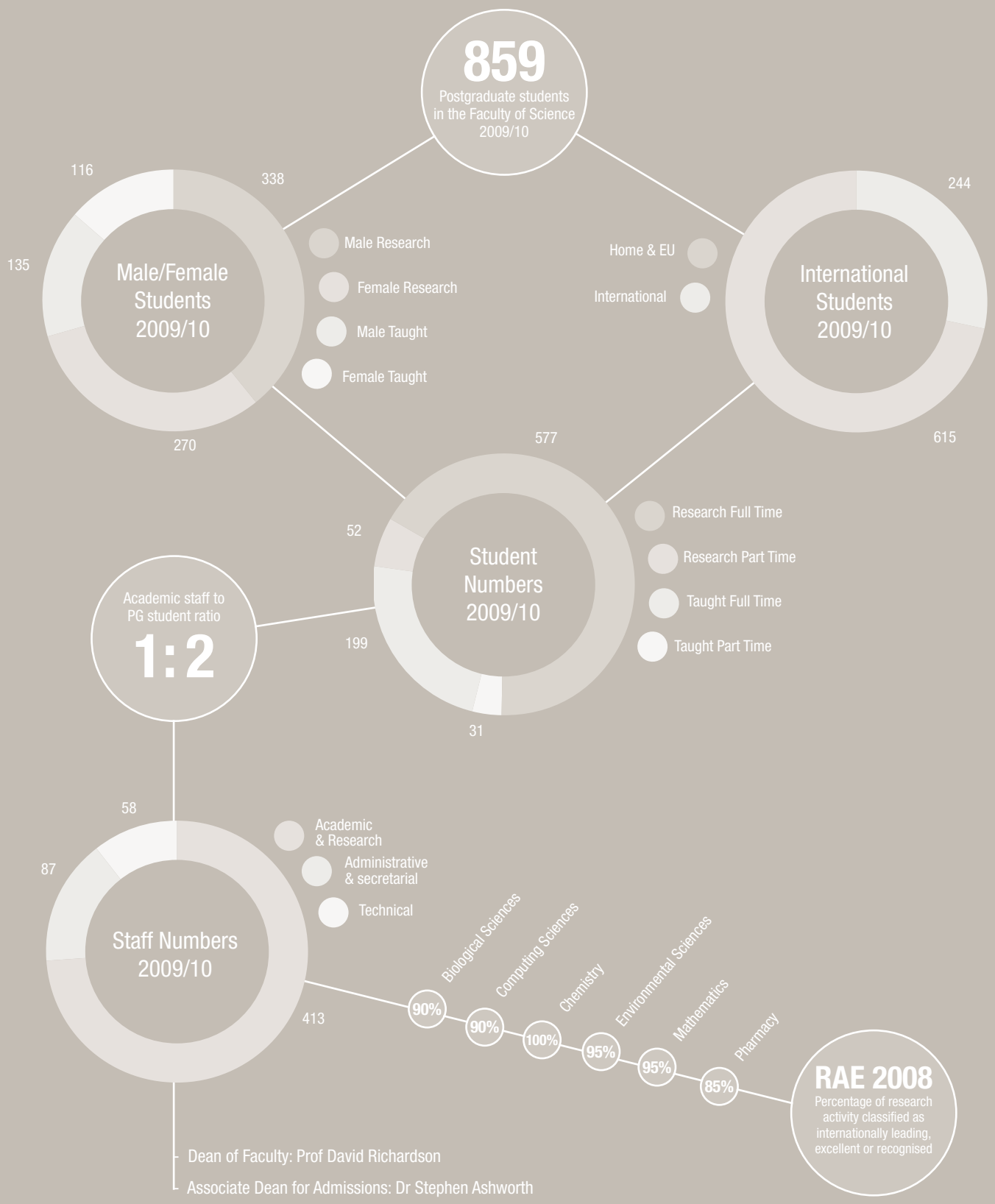
University of East Anglia

Postgraduate Studies Faculty of Science

Faculty of Science at a glance



Dean of Faculty's Address

Thank you for your interest in a postgraduate degree programme in the Faculty of Science at the University of East Anglia (UEA). I hope you will find the contents of this brochure a useful supplement to the University's prospectus.

The Faculty of Science consists of six Schools located on the UEA Campus: Biological Sciences (BIO), Chemistry (CHE), Computing Sciences (CMP), Environmental Sciences (ENV) Mathematics (MTH) and Pharmacy (PHA).

Our research is highly rated throughout the world and many of our scientists have won prestigious awards in recognition of their outstanding achievements. The Science Faculty has been very successful in winning Research Council, Wellcome Trust, Royal Society and Wolfson Foundation infrastructure awards resulting in new buildings, extensions, refurbishment and re-equipping. This includes the Zuckerman Institute for Connective Environmental Research (ZICER) Building, and the Laboratory for Global Marine and Atmospheric Chemistry (LGMAC) for ENV; the Biomedical Research Centre (BMRC) and Imaging Suites for BIO; a major new facility for Biophysical Chemistry in CHE; two new laboratories for Energy Research in CHE and BIO and a new D'Arcy Thompson Centre for Computational Biology in CMP. We also launched a new Postgraduate Research School in 2009. The Science Faculty currently has a total research grant holding of £80M and supports around 300 PhD postgraduates and 200 MSc postgraduates. About 300 postdoctoral associates and holders of personal fellowships work within the Faculty. These numbers double when fellows and students in the Institutes of the Norwich Research Park (NRP) are included.

The Faculty of Science is part of the NRP which includes three major BBSRC Institutes, the John Innes Centre for Plant and Microbial Science, the Institute of Food Research and the Genome Analysis Centre, along with the Sainsbury Laboratory and the Norfolk and Norwich University Hospital. With these Institutes we plan science strategy together, sharing joint grants to widen the research opportunities in the environmental, physical, computational, biological and health sciences. You will find more detailed descriptions throughout this brochure.

The range of degree programmes, at both taught and research level, allows students to tailor their degrees to their interests and career aspirations. We pride ourselves on being a friendly place in which to work. You will be able to explore a universe of ideas and academic disciplines within a stimulating intellectual environment.

I hope you will, if the opportunity arises, come and have a look around UEA and meet my colleagues. If you cannot visit then please do not hesitate to contact my colleagues who will be happy to talk to you.

Professor David Richardson
Dean of Science


Centre

Contents

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Postgraduate study in the Faculty of Science

UEA is one of Britain's premier research and teaching universities and is committed to achieving international standards of excellence. The quality of our research has earned us a reputation as one of the top ten research universities for science in the UK. In the last Government sponsored Research Assessment Exercise (2008) all of the research units within the Faculty of Science were rated as having world leading research and over 93% of the research outputs were assessed as being of international quality

The quality of our research will directly affect you as a student in the Faculty of Science, whether you pursue a research or a taught programme. We regularly review and develop our programmes in line with our research discoveries to ensure you will be taught or conduct research at the leading edge of your chosen discipline. You will have access to a wide range of specialist equipment and expert training in how to use it. As a graduate student you will be assigned to a member of academic staff who will act as your supervisor or advisor and who will give you guidance on academic and other matters throughout your programme of study.

