vegetation Ecology
- Environmental Economics
- Environmental Law and Policy

Workshops (e.g. GIS) are provided and tutorials are organised where students have not the relevant background in certain subject areas. At least five of the courses have associated field trips. Practitioners from various environmental fields give guest lectures to provide an insight to the practical application of the course material.

Apart from the lectures and tutorials students undertake a wide range of practical exercises such as chemical analyses, environmental scoping, experimental design and literature reviews. They also complete a three-month research-based project which exposes students to the excitement of scientific research and provides training in data collection methods, analyses, interpretation and reporting. Indeed reporting, in its many different forms, constitutes a key aspect of the training provided. The various practical assignments, including the thesis, constitute 40% of the final mark.

For further details please contact the Course Director Dr. Mary Kelly Quinn in the Zoology Department (see page 91).

Master of Applied Science in Food Science

(SCMXP0012)

A two-year, part-time course open to graduates in Science, Agriculture, Engineering, Veterinary Medicine, Commerce and Medicine. For further information contact the Department of Food Science (see page 70).

Master of Applied Science in Safety, Health and Welfare at Work

(Full-time: SCMXF0016/ Part-time: SCMXP0017)

The course is open to graduates who achieve a high standard in the Diploma in Safety, Health and Welfare at Work. It can be taken on a one year, full-time basis or on a two year, part-time basis.

The entry requirements for Science graduates will be the same as for the MSc. (entry requirements are listed on page 15). Suitably qualified graduates of other faculties and universities will be admitted on the recommendation of the Faculty. Candidates must attend the prescribed course of lectures and practicals. An examination will be held in the subject matter of the course selected. Candidates may be required to submit a dissertation on a project undertaken as part of their course and this dissertation will be taken into account by the Examiners in making their recommendation. Contact the Centre for Safety, Health and Welfare for further details (see page 83).

Degree of Doctor of Science (DSc) on Published Work*

A candidate shall be deemed eligible to present for the Degree of Doctor of Science by submitting published work to the National University of Ireland, which must embody the results of original research and a common theme sufficient to indicate that the candidate has achieved a special competence in this aspect of the subject. The work submitted must be of a high standard and contain original contributions to the advancement of knowledge and learning which has given the candidate international distinction in the field of study. Fifteen terms must elapse from the date of obtaining the Degree of Bachelor of Science of the NUI. Further information may be obtained from the National University of Ireland, 49, Merrion Square, Dublin 2, website: www.nui.ie.

* See Calendar of the National University of Ireland.

Departments, Staff and Research Interests

Faculty of Science Office

Room 128, Science Lecture Building, Telephone: +353-1-716 2355,
Fax: +353-1-716 2439, email: sue.philpott@ucd.ie, website: www.ucd.ie/science.

Dean of the Faculty	Professor Michael J. Kennedy
Associate Dean (First Science)	Dr Joe Carthy
Associate Dean (Undergraduate)	Mr Hubert Fuller
Associate Dean (Postgraduate)	Professor Ciaran Regan
Associate Dean (Research and Development)	Professor Mark Keane
Associate Dean (Teaching and Learning)	Dr Padraig Dunne
Senior Faculty Administrator	Ms Gillian Goodbody
Faculty Administrator	Ms Sue Philpott
Senior Executive Assistant	Mr Kieran Moloney
Student Advisors	Rev. Tony Coote
	Ms Aoife Fitzgerald
	Mr Owen Fallon

Biochemistry

Programmes Offered:

MSc (by research)	SCMRF0001
PhD (by Research)	SCDRF0022

Website: www.ucd.ie/biochem/

Email: annette.forde@ucd.ie

Contact for Postgraduate Study Enquiries:
Ms Annette Forde, Department of Biochemistry, Conway Institute of Biomolecular and Biomedical Research, University College Dublin, Belfield, Dublin 4.
Phone: +353-1-716 6772, Fax: +353-1-283 7211

The Biochemistry Department is committed to achieving excellence in both teaching and research. Its academic staff are all engaged in research on a range of topics including biotechnology, enzymology, molecular biology, cell signalling and neurochemistry. The department is housed in the Conway Institute of Biomolecular and Biomedical Research which was named after Professor E. J. Conway FRS, the first Professor of Biochemistry and Pharmacology in University College Dublin. This is a state of the art research facility, which promotes interaction between researchers from biological, medical, veterinary and chemical sciences. The Biochemistry department has numerous research projects, which range from basic to applied studies on topics such as diabetes, Alzheimer's disease and cancer. The department has an international mix of academic staff, postgraduate

students and postdoctoral workers from Ireland, France, Britain, Serbia, Spain, Denmark, Sri Lanka, Nigeria, Hungary, China, Sudan, and Germany etc. This provides a true multinational climate, which welcomes scientists from all parts of the world. Postgraduate students are funded by many research agencies including Science Foundation Ireland, Irish Research Council for Science Engineering and Technology, the Wellcome Trust, University College Dublin and the Irish Health Research Board. Detailed descriptions of the current research projects of the academic staff are given on the Biochemistry department website. Brief descriptions of the research areas of academic staff members are listed below. Persons interested in applying for postgraduate positions should contact the potential supervisor and the Departmental Administrator Annette Forde.

Academic Staff

J. Paul G. Malthouse BSc (Lond) PhD (Lond)
Head of Department

Associate Professor of Biochemistry

Research interests: We are synthesising protease inhibitors and using NMR to determine how they interact with specific proteases which can be targeted to treat various diseases such as AIDS, cancer and Alzheimer's disease. We hope that these studies will help us optimise their ability to inhibit the specific proteases involved in a range of diseases. Other research topics include: Stereospecificity of the exchange of the alpha-protons of amino acids catalysed by tryptophan synthase. Chemical and enzymatic synthesis of isotopically enriched amino acids, enzyme inhibitors, cofactors and substrates. www.ucd.ie/biochem/jpgm/

Paul C. Engel BA (Oxon) DPhil (Oxon)

Professor of Biochemistry

Research interests: Protein engineering, enzyme function, biotechnology and disease. The group is studying various $NAD(P)^+$ or FAD-dependent dehydrogenases, using 3-D structure and molecular genetic tools. With amino acid dehydrogenases we are engineering novel specificities for industrial production of high-value chiral amino acids. Separately we are seeking the molecular basis of allosteric control in this family by constructing hybrid oligomers. With IMPDH1, acyl CoA DH and glucose 6-phosphate DH we are investigating the functional effects of human disease mutations (those in IMPDH1 cause blindness) and protein folding defects are a recurrent theme. www.ucd.ie/biochem/pce/

Stephen G. Mayhew BSc (Sheffield), PhD (Sheffield), MRIA

Associate Professor (Redox Biochemistry)

Research interests: Flavin coenzymes are involved in a wide range of reactions. The interactions between flavin and host protein that determine these reactions are being investigated with flavodoxins and nicotinamide nucleotide-dependent flavoenzymes by enzymological and chemical modification methods and by site-directed mutagenesis. Structural changes are investigated through collaborative work with X-ray crystallographers and NMR spectroscopists. www.ucd.ie/biochem/sgm/

Geraldine Butler BA (Dub), PhD (Dub)

Senior Lecturer

Research interests: Analysis of virulence characteristics in *Candida* species. Candida species are the most common cause of fungal infection in man, and are responsible for the majority of hospital acquired fungal infections. We are identifying and studying virulence characteristics in three *Candida* species – Candida albicans, Candida glabrata and Candida parapsilosis. We have identified genes that from C. glabrata that increase virulence, and genes in Candida albicans that decrease virulence. We are the first group to carry out a sequence survey of the genome of C. parapsilosis. This organism is a particular source of infection in premature babies, where it grows as a mat (or biofilm) on indwelling medical devices. www.ucd.ie/biochem/gb/Lab

Jana Haase Diplom (Leipzig), PhD (Free University of Berlin)

Lecturer

Research interests: Structure, function and regulation of monoamine neurotransmitter transporters. Neurotransmitter transporters are integral plasma membrane proteins, which function in the re-uptake of neurotransmitters following their release into the synaptic cleft. The serotonin transporter (SERT) in particular is an important pharmacological target for widely used antidepressants as well as for drugs of abuse, such as cocaine, and MDMA (ecstasy). Current research projects in our group include the identification and characterisation of SERT-interacting proteins, studies on the role of lipid rafts in trafficking and regulation of SERT, and the identification of SERT residues involved in substrate and inhibitor binding as well as residues associated with the transport mechanism. www.ucd.ie/biochem/jh

Therese Kinsella BSc, PhD

Senior Lecturer

Research interests: Signal transduction, (Cardio)Vascular biology, Cell & Molecular Biology. The prostanoids as potent lipid mediators mediate diverse cellular effects under a range of physiologic and pathophysiologic/disease settings. Our research largely focuses on delineating the diverse cell signalling mechanisms mediated by the prostanoids (e.g. prostacyclin and thromboxane within the cardiovascular system); investigation of the structure/function relationships of their receptors; regulation of prostanoid receptor gene expression; the role of isoprenylation of the prostacyclin receptor and of members of the $p21^{ras}$ subfamily of (proto)oncoproteins. www.ucd.ie/biochem/btk/

Bartholomew Masterson BSc, PhD

Senior Lecturer

Research interests: Studies microbial pollution at the catchment level using molecular biologic techniques, funded by the EU INTERREG-IIIa and INTERREG-IIIb programmes. Carries out background studies for the proposed new Bathing Water Directive, funded by the Environmental Protection Agency. Carries out research and development for novel biomedical devices, and on the molecular basis of inflammation and sepsis funded by Industry. www.ucd.ie/biochem/bfm/

Gethin J. McBean BA Mod (Dub) PhD (Southampton)

Lecturer

Research interests: Neurochemistry: Characterisation of amino acid transport systems in the mammalian brain, and the mechanism of their regulation by intracellular signalling pathways. Analysis of neurotransmitter transporters as sites for drug action, and their association with neurodegenerative disease. Effects of gliotoxic amino acids on neurotransmitter uptake and metabolism in neurones and astrocytes. www.ucd.ie/biochem/gmb/

Philip Newsholme BSc (Birmingham) DPhil (Oxon)

Senior Lecturer

Research interests: 1) Assessment of pancreatic beta-cell metabolism using nuclear magnetic resonance (NMR); 2) Metabolism of nutrients and nutrient-dependent insulin secretion coupling in pancreatic beta cells; 3) Effect of nutrients on gene expression in cells of the immune system and pancreatic beta cells; 4) Molecular defects underlying beta-cell failure in Diabetes; 5) Neutrophil function in health and disease; 6) Molecular aspects of nutrition and inflammation associated with exercise. www.ucd.ie/biochem/pnn/

Jens Erik Nielsen PhD (EMBL/Marburg)

Lecturer

Research interests: Structural bioinformatics & enzyme catalysis. My research is concerned with understanding the working principles of enzyme catalysis. To understand enzymes I develop theoretical models, perform calculations in an attempt to predict the properties of mutant enzymes, and ultimately I test the validity of these ideas in wet-lab experiments. http: //enzyme.ucd.ie/group_members/jens/

Margaret Worrall BA Mod (Dub) PhD (Cantab)

Lecturer

Research interests: Characterisation of serpin proteins and CoA biosynthetic enzymes: 1) Investigation into the mechanism and physiological function of the serpin (serine protease inhibitor) family of proteins, in particular the promising therapeutic agents, maspin and PEDF, and the cancer associated serpins SCCA-1 and SCCA-2. Characterisation of new serpin genes and identification of serpin targets using yeast-2-hybrid technology. 2) Coenzyme A biosynthetic enzymes as targets for new antibiotics. www.ucd.ie/biochem/mw/

Dominic Walsh BSc, PhD (Queens, Belfast)

Wellcome Trust Senior Research Lecturer

Research Interests: A-beta PP/A-beta, Molecular and Cell biology, Neurobiology, Protein structure/chemistry, Signal transduction, Electrophysiology. www.ucd.ie/biochem/dw/

Brenda Brankin BSc (QUB), PhD (QUB)

Research Associate

Research Interests: Effects of the vascular endothelial growth factor family of peptides on blood retinal barrier function; Peptide growth factor-induced changes in phosphorylation of Occludin and Zonula Occludens-1 tight junction proteins and effects on transendothelial cell resistance and blood retinal barrier permeability; Blood retinal barrier and blood brain barrier *in vitro* models; Cytokine activation of brain endothelial cells; Cytokine gene expression in Lentiviral infections: www.ucd.ie/biochem/bb/

Lorraine Brennan BA MoD (Dub), PhD (Southampton)

Research Associate

Research Interests: Applications of Nuclear Magnetic Resonance Spectroscopy (NMR) in the study of cellular metabolism: 1) Investigating the effects of anti-diabetic drugs on metabolism in pancreatic beta cells. 2) Probing the mode of action of gliotoxins in astrocytes. 3) Metabolic profiling of disease state and action of drugs using a metabonomic/metabolomic approach: www.ucd.ie/biochem/lb/

Chandralal Hewage BSc (Sri Lanka), MPhil (Sri Lanka), PhD (Edinburgh)

NMR Manager

Research Interests: My main area of research lies on the structural elucidation of small and macro molecules by NMR and molecular modelling techniques. I am also interested in three dimensional solution structure calculations for peptides and small molecules using various modelling methods such as distance geometry (DG), dynamical simulated annealing (DSA) and molecular dynamics (MD) using variety of molecular modelling software. At the moment we are studying the solution structural details of Glucose-dependent insulinotropic polypeptide (GIP) and Endothelin peptides by NMR spectroscopy and modelling: www.ucd.ie/biochem/ch/

Botany

Programmes Offered:

MSc (by research)	SCMRF0001
MSc Botany (taught)	SCMXF0001
MSc Botany Mode III (taught)	SCMXF0024
MSc Plant Molecular Biology (taught)	SCMXF0002
PhD (by research)	SCDRF0022

Website: www.ucd.ie/botany/botany.htm

Contact: Departmental Administrator

Contact for postgraduate enquiries:

Departmental Administrator, Department of Botany, University College Dublin, Belfield, Dublin 4, Ireland. Telephone: +353-1-716 2253; Fax: +353-1-716 1153.