Research degrees

Research degrees include the Doctor of Philosophy (PhD), Master of Philosophy (MPhil) and Master of Science (MSc) by Research. All research programmes involve independent and original research, resulting in an extensive thesis at the end of the programme. Research students in the Faculty of Science undertake a specially developed skills training programme, designed to ensure that they are equipped with the necessary skills and methodological knowledge to undertake original research and progress to a future career.

PhD programmes usually last for a period of three years, however in some cases they may be up to four years in duration. MPhil programmes usually take two years to complete, however in some cases they may be three years in duration. MSc by Research programmes usually last for one year.

Taught degrees

The Faculty of Science at UEA has an excellent reputation for teaching, as confirmed by the rigorous process of external assessment by the national Quality Assurance Agency for Higher Education. Full-time Masters courses usually last for a period of one year, with the teaching element divided into two semesters. The programmes also incorporate an independent research project or dissertation, with guidance offered by a project supervisor. The Faculty also offers Graduate Diploma programmes, ideal for students who have undertaken a first degree in a non- or less-scientific discipline, but who aim to pursue a career in the sciences.

A day in the life of an MSc student

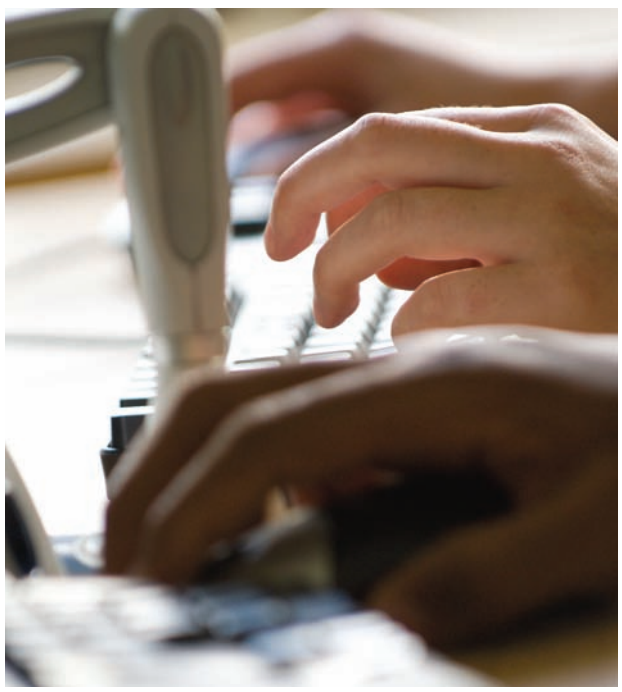
7.00 am – 9.45am A relaxed day in the life of a PG student starts at 7.00am. Wake up, run through the day's activities in the mind, frame questions to ask project supervisor in today's meeting, switch on the laptop and check diary for the day's schedules. Pack some sandwiches for the day and get ready for the lecture at 10.00am.

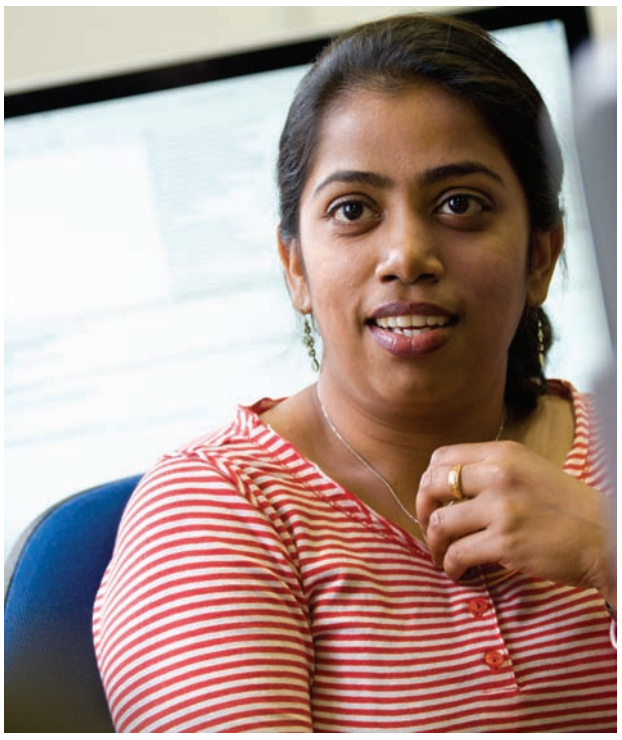
9.45am Start the short walk to the lecture theatre which is one of the comforts of living on campus.

10.00am – 12.00pm Artificial Intelligence (AI) lecture – take notes which usually run to several pages and are helpful in doing course work assignments and when revising for the end-of-semester exams.

12.00 – 2.45pm Accompany a classmate to the cafeteria and for a coffee and piece of cake and chat over the AI lecture and the announced group project. Go to the library pick up relevant materials, download articles and papers into carefully labelled folders on the central file server system which can be accessed from any terminal on campus, check e-mails. Meet my supervisor for a brief discussion on my project proposal. Go to the MSc lab to print the lecture slides, eat the packed sandwiches before heading to the next lecture.

3.00pm – 5.00pm Lecture on Decision trees & Rule induction algorithms in Data mining. The professor has strong industrial links and is a consultant for many major financial institutions in Norwich. Practical illustrations and issues are provided and discussed in class, which not only aids in better grasping of intricate concepts but also equips one to attempt to solve real world problems by producing tangible and actionable results. Sort quick plans for the lab sessions for the next day with group members.





5.00pm – 7.30pm Meet with a few pals as planned and go to the city to buy some stuff and food. Come back to the room for dinner, start work on the Statistics assignment.

8.00pm – 9.00pm Thursday evenings are for swimming sessions at the Sportspark, UEA with a friend. Well refreshed get back to the room and continue working on the statistics problem. Feel exhausted after a strenuous day. Take a break watch a TV show. Realise have a heavy workload to complete in the next few weeks - shut it down after watching just two!!

9.30pm Read the assignment question for Artificial Intelligence lying down on the bed and begin to motivate myself for late-night study sessions in the Lab and eventually fall asleep.

Excellent infrastructure, an attractive option of specialisation, strong academic and industrial links, a beautiful and vibrant campus and a truly international student community has greatly influenced my quality of life and opened new horizons for my career. I am glad I made the right decision in coming to UEA to pursue my passion and move to an altogether new level in qualification and experience.