The mission of the Department of Botany is the pursuit of excellence in research and teaching in Plant Science. The Department is dedicated to the pursuit of scholarly

research of international quality in plant science. It has particular interests in (a) plant cell biology, molecular biology, plant genetics and cell and tissue culture; (b) fungal and mycorrhizal biology, and (c) plant environment interactions, ecology and ecophysiology studies of Irish flora, vegetation and habitats, especially those of international importance. Staff, postdoctoral fellows and postgraduate students (mainly at PhD level) are involved in a wide range of research projects funded by national and international agencies. The Department attracts high-quality research students from UCD and other Irish universities, and from universities in the UK, EU, USA, Middle East, Far East, Africa and Australia.

Applicants for PhD Degrees should have a strong background in Botany, Plant Science or Biology, with First or Second Class Honours at degree level (or equivalent). The research interests of academic staff in the Department are listed below, together with web addresses that will allow prospective students to review research opportunities. Postgraduate students are typically funded through research grants obtained from state agencies, industry and the University. Scholarship schemes and Faculty funding for postgraduate students are detailed elsewhere in this booklet.

The research groups in the Department are –

Plant Biotechnology Group. The group conducts basic and applied research in plant cell biology, molecular biology, plant genetics, and cell and tissue culture. Specific interests include the structure and function of plant cells; developmental genetics of root hair development in *Arabidopsis;* use of molecular genetics in the study of plant development, including root formations, developmental phase change in woody species, and light regulated gene expression; DNA-based amplification methods for the detection of plant viruses; programmed cell death in plants; developmental cell-cell signalling in higher plants; stomatal guard cells and signal transduction in plants; activities of ion channels; the role of sphingosine-1-phosphate as a calcium-mobilising messenger in plants; role of sphingosine-related compounds in plant signal transduction; plant cell culture, propagation and secondary metabolite production *in vitro*; biosynthesis of plant secondary metabolites from medicinal plants in plant cell cultures.

Fungal and Mycorrhizal Biology Group. The group conducts basic and applied research on fungal and mycorrhizal biology. Specific interests are in fungal ecology, physiology and taxonomy; fungi causing disease and deterioration; wood-rotting fungi; mushrooms/toadstools; the fungi of Ireland; mycology and plant nutrition: identification of mycorrhizal associations of plants; physiology and ecology of mycorrhizas; influence of mycorrhizas on carbon metabolism of plants; ability of mycorrhizas to protect plants against metal toxicity; role of mycorrhizas in the propagation, growth and establishment of trees.

Environment and Plant Ecology Group. The group conducts basic and applied research on a range of environmental topics. Specific interests are in Irish habitat and vegetation studies (peatlands, fens, swamps, heathlands, grasslands, sand dunes, saltmarshes and woodlands); peatland ecology, conservation, cutaway restoration and impacts of grazing and tourist traffic on peatland systems; plant ecophysiology and climate change; environmental physiology of photosynthesis and photoprotective processes; ecology and ecophysiology of plants and vegetation of the karstic Burren Region on the west coast of

Ireland; plant ecotoxicology; wetland ecology and waste water treatments; rehabilitation of mine waste; plant population biology and demography.

Academic Staff

Gerard Doyle BSc, PhD, MI BioII
Head of Department
Associate Professor (Vegetation Science)
Research interests: Irish vegetation, ecology and conservation. Phytosociology and classification of Irish vegetation types. Ecology and conservation of bogs, fens, heathlands, sand dunes, swamps and woodlands. Environmental impacts on Irish vegetation types. Impacts on peatlands – fuel extraction, grazing and tourist impacts. Peatland conservation. Blanket bog cutaway rehabilitation and restoration.
www.ucd.ie/botany/doyle/doylehome.html

Martin W. Steer BSc (Bristol), PhD (QUB), DSc (Bristol), MRIA, FRMS, MIBioII
Professor of Botany
Research interests: Structure and function in plant cells. Developmental genetics of root hair development in *Arabidopsis*.
www.ucd.ie/botany/Steer/PlantCellBiolHome.html

Bruce A. Osborne, BA (Stirling), PhD (Nottingham)
Associate Professor (Plant Ecophysiology)
Research interests: Ecophysiology; plant optical properties; biophysics and plant metabolism; energy transduction and the environmental physiology of photosynthesis and photoprotective processes; carbon metabolism in mycorrhizal symbioses; nitrogen metabolism; biology of the *Gunnera-Nostoc* symbiosis.
www.ucd.ie/botany/osborne/ecophysiol.htm

Hubert T. Fuller BSc
Senior Lecturer
Associate Dean (Undergraduates) Faculty of Science
Research interests: Mycology. Fungal ecology, physiology and taxonomy; fungi causing disease and deterioration; wood-rotting fungi; mushrooms/toadstools; fungi of Ireland.
www.ucd.ie/botany/acad.htm#Fuller

Thomas F. Gallagher BSc, PhD
Senior Lecturer
Research interests: Plant and molecular genetics. Use of molecular genetics in the study of plant development, including root formations, developmental phase change in woody species, and light regulated gene expression. DNA-based amplification methods for the detection of plant viruses.
www.ucd.ie/ssuab/tommy.htm

Paul F. McCabe BSc, MSc, PhD

Lecturer

Research interests: Programmed cell death in plants. Developmental cell-cell signalling in higher plants.

www.ucd.ie/botany/acad.htm#mccabe

Derek T. Mitchell BSc (Sheffield), PhD (Sheffield)

Senior Lecturer

Research interests: Mycology and plant nutrition: identification of mycorrhizal associations of plants; physiology and ecology of mycorrhizas; influence of mycorrhizas on carbon metabolism of plants; ability of mycorrhizas to protect plants against metal toxicity; role of mycorrhizas in the propagation, growth and establishment of trees.

www.ucd.ie/botany/mitchell/mitchell.html

Carl Ng BSc (Singapore), MSc (Singapore), PhD (Lancaster)

Lecturer

Research interests: Stomatal guard cells and signal transduction in plants. Activities of ion channels. The role of sphingosine-1-phosphate as a calcium-mobilising messenger in plants. The role of sphingosine-related compounds in plant signal transduction. www.ucd.ie/botany/acad.htm#ng

Marinus L. Otte MSc (Vrije), PhD (Vrije)

Senior Lecturer

Research interests: Wetland ecology; biogeochemistry of wetland soils; utilisation of wetlands for water quality control and for rehabilitation of mine waste; responses of wetland plants to environmental stress; sulphur in wetland plants.

www.ucd.ie/wetland/wethome.htm

James White BSc, MSc (Wales), DSc

Senior Lecturer

Research interests: Plant demography. www.ucd.ie/botany/acad.htm#White

Graham Wilson, BSc (Lond), PhD (Birm)

Senior Lecturer

Research interests: Plant cell culture, propagation and secondary metabolite production in vitro. Biosynthesis of plant secondary metabolites from medicinal plants in plant cell cultures. www.ucd.ie/botany/acad.htm#Wilson

Chemistry

Programmes Offered:

MSc (by research) SCMRF0001
PhD (by research) SCDRF0022

Website: http: //chemistry.ucd.ie

Email: chemistry@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Elizabeth Armstrong, Department of Chemistry, UCD, Belfield, Dublin 4, Telephone: +353-1-716 2165; Fax: +353-1-716 2127.

The Chemistry Department maintains an active research programme in both traditional and emerging areas of chemistry and has active collaborations with research groups and industry worldwide, and students commonly carry out part of their research in other universities. Typically there are around one hundred MSc and PhD students working in the department, with a substantial fraction of international students. Currently all postgraduate degrees in chemistry are conducted by research and thesis. The current research areas are briefly summarized below.

In **Organic Chemistry**, chiral synthesis and catalysis mediated by organometal and organo-main group reagents have assumed major importance and our interests include the synthesis of chiral metal ligands, palladium, phosphorus and sulphur being the principal non-organic components of these reagents. Applications extend from total synthesis to ring-opening metathesis polymerisation. Further work in this area utilises Sharpless oxidation protocols and development of metal-salen catalysts. There are also developing programs in the areas of combinatorial and porphyrin chemistry. There is an emphasis on medicinal chemistry and especially modification of carbohydrates to provide novel modulators of protein function. In the carbohydrate field there has been a long standing interest also in host-guest and supramolecular chemistry of cyclodextrins. Physical organic research groups focus on the stability and reactivity of high energy intermediates including benzynes, enols of carboxylic acids and amides, nitrilium ions, protonated and hydrated aromatic molecules and iron tricarbonyl stabilised carbocations.

In **Inorganic Chemistry** there is emphasis upon synthetic and structural organometallic and coordination chemistry, including transition metal compounds of carbon monoxide, isonitriles, various sulphur-containing ligands, and the reactions and fluxional behaviour of metal-bound organic ligands. This work is complemented by reactivity studies and spectroscopy based mainly upon Fourier Transform Infrared and multinuclear High Field Magnetic Resonance measurements. A computational chemistry group carries out theoretical calculations at various levels of approximation ranging from semi-empirical to DFT with applications to the above mechanistic and spectroscopic studies of organometallic molecules. Further inorganic interests include the design of metal chelates with biological activity based on bio-inorganic chemistry research.

Physical Chemistry, maintains a strong presence in the important traditional areas of the discipline whilst rapidly extending its interests in various new experimental and

theoretical fields at the interfaces with biotechnology and advanced materials and increasingly is focusing on solving, through fundamental and applied research, major problems that impact adversely on quality of life. There is a strong emphasis on collaboration between experiment and theory and between the various research groups. There are research programs in the fields of biocolloids, soft matter and biomaterials, nanochemistry, electrochemistry and biosensors, chemical kinetics and photochemistry, environmental heterogeneous catalysis, theory and computation, solution chemistry and colloids.

The Centre for Synthesis and Chemical Biology is a new collaboration in the chemical sciences among University College Dublin, Trinity College Dublin and the Royal College of Surgeons of Ireland. The centre was established in Dublin in December 2001 after being awarded €26 million by the Irish Government's Higher Education Authority Programme for Research in Third Level Institutions (PRTLI). Currently there are thirty-seven principal investigators and their research groups within the Centre. Areas of interest within the centre include: carbohydrates, combinatorial chemistry, natural products, enzyme mechanisms, enzymes in synthesis, asymmetric catalysis, medicinal chemistry, bioinorganic chemistry, drug delivery, sensors and imaging.

The Chemistry Department has state of the art research facilities including: high field NMR spectroscopy, GC-MS facilities, X-ray diffraction, dedicated microanalysis laboratory, high performance computing, atomic force microscopy, ultrasound spectroscopy, infrared, UV-visible and fluorescence spectroscopies, HPLC, GC and electrophoresis, stopped-flow and temperature-jump instruments, precision calorimetry and densitometry, rheology and dynamic light scattering among others. There is also access to the University's electron microscopy facility.