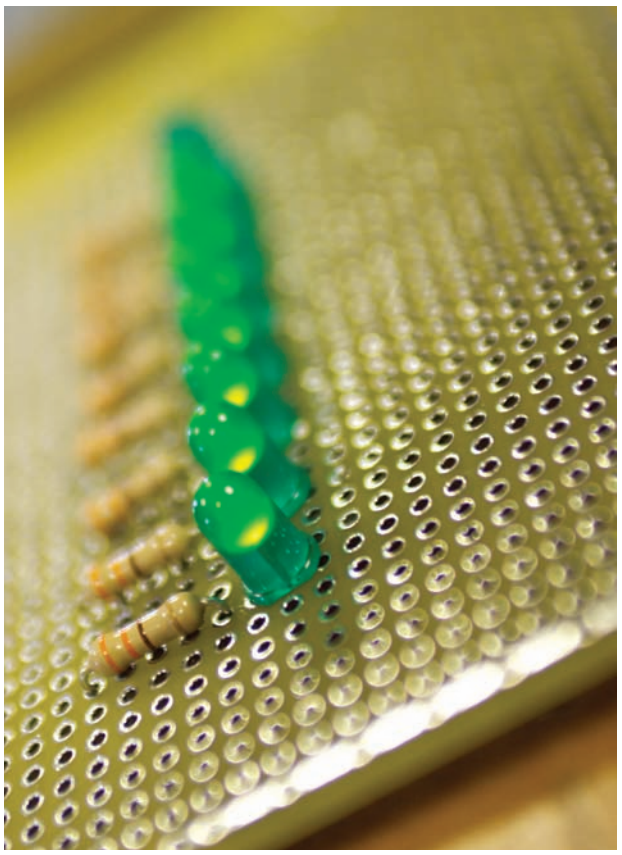
Miriam Chrisolet Ebenezer, Science MSc student

A day in the life of a PhD student

9.00am – 10.00am I walk to the lab, check my emails and then meet my mates in the Computing postgraduate common room for a coffee. Upon returning to the lab I always have plenty of work to choose from. I'll either be programming, finding and reading papers, or writing my literature survey. My favourite task is to set experiments running and to watch the results coming in, because it's the most satisfying part of Computer Science research. Designing and programming the experiments is probably the hardest part, so the results are a little reward for the hard work.

10.00am – 11.00am There's a coffee machine not far from my lab which only charges 20 pence for a coffee, so at 11am a group of us take advantage of its great value.

11.00am – 2.00pm Fortnightly, I have meetings with the whole project team, in which each of us takes it in turns to discuss our recent progress on the project. It's a chance for other members of the team to suggest ideas which my supervisor and I might have overlooked from being so closely involved with my research. Also, I have weekly meetings with my supervisor on a Tuesday at 12:00. I'll show him my latest results, we'll talk about them and then discuss what to do next. Hopefully he'll suggest that I start writing a paper, which is a vital addition to any PhD student's thesis. At around 12:30 I take a trip to the on-campus shop with the guys from my lab. I'll find time to quickly check Facebook when we return, and then settle down to some work for the afternoon.



2.00pm – 3.00pm On a Thursday we have seminars by visiting academics in our field. These are always worth attending in case you hear something relevant to your research or even just to broaden your knowledge of Computer Science in general.

3.00pm – 5.00pm Time for a final coffee break and a last stint of hard work.

5.00pm – Late Finally, at about 5:45, I head home. I live quite close to the campus so if there's any work which urgently needs finishing or an idea niggling in the back of my mind, I can come back in the evening. There's usually somebody in the lab late at night so it's never lonely and it's always easy to convince other research students to take another coffee break. Most of the time it's better to take some time away from your research to keep you thinking clearly, and on those days I will go to any of the many real ale pubs in Norwich with my friends and forget about my work completely!

Jacob Newman, Science PhD Student

How to get funding

Tuition fees 2010/11

(Approximately 3% annual increase expected)	Overseas	Home/EU
MSc Environmental Sciences, MSc Climate Change, MSc Environmental Assessment and Management	£13,350	£4,800
MSc Applied Ecology and Conservation, MSc Biotechnology for a Sustainable Future MSc Plant Genetics and Crop Improvement	£13,350	£3,800
Graduate Diploma in Biological Sciences	£13,350	£3,290
All other lab based postgraduate taught programmes	£13,350	£3,466
Mathematics postgraduate taught programmes (classroom based)	£10,600	£3,466
All Computing Sciences postgraduate taught programmes (classroom based)	£10,600	£3,800
Postgraduate Research Mathematics only	£10,600	£3,466
Postgraduate Research all other Science Schools	£13,250	£3,466

Bench fees

Bench fees are applied to most postgraduate research programmes. The amount charged varies according to the nature of the project taking into account laboratory and fieldwork requirements. You should expect to pay a minimum of £500 per year, for some subjects the amount is likely to be substantially more; the exact amount will be confirmed at the point of offer. In exceptional cases bench fees may be waived.

It's important to note that you do not need to have secured funding when you apply to study at UEA, and in many cases, holding the offer of a place to study may actually help to secure funding.

Studentships/Scholarship schemes for UK and EU students

You should start with the Grants Register published by Macmillan. This should be available in libraries. It lists a large number of awards and has a comprehensive index, which will direct you to relevant awards. You should also consult 'Educational Charities: A guide to educational trust funds'. Watch the press (especially the New Scientist and Nature) for announcement of various scholarships and awards. Residents of Northern Ireland should also write to the Department of Education, Rathgael House, Balloo Road, Bangor, County Down BT19 2PR. Reference to web sites is also a good way to update yourself on what is available. Approach your employer and any charitable institution/private foundation you know of.

Research Councils (BBSRC, ESRC, EPSRC, MRC and NERC) offer a variety of one-year and three-year awards to UK students which typically provide for tuition fees and for a maintenance award. Amounts awarded vary and are subject to periodic increases. There are often supplementary allowances for mature students with family responsibilities. EU students may apply for Research Council awards, but are normally eligible only for payment of tuition fees, without a maintenance grant.

The University, Faculty, Schools and Institutes also offer a number of research studentships. Some are subject-specific, others are tenable in any subject within the scope of the Schools of Study of the University. The awards are usually for a period of one to three years to enable the holders to read for a research degree at the University. Details of studentships available can be found on our Science web pages www.uea.ac.uk/sci.

Scholarship schemes for international students

Students planning to come to the UK to study should seek information from their own Ministry of Education and from the nearest British Council Office, British Embassy or British High Commission (www.britishcouncil.org). Students already in the UK can obtain information from their own Embassy or High Commission and the British Council regional or London Offices.

The majority of international postgraduate students taking courses in the Sciences are sponsored by their Governments, their employers, or an agency such as the British Council. Remember that you do not need to have secured all of your funding when you apply to study at UEA, and in many cases, holding the offer of a place to study may actually help to secure funding.

International Scholarship Fund

UEA awards a number of scholarships to excellently qualified overseas students each year, up to a maximum of 50% of tuition fees. Competition for these scholarships is very high, they are awarded on the basis of merit. Scholarships will only be awarded to those students holding an offer of a place (an acceptance letter) on a course at the University. It is not necessary for students to apply for one of these scholarships because University departments nominate their highly-qualified offer holders for these awards. Applicants should indicate on their application form that they wish to be considered for nomination for a scholarship.

In addition, there are some scholarship funds available from national funding bodies and ministries of education with which the International Office works closely. For details of these, please see the International Office website: www.uea.ac.uk/international/scholarships and click on your home country.

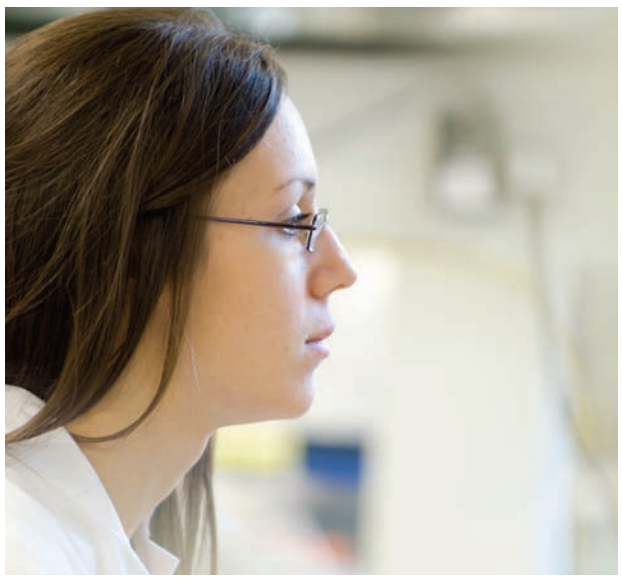
You can also contact your local British Council office for more details of these schemes: www.britishcouncil.org

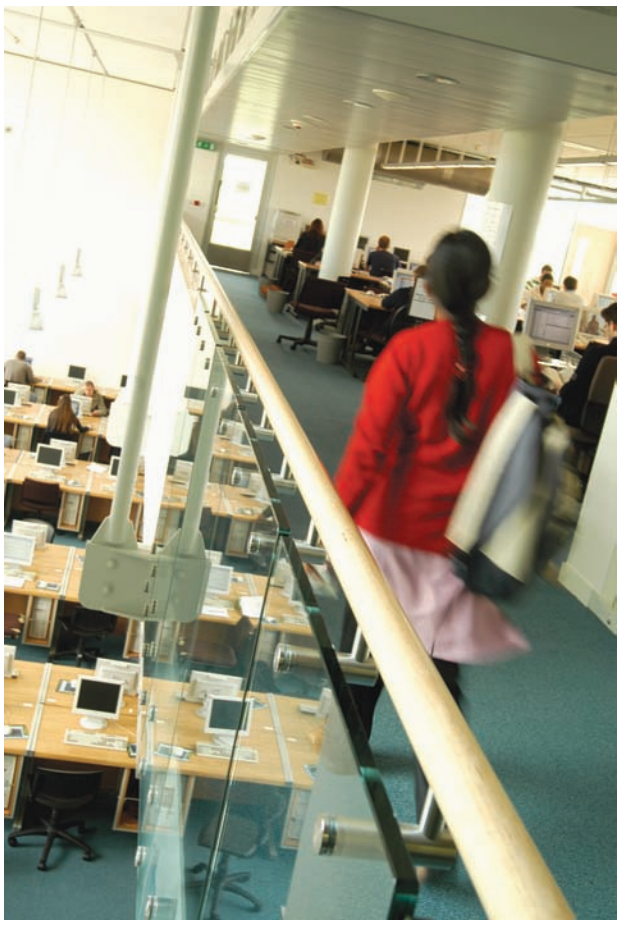
Chevening Scholarship Scheme

This scheme offers awards at mainly Masters level and in most subjects (some countries may offer a range of subjects relevant to that particular country). These are offered in countries with which the United Kingdom has, or is likely to develop, strong economic links. The scheme is advertised by the British Council in the candidate's own country. Details can be found at the British Council website: www.britishcouncil.org

British Council Fellowships

The British Council offers full fellowships to nationals of many countries for study at any level. The scheme is advertised through the British Council in the candidate's own country. Details can be found at the British Council website: www.britishcouncil.org





Commonwealth Scholarships and Fellowships Programme

The programme offers awards for candidates in Commonwealth countries or British Dependent Territories for postgraduate study or research. The scholarships are usually advertised by the Ministry of Education in the candidate's own country. Applications are made to the Commonwealth Scholarship Agency. Details are available from the Association of Commonwealth Universities, John Foster House, 36 Gordon Square, London, WC1 0PF, or the website:www.acu.ac.uk

UEA/Fulbright Scholarship

One scholarship, offered jointly by the University and the Fulbright Commission, is available for a US graduate of outstanding academic merit to pursue a one year taught postgraduate course in any discipline. The scholarship will cover university fees, a maintenance allowance, and round-trip travel. A discretionary supplementary allowance may be provided for one accompanying dependant. Details and application forms are available at: http://www.iie.org/fulbright

Please note: the information given in this section is intended as a general guide and is not an exhaustive list of all available funding. You are encouraged to apply to all sources of funding for which you are eligible. The level of competition for most of the awards mentioned here is very high and candidates are assessed on past and potential academic performance.

International students

UEA is home to almost 2,000 non UK students from more than 100 countries worldwide. We offer a high quality British educational experience, and welcome the cultural diversity our international students bring to the University. Studying at a University overseas will be a major undertaking for you both personally and financially, but it is also a most rewarding experience, intellectually, academically, socially and culturally.

The application process

We understand that applying to a University overseas can be a very daunting experience and you will inevitably have many questions about the University, Norwich and our courses. Our experienced Admissions Team within the Faculty of Science will be on hand to guide you through the process and to answer any questions you may have. You may have an opportunity to meet one of our International Officers in your home country before or during the application process. Details of planned overseas visits are available on the International Office website:www.uea.ac.uk/international. Once you accept a place as a postgraduate student, we will send you a copy of our International Students' Handbook containing information on preparing to travel, health advice and immigration regulations.

Welcoming you to UEA

When you first arrive in the UK, we will be on hand to meet you at designated times at Heathrow Airport, Norwich Airport and Norwich Train Station. We provide a special orientation programme for new international students, which provides an excellent opportunity to meet other students and to find out more about living and studying in Britain. It covers social and cultural issues and includes social events and tours of the campus and the city of Norwich.

Taking care of you

We have an International Student Advisory Team based in the Dean of Students' Office, who offer advice and support to all international students across a wide range of issues. They liaise closely with colleagues across the University, as well as external organisations such as the Home Office and the British Council to ensure that international students' needs are well looked after.