Academic Staff

Michael J. McGlinchey, BSc (Manchester), PhD (Manchester)
Head of Department
Professor of Inorganic Chemistry
Research interests: Syntheses, structures and dynamics of organo-transition metal complexes, use of organometallic moieties to stabilize short-lived intermediates, metal complexes of hormonal steroids and their biological activity, sterically crowded molecules, molecular propellers and gear-wheels.

Kenneth Dawson, BSc (QUB), MSc (Mathematics, QUB) DPhil (Oxon)
Professor of Physical Chemistry
Research interests: "Soft matter" systems (sometimes called colloids) and biomaterials. We study the methods by which nano- and meso- particles (including biopolymers such as DNA and proteins) assemble into superstructures, and those processes that sometimes prevent them from doing so. This involves deeper understanding of the 'glass-transition', and a range of different theoretical and experimental techniques are used to study the problem.

Anthony F. Hegarty, BSc, PhD, DSc, FRSC, MRIA

Professor of Organic Chemistry

Research interests: Synthesis and the use of kinetic techniques to examine reactivity, catalysis and stereospecific reactions including sterically hindered ketones, novel enols of carboxylic acids, amides, peptides and esters; theoretical studies of concerted catalysis is being examined in order to model the extraordinary catalytic efficiency of enzymes.

Donald Fitzmaurice BSc, PhD, DSc

Associate Professor (Nanochemistry)

Research interests: The preparation and characterization of nanoscale building blocks, including nanoparticles and supermolecules; the assembly of these building blocks in solution and the organization of the resulting functional nanoscale components at patterned substrates; breakthrough applications in nanoscale electronics and targeted drug delivery based on the resulting insights and capabilities.

Patrick Guiry, BSc, PhD

Associate Professor (Synthetic Organic Chemistry)

Research interests: Catalytic asymmetric synthesis; the design and preparation of new chiral ligands and the testing of their metal complexes in organic synthesis mechanism in asymmetric catalysis; total synthesis of biologically important compounds.

Anthony Manning, BSc (Manchester), PhD (Manchester)

Associate Professor (Inorganic Chemistry)

Research interests: Organometallic Chemistry: spectroscopic, structural and mechanistic studies on the reactions of metal carbonyl and isocyanide complexes with electrophiles and nucleophiles, in particular, complexes of the Donor-Ï-Acceptor type which have non-linear optical properties or are two-photon absorbers.

Robert D. O'Neill, BSc, PhD

Associate Professor (Electrochemistry)

Research interests: A member of the NeuroAnalytical Chemistry Laboratories (NACL). Design and application of sensors for molecules that are important in biomedical systems, particularly brain function. Most devices incorporate a polymer-enzyme composite membrane for optimum selectivity.

Howard Sidebottom BSc (St. Andrews), PhD (St. Andrews)

Associate Professor (Atmospheric Chemistry)

Research interests: The reactions of atoms and radicals in the gas phase, current interest focuses on of kinetic and mechanistic studies of reactions of hydroxyl and alkoxy radicals.

W. Earle Waghorne BSc (Guelph), PhD (Australian Nat. Univ.)

Associate Professor

Research interests: *Solution Chemistry:* Solvation of both electrolytes and non-electrolytes in aqueous, non-aqueous and mixed solvents, development of solvation theory, measurement of solution properties with applications in areas such as the environmental impact of new solvents and process fluids.

Noel Fitzpatrick BSc, PhD

Senior Lecturer

Research interests: Theoretical Chemistry: theories of bonding and the reactivity of molecules, calculation of the properties of chemical species and reaction pathways.

Declan Gilheany BSc (QUB), PhD (QUB)

Senior Lecturer

Research interests: Synthetic organic chemistry: Homogeneous catalysis, especially catalytic asymmetric synthesis, development of combinatorial chemistry methods of catalyst discovery, organic chemistry of main group elements, especially phosphorus, bismuth and indium.

Vitaly Buckin BSc (Moscow), MSc (Moscow), PhD (Inst. Bio. Phys., Russ. Acad. Sci.)

Lecturer

Research interests: Physical Chemistry of Biocolloids: hydration of biological molecules and membranes; state of water near polymer and membrane surfaces; polyelectrolyte effects and structure of ionic atmosphere, elasticity, conformational and phase transitions and stability of biocolloids, development and application of ultrasonic spectroscopic techniques.

Mike Casey BSc, PhD (London), DIC

Lecturer

Research interests: Synthetic Organic Chemistry: design and synthesis of novel 'tuneable' ligands and catalysts for use in catalytic asymmetric reactions, new stereoselective synthetic methods using organosulfur compounds, total synthesis of biologically active natural products including potent anti-cancer and anti-inflammatory agents.

Grace Morgan BSc (QUB), PGCE (QUB), PhD (Open University)

Lecturer

Research interests: Inorganic Chemistry: design of high value materials and biomimicry, development of a library of ligands with different architectures, planar, macrocyclic and tripodal, for the complexation of d-metal ions to investigate interactions with extended pi-systems and cluster formation.

Paul V. Murphy BSc, PhD

Lecturer

Research interests: Synthetic organic chemistry and chemical biology: Organic synthesis of glycosides and glycoconjugates, syntheses of conformationally rigid bivalent scaffolds for biological application; development of angiogenesis inhibitors as potential anti-cancer agents.

Donal F. O'Shea, BSc, PhD

Lecturer

Research interests: Synthetic organic chemistry: The development of methodologies for the rapid combinatorial library synthesis of bioactive molecules; the development of synthetic methodology exploiting organolithium addition to unactivated alkenes for the synthesis of structurally diverse pharmacophores; the development of anti-cancer photodynamic therapeutic agents.

Wilhelm Risse, Vordiplom (Marburg), Chemie-Diplom (Marburg) PhD (Bristol)

Lecturer

Research interests: Polymer Chemistry: transition metal catalysed polymerisation reactions of linear and cyclic olefins, including ring-opening olefin metathesis polymerisations (ROMP) and insertion polymerisations; polymer optical fibres, fluorinated polymers; rigid-rod polymers and polymers with good thermal stability.

Peter Rutledge BSc (Auckland), MSc (Auckland), DPhil (Oxon)

Lecturer

Research interests: Chemical Biology: applying the principles and tools of chemistry to probe biological problems, specifically the use of synthetic chemistry and structural biology to study enzyme mechanism, with the aim of developing improved biocatalysts and biomimetic catalysts with applications in environmental decontamination and synthesis.

Matthias Tacke, MSc (Münster), PhD (Münster), Habilitation (Karlsruhe)

Lecturer

Research interests: Synthetic Inorganic Chemistry: metal vapour synthesis, synthesis of organometallics and low-valent main group element compounds, which are of interest as new materials and as catalysts.

Edward Timoshenko MSc (Moscow), PhD (Moscow)

Lecturer

Research interests: Theoretical and Computational Chemistry: development and application of statistical mechanical and computational techniques for studying the conformational structure and dynamics of biological and synthetic polymers.

Ann-Marie O'Donoghue BSc, PhD

Assistant Lecturer

Research interests: Chemical Biology: Application of the methodologies of physical organic chemistry to biological systems; the study of the mechanisms of enzyme-catalyzed reactions in solution; directed evolution of new biocatalyst libraries to rival natural enzymes.

James A. Sullivan BSc, PhD

Assistant Lecturer

Research interests: Heterogeneous Catalysis: development of improved catalysts and processes for selective catalytic reduction (SCR) of NOx in an oxidising environment using a variety of catalysts and reductants.

Cognitive Science

Programmes Offered:

MSc Cognitive Science (taught)	SCMXF0011

Website: http: //cspeech.ucd.ie/cogsci/

Further Information

Further information on the programme may be had from either of the course directors:

Fred Cummins BA (Dub), MA (Indiana), PhD (Indiana)

Lecturer

Computer Science Department, Phone: +353-1-716 2902; email: *fred.cummins@ucd.ie*

Maria Baghramian BA (QUB), PhD (Dub)

Senior Lecturer

Department of Philosophy, Phone: +353-1-716 8125; email: *maria.baghramian@ucd.ie*

Computer Science

Programmes Offered:

HDip Computer Science	SCHDF0018
HDip Computational Science	SCHDF0025
HDip Computational Science (Part-time)	SCHDP0025
HDip Ubiquitous and Multimedia Systems	SCHDF0026
HDip Computational Science Secondary Curriculum	SCHDF0125
HDip Advanced Software Engineering	SCHDP0027
MSc (by research)	SCMRF0001
MSc Computational Science (taught)	SCMXF0025
MSc Ubiquitous and Multimedia Systems (taught)	SCMXF0026
MApplSc Computer Science (taught)	SCMXF0015
PhD (by research)	SCDRF0022

Website: www.cs.ucd.ie

Email: cs.secretary@ucd.ie or Patricia.geoghegan@ucd.ie

Contact for Postgraduate Studies Enquiries:
Postgraduate coordinator: Dr. Nick Kushmerick

Administrative staff: Ms Clare Comerford/Ms Angela Logue, (Ms Patricia Geoghegan for information on Higher Diploma in Computer Science course) Computer Science Department, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 2483/716 2469 Fax: +353-1-269 7262.

Academic Staff

Gregory M. P. O'Hare BSc (Ulster) MSc (Ulster)
Head of Department
Senior Lecturer
Research Interests: Multi-Agent Systems (MAS), Distributed Artificial Intelligence (DAI), mobile computing, ubiquitous systems, context sensitive service delivery, Collaborative Virtual Environments (CVEs), Social Robotics. Further information available at: www.cs.ucd.ie/staff/gohare

Mark T. Keane BA, MA (Dub) PhD (Dub)
Professor of Computer Science
Associate Dean (Research and Innovation), Faculty of Science
Research Interests: Analogy, Conceptual Combination, Cognitive Modelling, Case-Based Reasoning, Adaptive Information Systems Further information available at: www.cs.ucd.ie/staff/mkeane

Barry Smyth BSc, PhD (Dub)
Professor, Digital Chair of Computer Science
Research interests: Case-based Reasoning, Machine Learning; User Modelling & Profiling; Intelligent Multimedia Application. Further information available at: www.cs.ucd.ie/staff/bsmyth

Julie Berndsen BA (Dub), DPhil (Bielefeld)
Senior Lecturer
Research Interests: Multilingual Speech and Language Technology, Computational Linguistics, Finite State Techniques. Further information available at: http://muster.ucd.ie/~julie

Michela Bertolotto BSc (Genova, Italy) PhD (Genova, Italy)
College Lecturer
Research Interests: Geographic Information Systems (GIS), Spatial Data Handling, Web-based GIS, Mobile GIS, Efficient spatial data transmission; Multiple map representations. Further information available at: www.cs.ucd.ie/staff/mbertolotto

Chris Bleakley BSc (QUB), PhD (DCU)

College Lecturer

Research Interests: Computer Architecture, Processors, Application Specific Instruction Set Architectures, Design for Low Power, Digital Signal Processing. Further information available at: www.cs.ucd.ie/staff/cbleakley/home/

Joe Carthy BSc, PhD

Senior Lecturer

Associate Dean (First Science) Faculty of Science

Research Interests: Intelligent Information Retrieval, Document Summarisation, Information Representation, Incident Report Analysis and Retrieval, and Data Mining. Further information available at: www.cs.ucd.ie/staff/jcarthy

Arthur W. S. Cater BA (Cantab), PhD (Cantab)

College Lecturer

Research Interests: Artificial Intelligence in Computational Linguistics, in Transport Microsimulation, and in Computer Go. Further information available at: www.cs.ucd.ie/staff/acater

Rem W. Collier BSc (Bristol) MSc (UMIST) MPhil (UMIST) PhD

Assistant Lecturer

Research Interests: Agent-Oriented Software Engineering, Agent Programming Languages, Agent Toolkits, Multi-Agent Systems, Mobile Agents, Agent Architectures, Open Application Infrastructures, Ubiquitous Computing. Further information available at: www.cs.ucd.ie/staff/rem

Fintan Costello BSc, PhD (Dub)

College Lecturer

Research interests: Computational models of concept combination; classification in combined categories; creative natural language. Further information available at: www.cs.ucd.ie/staff/fcostello

Fred Cummins BA (Dub), MA (Indiana), PhD (Indiana)

College lecturer

Research Interests: Speech timing, Motor control, coordination, Cognitive Science, Personal Identity and Sense of Self, Multimodal Interfaces, Speech and Language Technology. Further information available at: www.cs.ucd.ie/staff/fcummins

Damian Dalton BSc, HDip Computer Science

College Lecturer

Research interests: Logic design and synthesis, VHDL Verilog; Testing and verification of hardware; Digital Simulation techniques and Simulation Engines; Parallel Processing. Further information available at: www.cs.ucd.ie/staff/ddalton

John Dunnion BSc, MSc

College Lecturer

Research Interests: Intelligent information retrieval; document summarisation; incident report analysis and retrieval; computational linguistics; recommender systems; humanities computing; XML technologies. Further information available at: www.cs.ucd.ie/staff/jdunnion

Franz Geiselbrechtinger Diplom Mathematiker (Munich), Dr rer nat (Munich)

College Lecturer

Research interests: Formal methods in software development; computer aided construction of formal specifications and program derivation, semantics of programming languages. Further information available at: www.cs.ucd.ie/staff/franz

Neil Hurley BSc, MSc (Dub) PhD (Dub)

College Lecturer

Research interests: Digital watermarking, information hiding, Computational Science, Parallel Computing, High Performance Computing, Grid Computing, Robustness of Information Retrieval Algorithms, Knowledge-based Engineering. Further information available at: www.cs.ucd.ie/staff/nhurley and www.ihl.ucd.ie

Tahar Kechadi DEA (Lille), MSc (Lille), PhD (Lille)

College Lecturer

Research interests: Grid Computing, Grid Middleware, Multistage Interconnection Networks, Distributed Datamining, Optimisation Techniques, Neural Networks, Heuristic Techniques, Handwriting Recognition. Further information available at: http://renoir.ucd.ie/~tahar/

Nicholas Kushmerick BS (Carnegie Mellon University), MSc (Washington), PhD (Washington)

College Lecturer

Research Interests: Machine learning, artificial intelligence, information retrieval, information extraction, intelligent information services. Further information available at: www.cs.ucd.ie/staff/nick

Alexey L. Lastovetsky MSc (Moscow Aviation Institute) PhD (Moscow Aviation Institute) DrSci (Russian Academy of Sciences)

College Lecturer

Research Interests: Parallel and Distributed Computing, Parallel and Distributed Programming Languages and Systems, Heterogeneous Computing, Grid Computing. Further information available at: www.cs.ucd.ie/staff/alexeyl

Lorraine McGinty BSc, PhD

College Lecturer

Research Interests: Adaptive Retail, Recommender Systems and User Feedback, Case-Based Reasoning, AI and the Internet, Personalization, e-Commerce, Collaborative Filtering, Information Retrieval, Mixed-Initiative Interaction. Further information available at: www.cs.ucd.ie/staff/lmcginty

Henry B. McLoughlin BSc

College Lecturer

Research interests: Software engineering; formal methods in software development; educational technology. Further information available at: www.cs.ucd.ie/staff/hbmc

Eleni E. Mangina MSc in AI (Edinburgh), MSc in Agriculture (Athens), PhD (Strathclyde)

College Lecturer

Research Interests: Multi-Agent Systems (MAS), Distributed Artificial Intelligence (DAI), Agent-Oriented Software Engineering, Agent-based intelligent tutoring systems, Applications of Intelligent Agents in engineering, e-commerce, bioscience. Further information available at: www.cs.ucd.ie/staff/emangina/default.htm

Liam Murphy BE, MS (Calif.), PhD (Calif.)

Senior Lecturer

Research Interests: Multimedia Networking; Performance Issues in Computer and Telecommunications Networks; Performance Assessment of Web-based Systems. Further information available at: www.cs.ucd.ie/staff/lmurphy/default.htm

Mel Ó Cinneide BSc, MSc, PhD (Dub)

College Lecturer

Research interests: Software Reengineering; Refactoring; Design Patterns; Agile Processes. Further information available at: www.cs.ucd.ie/staff/meloc

Ahmed Patel MSc (Dub), PhD (Dub)

Senior Lecturer

Research Interests: Computer networks; network security and management; investigative computing; distributed search engines. Further information available at: www.cs.ucd.ie/staff/apatel/default.htm

Gianluca Pollastri MSc (Florence), PhD (California, Irvine)

College Lecturer

Research interests: Bioinformatics, Machine Learning, Protein Structures of Prediction. Further information available at: www.cs.ucd.ie/staff/gpollastri

Guenole C. M. Silvestre Ingenieur (France), PhD (Dub)

College Lecturer

Research Interests: Multi-modal signal processing, Digital Communications, Coding, Security, Watermarking. Further information available at: www.cs.ucd.ie/staff/gsilvestre and www.ihl.ucd.ie

Tony Veale BSc, MSc, PhD (Dub)

College Lecturer

Research Interests: Theory and applications of creative language use (metaphor, analogy, metonymy, polysemy); design of lexical ontologies and thesauri; creative computation; computational models of humour; exploiting and enhancing WordNet for natural language processing. Further information available at: www.cs.ucd.ie/staff/tveale

Environmental Science

Programmes Offered:

MApplSc (taught)	SCMXF0014

Email: mary.kelly-quinn@ucd.ie

Further Information

Further information on the programme may be had from the Course Director Dr. Mary Kelly-Quinn in the Department of Zoology (see page 91).

Experimental Physics

Programmes Offered:

MSc (by research)	SCMRF0001
MSc Mathematical Physics (taught)	SCMXF0007
MSc Radiological Sciences (taught)	SCMXF0003
PhD (by research)	SCDRF0022

Website: www.ucd.ie/physics

Email: Marian.Hanson@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Marian Hanson (Secretary to Head of Department), Experimental Physics Department, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 2210; Fax: +353-1-283 7275.

The Department of Experimental Physics offers MSc and PhD postgraduate degrees by Research to students who have obtained a good Honours Primary degree in Physics or a closely allied discipline. The MSc is normally obtained within 1-2 years of the primary degree while the duration of completing a PhD is usually between 3-4 years.

In recent years strong research links and collaborations have been formed with scientists and laboratories primarily in EU and other European countries and also in North America. A notable feature of this international collaborative research is the mobility of academic staff and research students between UCD and the various research institutions abroad.

Currently, the research activities of the Department are focussed into the following broad areas of specialisation – Atomic and Molecular Physics; Experimental Particle Physics; High Energy Astrophysics; Radiation Physics, Radioecology and Isotope Dating; Natural Radioactivity and Radon Epidemiology; Space Science and Advanced Materials; Applied Physics.

Much of **Atomic and Molecular Physics** research at UCD is focussed on the use of plasmas produced by high power pulsed losers (50 MW – 3GW) as sources of extreme ultraviolet (EUV) radiation and ions for Spectroscopic studies. Currently the biggest challenge internationally in EUV physics is the development of radiation sources for lithography for use in the semiconductor industry. The UCD group is regarded as one of the key players internationally and work involves both experimental aspects such as target and laser pulse optimisation and theoretical modelling of laser plasma dynamics and emission processes. Other activities include photoabsorption and emission studies of atoms and ions for electronic structure determination, applications of statistical methods for characterising complex spectra, synchrotron based photoelectron spectroscopy and spectroscopy of electron-ion collisions. The group currently has at its disposal a range of high power pulsed losers and state-of the art vacuum spectrographs are E imaging systems.

Particle Physics experiments study nature at its most fundamental and microscopic level. The building blocks of matter, quarks and leptons, and the fundamental interactions of nature, electromagnetism, weak, strong and gravitational interactions, are investigated with advanced experimental techniques. The fields of astrophysics and cosmology are strongly interlinked with particle physics, concerning both model building and experimental techniques.

Experiments in particle physics are performed at powerful particle accelerators, reaching the highest possible collision energies. Large-scale detectors measuring the collisions are built and operated by collaborations consisting of many universities and research institutions around the world. Accelerators and detectors integrate highly advanced techniques in superconductivity, vacuum technology, mechanical and electronic engineering, semiconductor technology, fast electronics, data handling, computation and visualisation. Huge numbers of collision events are recorded and analysed to measure properties of fundamental particles and interactions precisely, and to hunt for manifestations of unexpected new physics. Experimental particle physics is the driving force for managing and exploiting computing resources distributed world wide (GRID computing).

The UCD particle physics group in the Department of Experimental Physics is member of collaborations experimenting at Fermilab close to Chicago, and at CERN, the European Laboratory for Particle Physics, in Geneva, Switzerland. Further information is available at: www.ucd.ie/physics/research.htm#part.

High Energy Astrophysics is one of the most dynamic and exciting areas of all the contemporary research conducted by Astronomers and Astrophysicists. The discipline is focussed on the Physics and Astrophysics of high energy processes in the context of expanding our cosmic perspective and our understanding of how the Universe evolves. Aspects of High Energy Astrophysics include Stellar Evolution, Supernova Explosions, Pulsating Stars, Black Holes, Active Galactic Nuclei, Gamma ray bursts, particle acceleration mechanisms and shock waves, extragalactic background light and aspects of quantum gravity and cosmology. The subject combines experiment with theory and is empowered by computing, mathematics, statistics, electronics, modern optics and aspects of engineering. Much of modern Astrophysics involves collaboration and the use of world class astronomical facilities in other countries. The UCD group is a founder member of the VERITAS collaboration which involves a large team of Astrophysicists from the US, Canada, UK as well as Ireland.

The **Radiation Physics, Radioecology and Isotope Dating Laboratory** at UCD specialises in the study of natural and artificial radionuclides in the environment, with emphasis on the processes controlling their transfer and behaviour in marine and terrestrial ecosystems. The Laboratory is equipped with the most modern facilities for low-level alpha spectrometry, low-level beta spectrometry, high resolution gamma- and X-ray spectrometry, and radionuclide dating, including radiocarbon. The Laboratory also possesses a high-quality radiochemical unit, where advanced radiochemical separation techniques are routinely employed to separate elements such as uranium, thorium, plutonium, americium, curium, technetium, radiostrontium and radiocaesium. The Laboratory offers expertise in the fields of environmental modelling, radiation protection, radionuclide metrology, radioactive waste disposal and nuclear test site evaluation and rehabilitation. Over the years, the Laboratory has enjoyed substantial financial support from a number of external bodies, including the European Commission, which has enabled it to make a significant contribution to research in these related fields. In the past decade, the Laboratory has successfully co-ordinated four major multinational projects within the framework of successive EC Nuclear Fission Safety Programmes. The Laboratory has also conducted a number of studies for retrospectively assessing climate change and reconstructing past environments utilising radioisotopic dating methods. Other interests include imaging analysis techniques in medical physics and radiation protection issues regarding medical accelerators.

Natural Radioactivity and Human Exposure: Excluding radiotherapy it is estimated that over 85% of the lifetime radiation dose received by most people in Ireland is due to natural sources of radiation. The major component of these natural doses is due to irradiation of lung tissue following the inhalation of short-lived alpha particle emitting decay products of radon gas. At the high levels of exposure to these species which have been found in parts of Ireland a not insignificant risk of lung cancer may occur. As an input into improved lung dosimetry and risk assessment investigations into the properties of these species have been carried out, with EU funding, over many years by the UCD group in collaboration with many laboratories in Europe. This work has concentrated on the retrospective assessment of radon exposures by developing techniques to measure the concentration of the long lived alpha emitter ^{210}Po in glass surfaces using solid state nuclear track detectors. In this context the UCD group is a participant in the EU Residential Radon Epidemiological Project. In addition the group is co-ordinating a

project in the Balkans on general population exposure to both natural uranium and to DU (depleted uranium) from weapons used there in recent conflicts. Currently collaboration is also taking place with partners at TCD and DIT in a health study of Irish bar workers exposed to environmental tobacco smoke.

The main activity of the **Space Science Group** is focussed on the huge cosmic explosions called Gamma-Ray Bursts. These explosions occur at a rate of two per day. They seem to occur at the end of the life of a massive star with the formation of a black hole. The time profiles and spectra of the Gamma-Ray bursts are studied with the Earth orbiting observatories INTEGRAL, XMM and Spitzer for determination of the emission mechanism and the central source. Once a Gamma-Ray burst is detected its co-ordinates are distributed globally within seconds. The afterglow from the burst is then observed with a robotic telescope installed by the group in South Africa. The effect of a Gamma-Ray burst on cosmic materials is also studied in the laboratory and at a powerful synchrotron. It has been proved that a Gamma-Ray burst can melt small pieces of cosmic material to form chondrules.