Entry requirements (including English)

We will consider applications from students with qualifications from any country worldwide. Our International Officers, local experts in international qualifications, work closely with the Admissions Teams to assess your application fairly and promptly. To be able to study at University level you will need to have a good command of English for writing, speaking, listening and reading. We need satisfactory evidence of your ability in the language and the preferred qualifications for the majority of both research and taught programmes are listed below (Mathematics and Computing Sciences research programmes accept slightly lower scores).

- UCLES International English Language Testing System (IELTS). For both research degrees and taught programmes, a minimum score of 6.5 is required (with a minimum of 6.0 in each component).
- American College Board and Education Testing Service's full Test of English as a Foreign Language (TOEFL). For both research degrees and taught programmes a minimum score of 580 (paper-based test), 230 (computer-based test) or 92 (internet based test) with a minimum score of 4.0 in the test of written English (TWE) is required.
- Pearsons Test of English (PTE). For both research degrees and taught programmes a minimum score of 62 is required (with no less than 47 in each component).
- GCSE or GCE Ordinary Level English Language at grade C or above.

We accept a range of alternative English qualifications and encourage you to contact the Admissions Teams for further information. If you have previously studied in the English language we may not require evidence of your ability in the language.

If you do not yet have the required English level to start your programme of study, our language centre can offer a range of language courses, including the academic preparation Pre-sessional English course. For further information please refer to the website: www.uea.ac.uk/into

Guaranteed accommodation

Single international postgraduates are guaranteed a place in University residences in their first year, provided they have been offered and accepted a place at UEA by the published deadline. The Union of UEA Students Advice Centre can also help with finding private accommodation. If you wish to bring your family with you to UEA you are advised not to make travel arrangements until you are absolutely certain that your family will have accommodation. Some family accommodation is available at UEA but it is subject to availability. Please contact the UEA Accommodation Office for further information: accom@uea.ac.uk

Postgraduate programmes in Science

Biological Sciences

PhD Biological Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 18-19
MPhil Biological Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 18-19
MSc (Research) Biological Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 18-19
MSc Applied Ecology and Conservation	Taught	bio.msc.admiss@uea.ac.uk	See page 35
MSc Biotechnology for a Sustainable Future	Taught	bio.msc.admiss@uea.ac.uk	See page 36
MSc Molecular Medicine††	Taught	bio.msc.admiss@uea.ac.uk	See page 37
MSc Plant Genetics and Crop Improvement	Taught	bio.msc.admiss@uea.ac.uk	See page 38
MSc Sustainable Agriculture and Food Security††	Taught	bio.msc.admiss@uea.ac.uk	See page 39
Graduate Diploma in Ecology	Taught	bio.msc.admiss@uea.ac.uk	See website*

Chemistry

PhD Chemical Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 20-21
PhD Industry-based/Institute-based	Research	sci.pgr.admiss@uea.ac.uk	See pages 20-21
MPhil Chemical Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 20-21
MSc (Research) Chemical Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 20-21
MSc Advanced Organic Chemistry	Taught	che.msc.admiss@uea.ac.uk	See page 40
MSc Forensic Archaeometry & Provenancing Studies	Taught	che.msc.admiss@uea.ac.uk	See page 41
Graduate Diploma in Chemical Sciences	Taught	che.msc.admiss@uea.ac.uk	See website*

Computing Sciences

PhD Computing Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 22-23
MPhil Computing Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 22-23
MSc (Research) Computing Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 22-23
MSc Advanced Computing Science	Taught	cmp.msc.admiss@uea.ac.uk	See page 42
MSc Computational Biology	Taught	cmp.msc.admiss@uea.ac.uk	See page 43
MSc Computing Science	Taught	cmp.msc.admiss@uea.ac.uk	See page 44
MRes Computing Science	Taught	cmp.msc.admiss@uea.ac.uk	See page 45
MSc Games Development	Taught	cmp.msc.admiss@uea.ac.uk	See page 46
MSc Information Systems	Taught	cmp.msc.admiss@uea.ac.uk	See page 47
MSc Knowledge Discovery and Datamining	Taught	cmp.msc.admiss@uea.ac.uk	See page 48
MSc Statistics††	Taught	cmp.msc.admiss@uea.ac.uk	See page 49
Graduate Diploma in Computing Science	Taught	cmp.msc.admiss@uea.ac.uk	See website*

† New for 2010 entry

†† New for 2011 entry

* Details of Graduate Diploma programmes are not included in this brochure, however further details can be found on the School websites; addresses can be found on the back cover.

Environmental Sciences

PhD Environmental Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 24-25
MPhil Environmental Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 24-25
MSc (Research) Environmental Sciences	Research	sci.pgr.admiss@uea.ac.uk	See pages 24-25
MSc Atmospheric Sciences	Taught	env.msc.admiss@uea.ac.uk	See page 50
MSc Climate Change	Taught	env.msc.admiss@uea.ac.uk	See page 51
MSc Environmental Assessment and Management	Taught	env.msc.admiss@uea.ac.uk	See page 52
MSc Environmental Sciences	Taught	env.msc.admiss@uea.ac.uk	See page 53
MRes Environmental Social Science	Taught	env.msc.admiss@uea.ac.uk	See page 54

Mathematics

PhD Mathematics	Research	sci.pgr.admiss@uea.ac.uk	See pages 26-27
MPhil Mathematics	Research	sci.pgr.admiss@uea.ac.uk	See pages 26-27
MSc (Research) Mathematics	Research	sci.pgr.admiss@uea.ac.uk	See pages 26-27
MSc Energy Engineering with Environmental Management	Taught	mth.msc.admiss@uea.ac.uk	See page 56
MSc Mathematics	Taught	mth.msc.admiss@uea.ac.uk	See page 57
MSc Mathematics with Mathematics Education††	Taught	mth.msc.admiss@uea.ac.uk	See page 58
Mathematics 1+3†	Taught	mth.msc.admiss@uea.ac.uk	See page 59

Pharmacy

PhD Pharmacy	Research	sci.pgr.admiss@uea.ac.uk	See pages 28-29
MPhil Pharmacy	Research	sci.pgr.admiss@uea.ac.uk	See pages 28-29
MSc (Research) Pharmacy	Research	sci.pgr.admiss@uea.ac.uk	See pages 28-29
MSc Industrial Pharmacy	Taught	*Planned for 2011 entry*	
Postgraduate Diploma in General Pharmacy Practice	Taught	pha.msc.admiss@uea.ac.uk	See website*

Course run in conjunction with partner universities

(University of Poitiers, France; Christian Albrechts Universität, Kiel, Germany; University of Coimbra, Portugal)

European Masters in Applied Ecology (EMAE)	Taught	contact@master-EMAE.org	See page 55