Research in the **Applied Physics** Group takes Physics into interdisciplinary areas; remote sensing, ocean colour science and water quality monitoring being the principle areas of interest. Research activity has included work into problem areas in the design of instruments for satellite and airborne remote sensing, work on marine ocean colour research, and the exploitation of this research in creating measurement solutions for the water industry. Optics, systems design, modelling, simulation and early phase market research are all aspects of the work of the group. A campus company, Spectral Signatures Ltd, is the commercial route for the exploitation of this work (www.ucd.ie/spectral).

Academic Staff

Gerard O'Sullivan BSc, PhD, CPhys, MInstP, MRIA
Head of Department
Associate Professor (Atomic and Molecular Physics)

Padraig Dunne BSc, PhD, MInstP
Senior Lecturer, Associate Dean (Teaching and Learning), Faculty of Science

Emma Sokell BA (Oxon), PhD (Manchester), MInstP
Lecturer
Research interests: Spectroscopy of atoms and ions produced in laser generated plasmas. Development of laser plasmas as extreme ultraviolet sources. Spatial and temporal analysis of laser plasmas. Atomic structure calculations. Statistics of complex spectra. Synchrotron based photoelectron spectroscopy. Further information available at: www.ucd.ie/speclab

Martin Grünewald Diplom (Aachen), PhD (CalTech)
Professor of Experimental Physics (Experimental Particle Physics)

Ronan McNulty BSc, PhD (Liverpool)

Lecturer

Research interests: Studies of the nature of matter at its most fundamental, with emphasis on the analysis of data recorded at particle accelerators reaching the highest possible center-of-mass energies. These include the CDF and D0 experiments at Fermilab's Tevatron, and the forthcoming CMS experiment at CERN's latest and most powerful machine, the new large hadron collider (LHC), due to come on stream in 2006.

David J. Fegan MSc, PhD, MRIA

Associate Professor (High Energy Astrophysics)

John Quinn BSc, PhD

Lecturer

Research interests: Tera-electron-volt (TeV) Gamma-ray Astronomy. Multi-wavelength studies of Active Galactic Nuclei (AGN). Time and spectral variability of Active Galactic Nuclei. Studies of Galactic sources of high-energy photons including pulsars and supernova remnants. Quantum Gravity. Gamma-ray bursts. Computational Astrophysics and development of algorithms for application in High Energy Astrophysics. Co-Principal Investigator for development of the VERITAS project (Very Energetic Imaging Telescope Array System) 2000-2005.

Peter Mitchell BSc, PhD, CPhys, FInstP

Associate Professor (Radiation Physics)

Luis León Vintró LicFis (Barcelona), PhD

Lecturer

Research interests: Radiation Physics and Radioistope Dating; Radionuclide Metrology and Actinide Radiochemistry; Radioecology and Radioecological Modelling; Nuclear Safety and Nuclear Test Site Rehabilitation. Radiation Protection. Other interests include PET imaging techniques and accelerator-based radiotherapy techniques.

James McLaughlin MSc, PhD, CPhys, FInstP

Senior Lecturer

Research interests: National study of population radiation doses from natural radioactivity. Development of radon control techniques. Radon epidemiology. Exposure to environmental tobacco smoke (ETS) and to depleted uranium (DU).

Brian McBreen BSc, PhD, MRIA

Associate Professor (Space Science)

Lorraine Hanlon MSc, PhD, MInstP

Lecturer

Research interests: Spectral and temporal properties of a range of astrophysical sources such as gamma-ray bursts, star-forming galaxies and active galacticnuclei, using ground-based and space-based telescopes. Construction of arobotic telescope for the detection

of gamma-ray burst afterglows and extrasolar planets. Development of space-based detectors for international astronomy missions. Design and coding of software for astronomical data analysis. Synthesis and characterisation of novel astromaterials in the laboratory and at international synchrotron facilities.

Eon O'Mongain BSc, MSc, PhD

Senior Lecturer

Research interests: Applied optics, including the calibration of optical instruments. Development of instrumentation for remote sensing and water monitoring. Commercial exploitation of research. Associated campus company, Spectral Signatures Ltd.

Food Science

Programmes Offered:

MSc (by research)	SCMRF0001
MApplSc Food Science (part-time)	SCMXP0012
PhD (by research)	SCDRF0022

Website: www.ucd.ie/foodsci/

Email: nuala.haugh@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Nuala Haugh, Department of Food Science, Faculty of Agriculture, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 7708, Fax: +353-1-716 1147

Geology

Programmes Offered:

MSc (by research)	SCMRF0001
PhD (by research)	SCDRF0022

Website: www.ucd.ie/geology

Email: sarah.procter@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Sarah Procter, Geology Department, Science Building, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 2331, Fax: +353-1-283 7733

The mission of Department of Geology is the pursuit of academic excellence in teaching and research in Geology. The Department is committed to active encouragement and promotion of scholarly research in Earth Sciences and will continue to consolidate research strengths and develop new sustainable research areas to the benefit of the Department, Faculty and University. It will continue to seek to attract the best students and researchers to the Department.

Applicants for PhD Degrees are expected to have a strong background in Geology/Earth Sciences with a First or Upper Second Class BSc Degree or equivalent.

Many successful applicants have completed MSc Degrees prior to commencing PhD research. Postgraduate students are typically funded through research grants obtained from state agencies, industry and from the University. Details of potential research projects are advertised on the departmental website. Interested applicants should contact either the supervisor or Ms Sarah Procter, the departmental administrator. Almost all postgraduates in the Department are graduates of other universities.

Research

Staff in the Department of Geology are actively involved in a wide range of research activities. These cover a broad spectrum of specialities with a seamless transition between pure and applied research. In recent years significant research funding has been obtained from the EU, INTAS, ESF, the oil and gas industry, the minerals industry, the nuclear industry and national agencies. Most members of the academic staff are members of international research teams and networks and this is strongly encouraged. A number of major research groups have developed within the Department. These comprise academic staff, postdoctoral researchers and postgraduate students. The main groups are:

Fault Analysis Group. The group conducts basic research on all aspects of faults and other types of fractures. Their research groups are also applied to practical problems, including the analysis and modelling of hydrocarbon reservoirs and mineral deposits.

Geophysics Research Group. The group carries out research focussing on the nature and complexity in crustal systems. Specific interests are in crustal imagery, fluid-rock interactions, earthquake and stress diffusion and earthquake triggering.

Geochronology and Isotope Geochemistry Group. The group carries out research on geochronology, the geodynamic evolution of continental crust, igneous and metamorphic petrology, sediment provenance, environmental geochemistry and climate change.

Marine and Petroleum Geology Group. The group carries out research focussing on the crustal and sedimentary geodynamics of the North Atlantic margin, basin analysis and petroleum prospectivity, and depositional mechanisms in deep-water basins.

Palaeobiology and Biostratigraphy Research Group. The group is involved with studies of the sedimentology, palaeontology and biostratigraphy of Carboniferous rocks in Ireland, SW Spain and Spitzbergen; the palaeobiology of trace fossils and ichnofabrics, and the exceptional preservation of non-biomineralised tissues.

Academic Staff

The Department of Geology currently has 10 academic staff (one serving as Dean of the Faculty of Science), 5 technical staff and 1 departmental administrator. There are 12 postdoctoral researchers and 26 postgraduate students. The members of the academic staff are as follows:

Patrick M. Shannon BSc, PhD, Finst Pet, PGeo, MRIA
Head of Department
Associate Professor of Petroleum Geology
Research interests: Petroleum exploration, basin analysis and marine geology. Basin modelling, sequence stratigraphy, sedimentology, and petroleum prospectivity of the sedimentary basins in the North Atlantic.

Michael J. Kennedy MA (Dub), PhD (Dub), PGeo, FGS
Dean of Science
Professor of Geology
Research interests: Structural geology and tectonics, particularly in the Caledonian/Appalachian orogen. Currently on leave from Department, serving as Dean.

Christopher J. Bean BA, MSc, PhD (Dub)
Senior Lecturer
Research interests: Crustal seismology, seismic wave scattering, seismic image enhancement, earthquake genesis.

J. Stephen Daly BA (Dub), PhD (Keele), PGeo, FGS
Senior Lecturer
Research interests: Radiogenic isotope geochemistry and geochronology applied to Precambrian crustal evolution, metamorphic processes and metal exploration. Mineral-scale investigation of granite petrogenesis.

Peter D. W. Haughton BA (Dub), PhD (Glasgow)
Lecturer
Research interests: Sedimentology, reservoir architecture, turbidite systems, studies of sediment provenance, evolution of the Caledonian-Appalachian and Betic orogens.

P. Francis McDermott PhD (Open University), PGeo
Senior Lecturer
Research interests: Isotope geochemistry and geochronology applied to late Pleistocene climate sensitive deposits (speleothems and lake sediments). Chemical weathering and its influence on atmospheric evolution. Trace metal mobility in the environment.

Julian F. Menuge BSc (Leicester), PhD (Cantab), PGeo
Lecturer
Research interests: Geochronology and isotopic studies of hydrothermal mineralisation. Radiogenic isotope and geochemical studies of sediment provenance, magmagenesis and crustal evolution in the Lower Palaeozoic and Proterozoic rocks of Laurentia and Baltica.

Patrick J. Orr BSc (QUB), PhD (Bristol)

Lecturer

Research interests: Palaeobiology of trace fossils, particularly their implications for ecospace utilisation in Early Phanerozoic deep marine environments. The exceptional preservation of fossils.

Ian D. Somerville BSc (QUB), PhD (QUB), PGeo, FGS

Senior Lecturer

Research interests: Carboniferous biostratigraphy and sedimentology. Micropalaeontology and corals. Evolution of sedimentary basins and tectonics. Upper Palaeozoic reefs and mud mounds. Base metal mineralisation.

John J. Walsh BSc, PhD, PGeo

Senior Lecturer

Research interests: Geometry and kinematics of faults. Effects of faults and fractures on fluid flow. Evolution of sedimentary basins. Analysis and modelling of hydrocarbon reservoirs and mineral deposits.

Departmental Research Facilities

The Department of Geology is equipped with standard rock preparation and mineral separation facilities needed for geological research. In addition, the Department possesses facilities for isotopic analysis of Rb-Sr, Sm-Nd and U-Bp by thermal ionisation mass spectrometry, an atomic absorption spectrophotomer, fluid inclusion and cathodoluminescence equipment. There are workstation facilities (Landmark and Charisma), seismic mapping and interpretation software, a UNIX cluster and Linux Beowolf for parallel applications. Access to other analytical facilities, both within the Faculty of Science and in other faculties, include SEM and TEM. Access to other facilities such as electron microprobe, XRF and XRD, ICP and stable isotope analyses can usually be arranged with other institutions.

Industrial Microbiology

Programmes Offered:

MSc (by research)	SCMRF0001
PhD (by research)	SCDRF0022

Website: www.ucd.ie/indmicro/

Email: geraldine.neylan@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Geraldine Neylan, Department of Industrial Microbiology, Ardmore House, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 1512, Fax: +353-1-716 1183.

The mission of the Department of Industrial Microbiology is to promote knowledge and economic advancement through excellence in research and teaching in the area of

microbiology. As the only Department of Industrial Microbiology in Ireland the Department acts as an essential resource for Irish Bioindustry.

Industrial Microbiology is particularly interested in organisms with commercial potential and in the application of basic scientific knowledge in the expansion and development of Biotechnology. Thus, it is the basis of a wide range of industrial processes ranging for synthesis and manufacture of healthcare products (antibiotics, flavours, preservatives, organic acids and solvents), beverages (beers, lagers, wines, spirits) and foods (cheeses, fermented milks, yoghurts, pickles, sauerkraut, vinegar etc.) to its application in agriculture (inoculants for composting, nitrogen fixation and silage making, bioinsecticides, effluent treatment etc.) and environmental management (industrial waste treatment and disposal, sewage treatment, treatment of oil spills, metal extraction etc.).

MSc and PhD Degrees are awarded on the presentation of a thesis based on original research. The Department of Industrial Microbiology offers a wide variety of research opportunities to graduates wishing to register for a postgraduate degree. Research can be carried out under the supervision of members of the Department in any of the areas described below.

The Department of Industrial Microbiology has state-of-the-art research facilities including: Beckman CEQ 2000 automatic sequencer, BioRad Multiimaging system, tissue culture facilities, laboratory and pilot scale fermentation facilities, and HPLC, GC and FPLC chromatography systems and access to Electron Microscopy facilities.

Academic Staff

Evelyn M. Doyle BSc, PhD
Head of Department
Senior Lecturer
Research interests: Biodegradation and Environmental Microbiology – Application of microorganisms in the degradation of xenobiotic compounds, in particular chlorinated aromatic compounds; bioremediation of contaminated sites. Novel applications and mechanism of action of microbial enzymes, particularly those involved in xenobiotic degradation.

Catherine T. Kelly BSc, PhD
Associate Professor of Industrial Microbiology
Research interests: Enzyme and Fermentation Technology – Microbial enzymes of commercial importance; screening and selection methods; fermentation technology as applied to enzyme production, laboratory and pilot-scale fermentation; enzyme engineering; applications of microbial enzymes in biotechnology.

Nicholas J. W. Clipson BSc (Newcastle), DPhil (Sussex)
Senior Lecturer
Research interests: Microbial Ecology – Assessment of community activity of microbes in a number of natural and applied environments.

Wim G. Meijer MSc (Groningen), PhD (Groningen)

Senior Lecturer

Research interests: Molecular Microbiology – metabolic regulation; regulation of gene expression; interaction between intracellular pathogenic bacteria and macrophages; Microbial Source Tracking. Further information available at: www.ucd.ie/molmicro.

J. Patrick Caffrey BAI (Dub), PhD (Dub)

Lecturer

Research interests: Molecular Biotechnology – biosynthesis of polyketide natural products; characterisation of complex polyketide synthase genes and proteins; glycosylation of natural products; engineered biosynthesis of novel pharmaceutical compounds. Further information available at: www.ucd.ie/indmicro/html/caffrey.html

James B. Gillespie BA (Oxon), PhD (UWO)

Lecturer

Research interests: Bacteriology – bacterial endospores and parasporal inclusions; control of microbial contamination in the pharmaceutical and cosmetic industries; microbiology of oligotrophic aqueous environments e.g. bottled water.

Hilary E. McMahon BSc, PhD

Lecturer

Research interests: Prions – Prion diseases or TSEs are a group of neurodegenerative disorders affecting animals and humans. These diseases are associated with the conversion of the normal prion protein (PrP^{C}) to an abnormally structured isoform termed PrP^{Sc}. Research in the Prion group focuses on understanding the disease process and the action of potential anti-prion drugs in these disorders.

Cormac D. Murphy BSc, PhD (QUB)

Lecturer

Research interests: Microbial Biohalogenation – the discovery of novel natural products and the mechanisms by which microorganisms biosynthesise these secondary metabolites. A major theme is the enzymes involved in halogenation, which is particularly topical since the recent discovery of the first fluorinase enzyme and a new class of halogenase distinct from haloperoxidases. A further research area is that of enzymatic dehalogenation, particularly of fluorinated compounds. Further information available at: http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=11907567&dopt=Abstract

Kevin E. O'Connor BSc, PhD

Lecturer

Research interests: Biocatalysis and metabolic engineering – Biocatalysis and Metabolic Engineering – Single step biotransformations using enzymes and whole cells; Production of value added products; Biosensors: sensing chemicals through enzymes and microbial cells; Biodegradable plastic synthesis (polyhydroxyalkanoates); Biosynthesis of chiral molecules; Testing the biological activity of small molecules. Further information available at: www.ucd.ie/biocatal.

Damien B Brady BSc, PhD (Ulster)

Temporary Lecturer

Research interests: Microbial Bioprocessing – bioconversion of agricultural, commercial and other waste streams to value added products. Use of microbial extracellular enzymes in the generation of bioactive compounds from food grade material. Cell and enzyme immobilisation. Scale up of bioprocess operations.

Mathematical Physics

Programmes Offered:

HDip Mathematical Science	SCHDF0020
HDip Computational Science	SCHDF0025
HDip Computational Science (Part-time)	SCHDP0025
HDip Computational Science (Secondary Curriculum)	SCHDF0125
MSc (by research)	SCMRF0001
MSc Mathematical Physics (taught)	SCMXF0007
MSc Mathematical Science	SCMXF0010
MSc Meteorology	SCMXF0028
MSc Computational Science	SCMXF0025
PhD (by research)	SCDRF0001

Website: www.ucd.ie/math-phy/

Email: mathematical.physics@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Veronica Barker, Department of Mathematical Physics, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 2560, Fax: +353-1-716 1172.

The mission of the Department of Mathematical Physics is to achieve excellence in teaching, training and research in Applied Mathematics and Theoretical Physics. This mission encompasses:

The provision of a first class education at undergraduate and postgraduate levels in which teaching is delivered by research-active academic staff. The aim is to equip graduates for careers in Applied Mathematics and Theoretical Physics and in a wide range of related disciplines.

The undertaking of fundamental research in the Department by top-quality research staff. The aim is to obtain research funding from external sources, to attract high calibre researchers, to consolidate existing collaborations and to develop new research links with international centres of excellence in the Applied Mathematics and Theoretical Physics.

The mathematical formulation of our experience leads in many cases to an amazingly accurate description of a large class of phenomena. Over three hundred years ago Galileo made the statement that the laws of nature are written in the language of mathematics; it is now more true than ever before with advances in mathematics often intertwined with advances in theoretical physics.

The Department's expertise in Theoretical Physics spans a wide range of subjects from Astrophysics to General Relativity, from Quantum Field Theory to String Theory and Quantum Gravity, and from Computational Physics to Statistical Mechanics. The Department's expertise in Applied Mathematics spans a range of subjects from Fluid Mechanics to Non-Linear Wave Theory, and from Acoustics to Meteorology.

In addition to the conventional theory/experiment basis for scientific inquiry, a new approach based on computational simulation, especially of complex phenomena, plays an increasing important role in many areas. Computational Science, as it has come to be known, is now recognized as an area of research in its own right. The Department offers taught postgraduate programmes in conjunction with the Department of Computer Science and also provides research opportunities.

A new Centre in Meteorology and Climate has been established, headed by the Met Éireann Professor of Meteorology, which acts as a national focus for Meteorological research. Both taught postgraduate programmes and research opportunities are available.

Together with the Department of Mathematics, the Department shares a twenty-one-PC Computing Laboratory equipped with twin LCD projectors and video-conferencing facilities. The Department also runs a Linux server. The UCD Centre for Computational Mathematics headed by Professor Ottewill provides a focus for computationally intensive research.

Taught Programmes

The Department offers three taught Masters programmes, leading to MSc Degrees, in the areas of:

- Mathematical Physics/Mathematical Science
- Meteorology
- Computational Science

The Higher Diploma in Mathematical Science is also available as a means of qualifying for entry to the MSc Degree courses for students whose first degree contains insufficient Mathematical background.

Research Programmes

Supervision of research is offered leading to the MSc and PhD Degrees in the areas of research of the Department. The Department maintains a strong research effort which is aided by regular research seminars from national and international visitors. Extensive computer facilities are available in the Department.

General Notes for Postgraduate Studies Enquiries:

- Course fees: fees for all courses can be downloaded from: www.ucd.ie/fees
- Closing dates for EU applicants: 31 July of the year of entry.
- Closing date for non-EU applicants (who require a visa): 31 March of the year of entry. We will endeavour to notify such applicants within one month.
- Notice for Non-EU Applicants: The Department is not responsible for arranging an Irish Visa. However, the International Office provides information on visa requirements; their website is www.ucd.ie/global and their email address is: international@ucd.ie.
- Applicants whose primary language is not English: Must submit evidence of either a TOEFL score of 550 or a IELTS score of 660; see www.toefl.org/ or www.ieltsonline.com for details. The test results must be less than two years old.
- Application form: Application form can be downloaded from: www.ucd.ie/math-phy/forms

Academic Staff

Adrian Ottewill, MA (Oxon), DPhil (Oxon), DSc (Oxon), MRIA, FRAS, FInstP, C.Phys

Head of Department

Professor of Mathematical Physics

Research interests: General relativity (gravitational entropy, cosmic string networks, gravitational waves); Quantum Field Theory in Curved Space-Time (Hawking evaporation of black-holes, quantum mechanical origin of structure in the universe).

Joseph V. Pulé, BSc (Malta) DPhil (Oxon), DSc (Oxon), MRIA

Associate Professor

Research interests: Statistical mechanics; random Schrödinger operators in the presence of a magnetic field; applications of Large Deviation Theory to problems in equilibrium statistical mechanics, especially Bose systems.

Peter Hogan, MSc, PhD, DSc, MRIA

Associate Professor (Relativity Theory)

Research interests: General Relativity Theory (the propagation of gravitational and electromagnetic radiation across the universe); relativistic electrodynamics; Yang-Mills Gauge Theory.

Daniel Birmingham, BA Mod (Dub), PhD (Dub)

Senior Lecturer

Research interests: Quantum field theory, String theory, Topological field theory theory, Topological lattice field theory.

Edward A. Cox, BSc (QUB), MSc, PhD
Senior Lecturer
Research interests: Fluid dynamics; nonlinear acoustic waves, bifurcations, chaos; numerical modelling of nonlinear behaviour.

Peter Duffy, BA Mod (Dub), PhD (Dub)
Senior Lecturer
Research interests: Theoretical Astrophysics (particle acceleration, high energy processes and numerical modelling), particle transport theory in stochastic fields and fusion plasmas.

K. Bertram Broberg, TechD (Stockholm), MembSwedAcadSci, MembSwedAcadEngSci
Visiting Professor
Research interests: Crack Mechanics, fracture, earthquake source physics, biomechanics.

Mathematics

Programmes Offered:

HDip Mathematical Science	SCHDF0020
MSc (by research)	SCMRF0001
MSc Mathematics (Mode II) (taught)	SCMXF0006
MSc Mathematical Science (taught)	SCMXF0010
MSc Mathematics (Mode III) (taught)	SCMXF0027
PhD (by research)	SCDRF0001

Website: www.maths.ucd.ie

Email: mathematics@ucd.ie or Thomas.Laffey@ucd.ie

Contact for Postgraduate Studies Enquiries:
Professor T.J. Laffey, Mathematics Department, Science Building, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 2578, Fax: +353-1-716 1196.

The research mission of the Department of Mathematics is to produce and disseminate results of recognized significance and excellence on topics of current international interest. Strategically, the work is focussed on specific areas, within Analysis and Algebra, in which the department has the expertise and ability to make a notable contribution. Some members of the department have achieved the visibility and status of key figures contributing to progress in infinite dimensional holomorphy, potential theory, group representation theory, matrix inverse eigenvalue problems, K-theory of number domains and the algebraic properties of Witt rings. These topics serve to mark the primary issues being investigated by staff and research students. Strong collaboration exists between the department and other centres of excellence within the EU, and this is enabled and enhanced through its involvement in research networks, mutual visits by staff and the exchange of postdoctoral students. There are also ongoing joint research projects with investigators in North and South America and Israel.

The research teams and their specialities are listed here:

Infinite Dimensional Complex Analysis

Members: S. Dineen, P.Mellon, C. Boyd, M. Mackey

This group studies the geometric, algebraic and analytic structures arising from the theory of holomorphic functions defined on infinite dimensional spaces. Current topics: Spectral theory. Composition operators. Geometry of spaces of polynomials. Iteration of holomorphic functions. Jordan and Lie structure of bounded symmetric domains. Analytic continuation and boundary behaviour of holomorphic mappings.

K-theory and Quadratic Forms

Members: K. Hutchinson, D. Lewis, T. Unger

Topics: Invariants of quadratic and Hermitian forms. Structure of central simple algebras with involution. Local-global principles for quadratic and Hermitian forms. Witt rings. K-theory of algebraic integers. Wild kernels of number fields. Connections between K-theory, Galois cohomology and Iwasawa theory.

Group theory, linear algebra and combinatorics

Members: R. Gow, R. Higgs, T. Laffey, R. Quinlan

Topics: Modular and projective representation theory of finite groups. Lattices. Group rings. Division algebras. Algebraic theory of matrices. Integer matrices. Symmetric and alternating forms. Linear preserver problems on matrix groups and matrix spaces. Factorization and conjugacy questions in algebraic groups, particularly over finite fields. Combinatorial structures. Difference sets. Octonions.

Potential Theory

Member: S. Gardiner

Topics: Subharmonic functions. Approximation by harmonic functions. Boundary behaviour in potential theory. Applications of fine topology to function theory.

Differential Equations

Member: M. Meehan

Topic: Existence theory for nonlinear integral and integrodifferential equations.