Institute of Food Research

PhD Food Sciences	Research	graduates.nrp@bbsrc.ac.uk	See pages 30-31
MPhil Food Sciences	Research	graduates.nrp@bbsrc.ac.uk	See pages 30-31
MSc (Research) Food Sciences	Research	graduates.nrp@bbsrc.ac.uk	See pages 30-31

John Innes Centre and Sainsbury Laboratory

PhD four year with rotation year	Research	graduates.nrp@bbsrc.ac.uk	See pages 32-33
PhD four year project studentship	Research	graduates.nrp@bbsrc.ac.uk	See pages 32-33
PhD three year fast-track studentship	Research	graduates.nrp@bbsrc.ac.uk	See pages 32-33
MPhil	Research	graduates.nrp@bbsrc.ac.uk	See pages 32-33
MSc (Research)	Research	graduates.nrp@bbsrc.ac.uk	See pages 32-33

Research opportunities in Biological Sciences

The School of Biological Sciences (BIO) is a dynamic academic community rated as one of the best of its kind in the UK. Our expertise covers the full spectrum of biological sciences, from protein structure to conservation biology. We take both broad and deep approaches that capitalise on modern methodologies to integrate the study of biological systems from the level of molecules through to ecosystems.

"I particularly enjoy being a postgraduate student here because of the welcoming, supportive and friendly attitude in the School. The high quality of research here is truly inspiring and the School has many collaborators outside the university so there are regular opportunities to hear and meet speakers from different research fields."
Natasha Baker, PhD student, Cells and Tissues theme

Our commitment to research

BIO has an excellent research record (in the 2008 Research Assessment Exercise, 90% of research activity in the School of Biological Sciences was classified as internationally leading, excellent or recognised). Our teaching is of the highest quality, (rated 'Excellent' in the Teaching Quality Assessment), and we are consistently ranked in the top five for overall student satisfaction amongst mainstream English universities. We offer an outstanding environment in which to carry out research across the whole of the life sciences. BIO currently houses about 80 PhD students engaged in research across three broad themes:

Organisms and the environment Research in this theme covers important issues such as how organisms evolve and interact with their environment, and how to ensure the preservation of ecosystems and their biotas so that future generations can benefit from the scientific insights and ecosystem services that stem from the natural world. We have a particular emphasis on understanding adaptation at both the gene and whole-organism level, and on applying sound basic scientific principles to pressing questions in conservation and applied biology.

Cells and tissues This theme aims to understand tissue specification and function in health and disease. A multidisciplinary approach is taken to define mechanisms that direct development and tissue maintenance and the role environmental factors play in the pathogenesis of disease. Our combination of strengths in cell and developmental biology, extracellular matrix and pericellular protease research and medically-oriented studies of widespread human diseases, from laboratory experiments through to clinical praxis, forms the basis to improve therapeutic manipulations in translational research.

Molecules and pathways Research in this theme addresses many aspects of the fundamental molecular properties of biological phenomena. These range from the molecular structural biology of metallo-enzymes, the role of lipids in the pathogenic properties of trypanosomes, through to the molecular dissection of important greenhouse gas metabolism by marine bacteria. Research within the theme benefits from collaborations across the Norwich Research Park, for example in projects such as the role of different microbial respiratory pathways in diseases caused by Salmonella and in the analysis of gene expression in the antibiotic-producing bacterium Streptomyces.

Why should I come to UEA?

You will find yourself in a dynamic, open and friendly School that delivers excellence in science and which has an international impact.

You will enter the Science Graduate School and undertake our 'Professional and Personal Development' programme of generic skills training, which complements your research programme and which delivers the wide range of skills you will need to undertake your PhD as well as those recognised as important for gaining future employment.

You will therefore have the opportunity to conduct scientific research at the highest level and be trained to a level to enable you to maximise your options for career progression.

Recent Thesis Titles

Analysis of cell signaling pathways involved in expression of metalloproteinases and their inhibitors in fibroblasts

The tumour-stroma distribution of degradome components in human prostate cancer

Conservation of Vietnam's chelonians, the Keeled Box Tortoise (Pyxidea mouhotii)

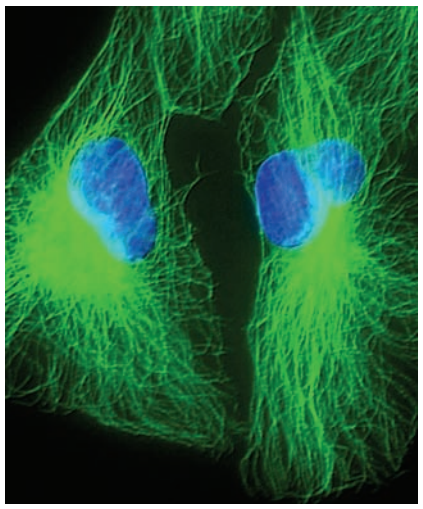
Localisation of chromatin associated proteins and function of telomeric end binding proteins

Genetic diversity of the endemic Canary Island pine tree, pinus canariensis

Microtubule deployment in polarised epithelial cells

The Cf-11 locus in tomato for resistance to Cladosporium fulvum

Fertilisation dynamics in Atlantic salmon



BIO is a key part of the wider Norwich Research Park (NRP), with partner organisations the Sainsbury Laboratory, John Innes Centre, the Institute for Food Research, the Genome Analysis Centre and the Norfolk and Norwich University Hospital Trust.

Research links

Our research is embedded within the three major areas of scientific excellence of the NRP: environmental science, plant and microbial genetics and food, diet and health. These areas together address major 'Grand Challenges' of global food security, (bio) energy, healthy ageing and living with environmental change. The following bridges link these areas, giving us a unique interdisciplinary research and training environment: (i) the Earth & Life Systems Alliance (ELSA), (ii) the Food & Health Alliance (FAHA), and (iii) Plant and microbial natural products.

There are also a number of cross-school research centres. For example, the Centre for Ecology, Evolution and Conservation (CEEC), is based across BIO and the School of Environmental Sciences and is one of the largest groups of ecologists and evolutionary biologists in Europe. BIO and the School of Chemistry also form the Centre for Molecular and Structural Biochemistry (CMSB). Since its inception 16 years ago the CMSB has developed an international reputation for excellence based on publication of ~200 peer reviewed papers. The centre is highly regarded as an example of how to successfully organise science at the life science:chemistry interface. Further afield, BIO has formal scientific links with many research centres across East Anglia, for example, with the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) and with the British Trust for Ornithology.

Facilities

We have a number of world-class facilities available within BIO. For example: (i) the BioMedical Research Centre (BMRC), officially opened in 2006, is a unique collaboration between BIO and the School of Medicine, and undertakes pioneering work into diet and health, cancer, arthritis and other musculoskeletal disorders, cardiovascular disease, diabetes, neurological disease, hearing disorders and infectious diseases. (ii) The Henry Wellcome Laboratory for Cell Imaging, a state-of-the-art bioimaging facility and analysis suite containing cutting edge fluorescence, confocal and multiphoton microscope technology. (iii) The Wolfson Fermentation & Bioenergy Laboratory is a containment level 2 facility that houses a range of large-scale bioreactors and downstream processing facilities. It also houses state-of-the-art continuous culture bioreactors for use in post-genomic studies on microbial physiology. It is the hub for our work on microbial metabolism including the study of potent greenhouse gases such as nitrous oxide; the production of biofuels; the molecular mechanisms of bioelectricity generation and the modelling of waste-treatment processes.

Thesis Word Length

PhD - 100,000 words
MPhil - 65,000 words
MSc(R) - 40,000 words

Period of Study

Full time		Part time	
PhD	3 years	PhD	6 years
MPhil	2 years	MPhil	4 years
MSc(R)	1 year	MSc(R)	2 years

All students then have one additional year in which to write up and submit.

Entry Requirements

Candidates should have, or expect to have, a first class or upper second class honours degree (or equivalent) in a relevant biological subject.

Related Taught Programmes

MSc Applied Ecology and Conservation p 35
MSc Biotechnology for a Sustainable Future p 36
MSc Molecular Medicine p 37
MSc Plant Genetics and Crop Improvement p 38
MSc Sustainable Agriculture and Food Security p 39

Contact Details

Admissions Office
Faculty of Science
University of East Anglia, Norwich NR4 7TJ
Tel: 01603 593002 Fax: 01603 591045
Email: sci.pgr.admiss@uea.ac.uk

Research opportunities in Chemistry

The UEA School of Chemistry was one of the first Schools to be established at UEA, building an international reputation for the quality of its research and post-graduate training. Today, it is amongst the most vigorous of UEA Schools in terms of research and environment.

Significant investments in the School, and in the co-located School of Pharmacy, have provided high quality teaching and research environments, all centrally located and close to campus facilities and residences. The School prides itself on its innovative chemistry degree programmes, which reflect the position of chemistry as the central science making key contributions to all other science disciplines. This diversity is reflected in the range and strength of the School's research portfolio, which covers synthetic, nanomaterials, analytical, physical and biological chemistry (see below for more information).

Facilities in the School have benefited during the past few years from more than £9M in grants/awards from government and charities to fund a comprehensive laboratory refurbishment programme, coupled to major new instrumentation investment. This has led to major strengthening in synthetic chemistry, nanoscience and biophysical chemistry research, including state of the art NMR and EPR facilities, and the establishment of a new Energy Materials Laboratory.

Chemistry research is led by 31 faculty members working in conjunction with more than 100 postgraduate students, postdoctoral fellows and senior visitors. In the most recent Research Assessment Exercise (RAE) in 2008, 100% of research activity was classified as being internationally leading, excellent or recognised.

Research groups

Research is carried out in individual research groups, but teams are often organised to address new topics in organic, inorganic, physical and theoretical chemistry and to bring together the strengths spanning several disciplines, thus opening up exciting possibilities for interdisciplinary research. This is exemplified by recent initiatives in nanomaterials, the Centre for Molecular and Structural Biochemistry (CMSB), the recently opened Energy Materials Laboratory and the Wolfson Materials and Catalysis Centre (WMCC).

Areas of research

Physical chemistry and chemical physics research encompasses: laser spectroscopy, bringing together fundamental theory and method development for the study of ultrafast phenomena, with applications in liquid state and protein science; quantum electrodynamics (QED) of non-linear optical processes for energy transport and nanoscience; cavity ring-down spectroscopy for the ultrasensitive detection of chemical species found in the upper atmosphere and marine boundary; optical and neutron scattering methods and muon spin spectroscopies to explore new ways of obtaining chemical information about molecular dynamics and structure; preparation and characterisation of nanomaterials for optical and energy storage applications.

Analytical and nanomaterials research encompasses molecular recognition principles together with detection by surface Plasmon resonance (SPR) and evanescent wave excited fluorescence for the development of chemical and bio-sensors. At the interface between materials and bio-analytical science, new materials and methods are being developed based on quantum dots (for example, leading to new imaging tools and energy devices) and on molecular imprinting (for example, leading to artificial 'antibodies'). In forensic research, isotope ratio mass spectrometry and DNA fingerprinting are being applied to problems in materials authentication and anthropology.

Why should I come to UEA?

The School of Chemistry together with its collaborators within the UEA Science Faculty, and across the Norwich Research Park, including the John Innes Centre, the Institute of Food Research and Norfolk and Norwich University Hospital, offers opportunities to do cutting-edge research across the spectrum of chemical sciences in an internationally renowned, genuinely multidisciplinary environment.

Recent Thesis Titles

Design, preparation and investigation of some novel phthalocyanines as photosensitisers for PDT and near infra-red absorbing dyes

Synthesis, structure and catalytic activity of novel bidentate ligand complexes of the group 4 metals

Metal binding studies of CopZ and CopA from Bacillus subtilis

Tandem reactions for heterocycle synthesis

Quantum electrodynamical calculation of molecular energy transfer and electro-optical phenomena

Photosensitiser stabilised metal nanoparticles for photodynamic therapy

The mechanism and inhibition of novel anti-tuberculosis targets

Interactions of phospholipids with fatty acids

Metal-catalysed polymerisations from the design of new catalysts to macromolecular architectures

Synthetic chemistry encompasses organic, inorganic and organometallic chemistry with emphasis on new synthetic methods, target synthesis of natural and purpose-designed products and on catalytic processes. Organic synthesis programmes include investigation of organo- and organometallic catalysis methodology with emphasis on understanding and enhancing regio- and stereocontrol, enzyme mediated synthesis, synthesis of natural products such as lactacystin, tetronothiodin and tagetitoxin and organic materials based on macrocyclic scaffolds. Synthetic chemistry underpins programmes in biological and biomedicinal chemistry and in energy research. Inorganic synthesis, within the Wolfson Materials and Catalysis Centre (WMCC) focuses on functional and biocompatible polymers, the structure and mechanisms of catalysts and the design of metal organic framework materials for hydrogen storage.

Biological chemistry research is focused on applying chemical principles to understand and utilise biological systems. Within the Centre for Molecular and Structural Biochemistry (CMSB), which brings together research groups in the Schools of Chemistry and Biological Sciences, advanced biophysical techniques are used to determine atomic/molecular and mechanistic details of a range of protein systems, with particular strengths in studies of transition metals in biology and unstructured proteins. The range of techniques utilised (and continually developed) in the Centre includes advanced optical and magneto-optical and pulsed electron paramagnetic resonance spectroscopies, NMR, protein electrochemistry and X-ray crystallography. Experimental methods are supported by theoretical studies and computer-assisted modelling.