Coding Theory

Members: E. Byrne, R. Higgs

Topics: Algebraic coding theory. Cryptography. Codes over rings. Z_4 -codes. Decoding algorithms. Codes and designs. Incidence structures associated with codes. Two-weight codes. Codes and graphs. Boolean functions. Quadratic residue codes. Galois codes. Codes that are easy to decode.

Operator Theory

Member: M. Ó Searcóid

Topics: Fredholm theory. Decomposition of operators. Set-theoretic issues.

Probability theory
Member: W. Sullivan
Topic: Stochastic processes.

Educational Issues and Learning Aids
Members: M. Meehan, J. Quigley, D. Tipple
Topics: Teaching and learning of Mathematics at Third Level Computer languages and programming for algebraic manipulation. Production of computer algebra texts.

Nonnegative matrices and dynamical systems
Member: T.J. Laffey
Topics: Inverse eigenvalue problem for stochastic matrices. Common Lyapunov quadratic functions.

Academic Staff

Stephen J. Gardiner MSc (QUB), PhD (QUB), DSc (QUB), MRIA
Head of Department
Professor
Research interests: Complex analysis; potential theory; subharmonic functions; approximation.

Seán Dineen PhD (Maryland), DSc MRIA
Professor of Mathematics II
Research interests: Functional analysis; complex analysis; differential geometry; infinite dimensional holomorphy; symmetric domains; J* triple systems; invariant metrics on Banach spaces.

Roderick I. S. Gow BA (Cantab), PhD (Liverpool), MRIA
Associate Professor
Research interests: Algebra; representation theory of finite groups; linear algebra.

Thomas J. Laffey MSc, DPhil (Sussex), MRIA
Associate Professor (Algebra)
Research interests: Algebra; finite group theory, representation theory; matrix theory.

David Lewis BSc, PhD, DSc
Associate Professor
Research interests: Algebra and topology; quadratic and hermitian forms.

Russell J. Higgs BA (Liverpool), PhD (Liverpool)
Senior Lecturer
Research interests: Algebra; group theory; coding theory; computer algebra.

Pauline Mellon MSc, PhD
Senior Lecturer
Research interests: Complex analysis and infinite dimensional holomorphy; bounded symmetric domains; JB*-triple systems.

Mícheál S. A. Ó Searcóid BSc (Lond), HDip in Ed. (Dub), MSc, PhD
Senior Lecturer
Research interests: Functional analysis; operator theory; mathematical type design and setting.

Wayne G. Sullivan BSc (Georgia Inst Tech), DPhil (Oxon)
Senior Lecturer
Research interests: Probability theory; multicomponent stochastic processes and infinite particle systems; computing as an academic resource.

Christopher Boyd BA (Dub), MSc (Dub), PhD
Lecturer
Research interests: Functional analysis; infinite dimensional holomorphy; geometry of Banach spaces.

Eimear Byrne BA (Dub), MSc, PhD
Lecturer
Research interests: Algebra; error-correcting codes; codes over rings.

Kevin Hutchinson BA, MSc, PhD (Cornell)
Lecturer
Research interests: Algebraic K-theory; algebraic number theory.

Michael T. Mackey MSc, PhD
Lecturer
Research interests: Bounded symmetric domains; complex analysis.

Maria Meehan MSc, PhD
Lecturer
Research interests: Analysis; integral equations.

J. Brendan Quigley MSc (QUB), PhD (Indiana)
Lecturer
Research interests: Algebraic topology; Lie groups; computers.

Rachel Quinlan MSc, PhD (Alberta)
Lecturer
Research interests: Representation theory of finite groups; group theory.

David A. Tipple MSc (Manchester), PhD (Manchester)
Lecturer
Research interests: Algebraic topology; homotopy theory.

Thomas P. Unger Lic Wet Wisk (Ghent), PhD
Lecturer
Research interests: Quadratic and hermitian forms; algebras with involution.

Occupational Safety and Health

Programmes Offered:

Cert Safety & Health at Work	SCCTP0001
Cert Safety & Health at Work IBEC	SCCTP0002
Dip Safety Health & Welfare at Work (Dublin)	SCDPP0001
Dip Safety Health & Welfare at Work (Waterford)	SCDPP0002
MApplSc Safety Health & Welfare at Work (taught)	SCMXF0016
MApplSc Safety Health & Welfare at Work (taught, part time)	SCMXP0017

Email: cshw@ucd,ie or anne.drummond@ucd.ie

Contact for Postgraduate Study Enquiries
Ms Anne Drummond, Centre for Safety and Health at Work, NovaUCD, University College Dublin, Belfield, Dublin 4. Phone: +353-1-716 3500, Fax: +353-1-716 3501.

The aim of the Centre is to provide a focus for teaching and research in occupational safety and health. Its functions are to administer continuing education and advanced training courses in safety and health; to provide a framework for research in related areas; and to offer advice and consultancy services to industry and the public sector. It draws on the wide range of expertise available in University College Dublin and from external experts.

Further Information
Further information on the programmes may be had from the course director:

Anne Drummond RGN, RM, MSc (Surrey)
Joint Academic Director
Research interests: Education for occupational safety and health professionals; incident management systems.

Pharmacology

Programmes Offered:

MSc (by research)	SCMRF0001
PhD (by research)	SCDRF0022

Website: www.ucd.ie/pharmacol/pharhome.htm

Email: suzanne.ohalloran@ucd.ie

Contact for Postgraduate Studies Enquiries:
Ms Suzanne O'Halloran, Pharmacology Department, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 6744, Fax: +353-1-269 2749.

Opportunities for postgraduate work are available in the Department of Pharmacology. Currently there are 66 postgraduate students registered with the Department and pursuing research work towards MSc, MMedSc or PhD Degrees either in the Department or in associated laboratories. Usually, there are approximately 15-20 Post-Doctoral Research Fellows working in the Department.

The Department conducts its research in the Conway Institute of Biomolecular and Biomedical Research. This is a new state-of-the-art facility, which is fully equipped for all aspects of Pharmacological research, including cell culture, in vitro and in vivo model organisms, genomics and proteomics.

Grants for research projects by staff members have been obtained from Science Foundation Ireland (SFI), the Health Research Board, Enterprise Ireland (the Irish Science and Technology Agency), the Irish Heart Foundation, the Irish Cancer Society, the Irish Kidney Association, the Wellcome Trust, European Union Research Programmes, as well as from many Pharmaceutical Companies.

Research opportunities include collaborative research and consultancy with the medical and healthcare professions and related industries.

Academic Staff

Michael P. Ryan BSc, PhD
Head of Department
Professor
Research interests: Renal and Cardiovascular Pharmacology and Toxicology, Toxicogenomics and Proteomics. Models and mechanism of therapeutic action and chemical-induced kidney cell injury; biotechnology-derived products; novel mechanistic based endpoints; strategies for cytoprotection. Immune-mediated renal disease. Epithelial-mesenchymal transition.

Finian Martin BSc, PhD
Associate Professor
Research interests: Endocrine Pharmacology, Molecular Biology and Cancer. Development of the mammary gland; regulation of gene expression during growth,

differentiation and involution. Nuclear oncoproteins. Molecular pathogenesis of diabetic nephropathy.

Ciaran Regan BSc, PhD DSc

Associate Professor (Neuropharmacology)

Associate Dean (Postgraduate), Faculty of Science

Research interests: Neuropharmacology and Neurotoxicity. Pharmacology of memory and learning. Behavioural Toxicity. Therapeutics for psychotic and neurodegenerative disease. In vitro screening for drug structure-activity relationships and pharmacotoxicological potential.

Alan K. Keenan BSc, PhD

Associate Professor

Research interests: Cardiovascular Pharmacology; Mechanisms and treatment of cardiovascular disease. Regulation of vascular endothelial and smooth muscle functions. Endothelial dysfunction and oxidant injury in diabetes. Local drug delivery to coronary vasculature.

Kathy O'Boyle BSc, PhD

Senior Lecturer

Research interests: Neuropharmacology. G-protein coupled receptors in mammalian brain. Signal transduction pathways. Drug/receptor and receptor/ receptor interactions. Effects of disease, drug treatment and age. New therapeutic agents: evaluation of biological activity and anti-angiogenic potential of novel heparin-like glycoconjugates.

Paul Moynagh BA (Dub), PhD

Senior Lecturer

Research interests: Immunology: Relevance to Neurobiology. Proinflammatory cytokines and their effects on glial and neuronal cells. Interleukin-1 signalling and transcription factor activation. Regulation of cell adhesion molecule expression in neurodegenerative diseases. Intracellular signalling and IgE switching.

Carmel Hensey BSc, PhD

Lecturer (Wellcome Trust Fellow)

Research interests: Developmental Biology. Elucidation of fundamental mechanisms in the regulation of cell cycle and cell death during development. Regulation of cell cycle checkpoints and apoptotic pathways.

William Gallagher BSc, PhD

Lecturer

Research interests: Cancer Biology and Molecular Therapeutics. Genomic and Proteomic Approaches. Role of the fibulin gene family, tumour-derived p53 mutants, knowledge-based prediction approach plus computer-assisted modelling techniques.

Breandan Kennedy BSc, PhD

Lecturer

Research interests: Developmental Biology, Functional Genomics and Pharmacological Screens Use of zebra fish model to study the neurobiology of eyes/pineal/hypothalamus. Mutant and transgenic lines as pharmacological screens.

Physiology

Programmes Offered:

MSc (by research)	SCMRF0001
PhD (by research)	SCDRF0022

Website: www.ucd.ie/physiol

Email: carole.doyle@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Carole Doyle, Department of Physiology, University College Dublin, Earlsfort Terrace, Dublin 2. Telephone: +353-1-716 7310, Fax: +353-1-716 7417.

The research of the Department is mainly located in the Conway Institute of Biomolecular and Biomedical Research. Collaborations also exist with researchers in a number of clinical environments and international research institutions. Research is currently funded by grants awarded by a number of funding agencies including Science Foundation Ireland (SFI), Enterprise Ireland and the Health Research Board.

Postgraduate courses available within the Department of Physiology are as follows: Master of Science (Physiology) by Mode I (research and thesis) or by Mode II (course and examination). These programmes lead to the award of the MSc (Physiology) Degree.

Doctor of Medicine. This programme leads to the award of the Doctor of Medicine Degree (MD) and is awarded through the Faculty of Medicine.

Doctor of Philosophy. This programme leads to the award of the Doctor of Philosophy Degree (PhD).

Academic Staff

Paul McLoughlin MB, BCh, BAO, BSc, PhD (London) MRCPI

Head of Department

Professor of Physiology and Histology

Research interests: Regulation of pulmonary vascular resistance, vascular remodelling and angiogenesis in the lung in chronic hypoxia and pulmonary disease.

Stuart Bund BSc (Leicester), PhD (Leicester)

Lecturer

Research interests: Structural and functional abnormalities of resistance arteries in hypertension. Endothelial modulation of arterial tone. Vascular autonomic control.

Paul Byrne MB, MMedSc

Temporary Lecturer

Research interests: Information Technology in teaching and assessment. Vitamin D in pathogenesis and treatment of autoimmunity.

Helen Harty BSc (Sheffield), PhD (QUB)

Lecturer

Research interests: Respiratory and Exercise Physiology. Limitations of exercise performance due to hypoxaemia, pulmonary mechanics and gender differences.

Caroline Herron BSc (Southampton), PhD (Southampton)

Lecturer

Research interests: Cellular models of learning and memory including hippocampal long-term potentiation and long-term depression. Mechanism of action of the Alzheimer's peptide, beta amyloid (1-40) and associated cellular signalling. Model of addiction investigating the synaptic connections between the Ventral tegmentum and the nucleus accumbens.

James Jones MB, BCh, BAO, BSc, MD, PhD

Senior Lecturer

Research interests: Vagal control of the heart. Aortic body chemoreceptors. Motor control of the diaphragm. Single fibre nerve recordings from cardiac vagus, phrenic and aortic nerves. Vagal control of pulmonary veins and the accessory circulation.

John Moynihan BSc, PhD

Senior Lecturer

Research interests: Electrolyte homeostasis. Endocrine control of metabolism. Factors influencing diffusion, transport and metabolic functions of carbon dioxide and bicarbonate ions.

John O'Connor BSc, PhD

Senior Lecturer

Research interests: Synaptic transmission and plasticity in the central nervous system with particular interests in long-term potentiation and signal transduction mechanisms including mitogen activated protein kinases. Neuro-immune interactions. Modulatory role of peptides and pro-inflammatory cytokines on glutamatergic transmission.

William O'Connor BSc, PhD

Lecturer

Research interests: Nerve circuitry dysfunction in neurological disorders such as Parkinson's Disease, schizophrenia and epilepsy. Microdialysis techniques.

Kenneth O'Halloran BSc, PhD

Lecturer

Research interests: Neural control of breathing, with specific interest in motor control of the upper airway. Current studies focus on mechanisms of altered upper airway muscle function in experimental models of obstructive sleep apnoea.

Psychology

Programmes Offered:

MSc (by research):	SCMRF0001
PhD (by research):	SCDRF0001

Website: www.ucd.ie/psydept/

Email: babara.dooley@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Barbara Dooley, Department of Psychology, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 8725, Fax: +353-1-716 8369.

Qualified Science graduates in Psychology are also entitled to apply for places on the MA (Social and Organisational Psychology) and the DPsychSci in Clinical Psychotherapy. Please see the website or contact the department for further details.

Statistics and Actuarial Science

Programmes Offered:

Postgraduate Certificate in Research Methods	SCCTP0003
HDip Actuarial Science	SCHDF0001
HDip Actuarial Science (part-time)	SCHDP0001
HDip Statistics	SCHDF0021
HDip Statistics (part-time)	SCHDP0021
MSc (by research)	SCMRF0001
MSc Statistics (taught)	SCMXF0008
MSc Statistics (taught, part-time)	SCMXP0008
PhD (by research)	SCDRF0001

Website: www.ucd.ie/statdept/

Email: Marie.Doyle@ucd.ie

Contact for Postgraduate Studies Enquiries:

Ms Marie Doyle, Department of Statistics, Library Building, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 7152, Fax: +353-1-716 1186.

Excellence in teaching and research is the mission of the Department of Statistics and Actuarial Science. At postgraduate level it offers a broad range of courses leading to

taught Masters, Diplomas and Certificate qualifications in Statistics, Actuarial Science and Research Methods.

The Department maintains an active research programme in several areas of Theoretical and Applied Statistics as well as Actuarial Science, and has active collaborative links with leading research centres and companies worldwide. The department receives funding for its research from national and international sources, including the EPA, Department of Agriculture and Food, Health Research Board, USDA, EU, Elan Corporation, and Pfizer Global Research.

One of the strengths of this department is the ability of its staff to cross departmental and disciplinary boundaries to collaborate in teams that can better address the complex challenges facing science. The Department supports research in the University through its course in Postgraduate Research Methods and its Summer Statistical Support Unit (SSSU), a consultancy unit for postgraduate students and staff run during three months in Summer.

The main research groups in the Department are:

Pharmaceutical Statistics – research in pharmacometrics. Recent research includes development of a system of in vitro – in vivo models of drug absorption and applications to drug formulation and delivery, nonlinear mixed effects modelling. Has active links with leading pharmaceutical companies in Ireland, Europe and the US.

Human and Veterinary Epidemiology – active collaboration with the Faculties of Medicine and Veterinary Medicine. Recent and ongoing work includes investigating spatial and temporal aspects of the occurrence of M. bovis in Irish cattle herds, the occurrence of Salmonella in the pig industry, and scrapie among sheep, the AIDS epidemic, neo-natal care and aspects of human physiology. Collaborators include St. James's Hospital, St Vincent's University Hospital, the Mater Misericordiae University Hospital and the National Maternity Hospital.

Environmental/Agricultural/Ecological Group – basic and applied research on the interface between statistics and biology. Recent research includes the development of design strategies and analytical tools for the investigation of biodiversity effects in natural and semi-natural plant and animal communities, modelling greenhouse gas emissions from soils, modelling compositional relations of growing animals, reproductive allocation in plants and the effects of global change on plant communities. This group has a wide range of international links with leading research centres in Europe and the US.

Actuarial Statistics – research in several areas of financial mathematics and actuarial science including life assurance solvency and financial reporting, mortality and morbidity, health insurance and long-term care, genetics and insurance, investment strategies for investment funds, pricing anomalies and their distributions, asset liability modelling, and statistical modelling in general insurance. This research has strong ties with the Society of Actuaries in Ireland and the Irish Insurance Industry and research centres in the UK.

Reliability theory – basic and applied research in statistical methods used in the general area of Reliability. More recently the emphasis has been on theoretical and practical challenges in software reliability and testing. The complex nature of phased iterative software development and the multivariate nature of software faults, has led to the use of powerful statistical models, which provide tools to software developers in improving

quality and efficiency. The UCD group collaborates extensively with the Irish software industry and researchers in the USA and India.

Econometrics and Official Statistics – basic research in econometrics and applied research related to Official Statistics and human sciences. Current theoretical research includes the development of new methodologies in econometrics with collaborations in Sweden, Denmark and Ireland. On the applied side there is strong collaboration with ISSC, the CSO and the University of Michigan in the fields of Political Science and Economic Statistics.

Theoretical statistics – current theoretical statistical research in the department includes aspects of reliability theory, generalized linear models, mixed models, robust statistics and econometric theory.

Academic Staff

John Connolly, BSc, HDip in Ed, MSc (Reading), PhD (Dub)
Head of Department
Senior Lecturer
Research interests: statistical applications in the environment, biology and ecology with particular interest in the investigation of biodiversity effects in natural and semi-natural plant and animal communities.

Philip J Boland BSc (Le Moyne), MA (Rochester), PhD (Rochester), DSc
Professor
Research interests: statistical and probabilistic aspects of reliability theory and life testing; probabilistic methods of actuarial science; mathematical statistics; history of statistics.

Gareth Colgan MA, FIA, FSAI, ASA
Lecturer
Research interests: life assurance solvency and financial reporting; mortality and morbidity; genetics and insurance, especially Alzheimer's disease and long-term care.

Adrian Dunne BSc (Lond), PhD (Dub)
Senior Lecturer
Research interests: applications of statistics to the biological sciences with particular emphasis on the pharmaceutical/pharmacological sciences.

Gabrielle Kelly MSc, PhD (Stanford)
Senior Lecturer
Research interests: statistical applications in medicine and veterinary epidemiology; nonparametric statistics, robust estimation and diagnostics; survey sampling; quality control.

Patrick Murphy MSc

Lecturer

Research interests: Econometrics, in particular new approaches to I(2) co-integration; official statistics; voter turnout at Irish elections; statistical education; survey design and analysis.

Shane Whelan BSc PhD (Heriot-Watt), FFA, FSAI, ASA

Lecturer

Research interests: capital markets – history, pricing anomalies, return distributions, econophysics; pension funding and investment strategies, asset liability modelling; actuarial statistics.

David Williams BA (Dub), MSc (Birmingham), PhD (Manchester)

Senior Lecturer

Research interests: statistical computing and software; experimental design with applications in agriculture, veterinary medicine; veterinary epidemiology.

Zoology

Programmes Offered:

MSc (by research)	SCMRF0001
MApplSc Environmental Science	SCMXF0014
PhD (by research)	SCDRF0022

Website: www.ucd.ie/zoology

Email: tom.bolger@ucd.ie

Contact for Postgraduate Studies Enquiries:

Professor Thomas Bolger, Department of Zoology, Science Buildings, University College Dublin, Belfield, Dublin 4. Telephone: +353-1-716 2330, Fax: +353-1-716 1152.

The Zoology Department has a vibrant postgraduate community, comprising some fifty students, who are actively supported via a comprehensive postgraduate review programme and an annual symposium. The Department is notable for its wide spectrum of research interests, fostering young researchers with an integrated view of biological systems at a range of levels of organisation.

The ecology of whole organisms and ecosystems is one of the main strengths of the department, with interests in fundamental and applied ecological research encompassing terrestrial, marine and freshwater habitats and target organisms ranging from soil fauna to marine and freshwater invertebrates to fish and terrestrial mammals. Several researchers tackle issues of relevance to the conservation and management of biological resources (e.g. fisheries) and there are strong links with government bodies such as the Environmental Protection Agency, Teagasc and the Marine Institute. A linking theme is the measurement of human impacts on biodiversity and consequences of loss of diversity for the functioning of ecosystems. Another shared interest is in patterns of dispersal and consequences for the dynamics and genetic structure of populations. Interests in

behavioural and evolutionary biology focus on terrestrial mammals and extant and fossil birds (including systematics). The department has a strong relationship with the National Museum of Ireland meaning that its extensive collections are readily available for postgraduate research projects.

At a physiological level, research in the department encompasses a number of areas including (i) plant-insect interactions, with specific reference to the factors which affect feeding rates and palatability of plants and (ii) immunological responses to parasites and inflammation associated with acute and chronic bovine mastitis.

Cell, molecular and developmental biology are also a key feature of the department, with researchers focussing on prion diseases such as BSE and scrapie in cattle and sheep, neurological diseases and cellular signalling systems with particular reference to the evolution and varied functions of the mannose-6-phosphate receptor.

Comprehensive facilities are available in all these areas for both teaching and research programmes. This includes a fully equipped water chemistry laboratory with atomic absorption and graphite furnace facilities, plus a Dionex Ion Chromatogram, gas chromatogram, and HPLC. Expertise and equipment is available for radio-immune assays; ELISA, electron microscopy (TEM and SEM), tissue culture facilities and monoclonal antibody production, DNA sequencing and general molecular biology techniques. Access is available to remote sensing and image analysis facilities, Mass Spectrometer and H-NMR, general field equipment and inflatable zodiac for ecological research.

Academic Staff:

Thomas M. Bolger BSc, PhD
Head of Department
Professor of Zoology
Research interests: Studies of the functional significance of biodiversity and of soil animal communities with particular reference to the factors controlling their species diversity, their role in determining rates of nutrient flux and their responses to changes in land use, climate change and acid rain. Effects of global change and management practices on nutrient cycles.

Thomas J. Hayden BSc, PhD
Senior Lecturer
Research interests: Mammals: Reproduction, Breeding systems, population dynamics, Lifetime reproductive success, Ecology; Genetic variation. Ungulates, carnivores, rodents. Wildlife Management and Conservation.

Patrick Joyce BSc, PhD
Senior Lecturer
Research interests: Immunology, parasitology; The role of neutrophils in milk and cheese quality. Macrophages in chronic and acute bovine mastitis.

Mark Rogers BA (Dub), PhD (Glasgow)

Senior Lecturer

Research interests: Molecular Biology/Biotechnology: Particular interest in Prions that cause the fatal neurodegenerative diseases of humans and animals including BSE and CJD. Within this field, a particular interest in the determinants of strain properties and in the mechanisms by which the infectious agent replicates.

Michael F. Ryan BSc, PhD (Lond)

Senior Lecturer

Research interests: Chemically mediated plant/insect interactions; naturally-occurring pesticides; plant resistance to insects; plant/insect-coevolution; chemosignificant plants in the equatorial rain-forest; chemically-mediated interactions between the equine and strongyloid nematodes.

Tasman Crowe BSc (Bristol), PhD (Sydney)

Lecturer

Research interests: Experimental studies of marine ecology and biodiversity, behaviour of marine invertebrates, human impacts on intertidal communities.

www.ucd.ie/zoology/crowe.htm

www.ucd.ie/zoology/marinbiodiversity.htm

Gareth Dyke BSc (Bristol), PhD (Bristol)

Lecturer

Research interests: Vertebrate morphology and systematics, museum studies, comparative anatomy and systematics of extant and fossil Aves, non-avian dinosaurs, evolution of flight and aerodynamics, phylogenetic methods.

www.ucd.ie/zoology/dyke.htm

www.ucd.ie/zoology/DYKE/birdresearch.htm

www.ucd.ie/zoology/museum/

Mary Kelly-Quinn, BSc, PhD

Lecturer

Research interests: Freshwater ecology including taxonomy of the Ephemeroptera, evaluation of macroinvertebrate biodiversity and development of predictive models for bio-assessments in rivers, population ecology of whiteclawed crayfish, acidification impacts on freshwater fauna.

www.ucd.ie/zoology/limnology.htm

Catherine Nolan, BSc, PhD

Lecturer

Research interests: Cell and Developmental Biology. Genomic imprinting in evolution and disease. The IGF signalling system in embryonic development, tumour growth and neurological disease.

Tom Wilkinson, BSc (Wales), DPhil (Oxon.)

Lecturer

Research interests: Symbiosis between insects and intracellular microorganisms with particular emphasis on aphids and bacteria, physiology, nutrition and feeding mechanisms of herbivorous insects.