Energy materials research carried out in the new Energy Materials Laboratory is at the forefront of research on artificial hydrogenases, and is active in emerging areas such as the construction of electron-transfer interfaces for bioenergy transduction, the design of metal organic framework materials for hydrogen storage and the assembly of light harvesting nanocells for artificial photosynthesis and generation of solar fuels.

"I had an amazing time doing my undergraduate degree at UEA and was thrilled to be able to continue with a PhD here too, surrounded by interesting research and enthusiastic people, in a School that has a good atmosphere and a University with loads going on."
Rose-Marie Doyle, PhD student, Chemistry

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All students then have one additional year in which to write up and submit.

PLEASE NOTE: It is also possible to undertake industry-based and Institute-based MSc and PhD degrees. Please contact our admissions staff for further information.

Entry Requirements

Candidates should have, or expect to have, a first class or upper second class honours degree (or equivalent) in either chemistry or a related discipline.

Related Taught Programmes

MSc Advanced Organic Chemistry p 40
MSc Forensic Archaeometry and Provenancing Studies p 41

Contact Details

Admissions Office
Faculty of Science
University of East Anglia, Norwich NR4 7TJ
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Email: sci.pgr.admiss@uea.ac.uk

Research opportunities in Computing Sciences

Research in the School concentrates on the development and application of techniques to address some of the key contemporary challenges in computing. The School is internationally known for its long-standing work in optimisation, data-mining, computer vision, colour vision, computer graphics, speech processing and virtual humans. Computational Biology is a new area established to address the challenges to computer science posed by modern biology. The School has formed its own consultancy company which helps reinforce links with industry and commerce.

Research laboratories

Research in the School is carried out in three laboratories:

The **Graphics, Imaging and Vision Laboratory** is concerned with the analysis, processing, recognition and generation of signals in applications such as colour vision, machine vision, computer graphics, avatars and speech, music and language processing. These technologies have many common theoretical foundations that include signal-processing, machine learning and statistical pattern recognition. Although each area within the laboratory is an internationally-leading research group in its own right, there is collaboration and synergy between them in research in specific application areas. For instance, our research on audio-visual speech synthesis and lip-reading draws on our experience in both automatic speech recognition and computer vision. The research interests of the Lab are detailed below:

Computer Graphics: automatic and interactive urban modelling, rendering acceleration for large populated urban models, crowd simulation, haptic rendering, medical visualisation and multi-modal visualisation (including sound and touch), high-quality animation of sign language from XML input, with accurate facial gestures.

Speech, Language and Music Processing: Robust speech processing in noise, voice over IP, audio-visual speech processing, modelling of formulaic language, recognition of dysarthric speech, language identification, music processing.

Vision: Computational colour constancy, physics based vision, image reproduction, colour graphics, image indexing, colour scanning, colour science, colour-blind computer vision, scale-space saliency measures, computerised lip-reading.

Physically located in between the Schools of Computing and Biological Sciences, and housed within the newly established D'Arcy Thompson Centre, the **Computational Biology Laboratory** promotes computational research spanning the biological hierarchy from genome through to ecosystem. In addition to carrying out high quality research with national and international partners, the laboratory aims to develop and support computational biology across the Norwich Research Park (NRP), and its members collaborate closely with scientists from NRP institutions such as the School of Biological Sciences, the School of Environmental Sciences, the John Innes Centre, the Institute of Food Research and the Sainsbury Laboratory.

The **Data Mining, Machine Learning and Statistics Laboratory** is concerned with the analysis of data in its various guises, from large databases of commercial data through web mining, text mining and applications-driven research in health and commerce to research into the underlying principles, techniques and algorithms.

Recent projects have included practical work on large medical databases, the development and application of novel clustering techniques, new techniques in statistics for handling mixed data sets and aggregated data, time series analysis and fundamental research on copulas. Members of the Laboratory work with researchers across the Norwich Science Park, including the Hospital, Medical school and the biological institutes. There is a strong demand for the group's skills in industry and commerce and substantial projects have been undertaken for companies such as Aviva, Lanner, and Master Foods.

Why should I come to UEA?

The School is recognised for its award-winning research and graduates have excellent employment prospects.

90% of research activity classified as leading, excellent or recognised in the 2008 Research Assessment Exercise.

The School is a very friendly environment in which to undertake research and students are supervised by some of the leaders in their fields.

There are well-equipped laboratories with modern equipment.

Recent Thesis Titles

Adaptive bidding agents for single-seller and continuous double auctions

Computing chromatic adaptation

Improving colour image retrieval

Robust algorithms for speech reconstruction on mobile devices

Convoy routing under uncertainty

Modelling baterial growth at population and single cell level

Characterization of speakers for improved automatic speech recognition

Quantitative analysis of petal morphology in antirrhinum majus: an inter-disciplinary approach

A framework for designing usable localised websites

"What does being a PhD student mean to me? It means I get to spend all my time researching something that I love. UEA is a really friendly place, where people will take the time to help you out, whether they are students or lecturers. On top of the research I have the opportunity to teach in labs and seminars. Its great helping students by passing on what you've learnt in your own degree/research, especially when it's teaching how to write simple computer games!"
Greg Ryder, PhD student, Computing Sciences

Areas of research

- Leading solutions to the problems of colour cast removal, dynamic range compression and colour correction have been developed and then commercialised by the colour group. The group has worked with many commercial partners including Hewlett Packard, SONY, AGFA, Foveon and Sortex.
- Interface devices with mechanical feedback comprising of kinaesthetic and tactile feedback are called 'haptic' displays. Work on haptics focuses on the rendering of tools extending single point rendering algorithms to include the interaction of two deformable objects.
- TESSA is a system for use in Post Offices that translates what a clerk says into sign language and has won awards from the British Computer Society and the Royal Television Society.
- Clonal analysis involves genetically marking dividing cells followed by identification of their clonal descendants. The Analysis and Modelling of Plant Growth Group collaborates with the John Innes Centre to address this problem in the context of petal development, by integrating clonal analysis with a computational, dynamic, growth map.
- The evolutionary history for plants and microbes, which hybridize across species, is, in computing science terms, a network rather than a tree. As part of its ongoing research into such phenomena, members of the Phylogenetics Group recently organised a 4-month research programme at the Isaac Newton Institute for Mathematical Sciences.
- Together with faculty in the School of Biological Sciences, the Computational Biology of RNA Group are data-mining for short RNAs using cutting-edge bioinformatics algorithms, a field set to rapidly expand due to the imminent surge of cheap, massively parallel sequencing.
- Projects undertaken by members of the Modelling & Optimisation group include telecommunication network design (Nortel Networks), production scheduling (Unilever), and parameter optimisation within simulation (Lanner), each of these resulting in software products in regular use.
- The Virtual Human Group's talking head is based on statistical active appearance models and uses techniques from concatenative speech synthesis to achieve photorealism.
- Scale-space techniques for representing images that were developed in the computer vision group form the algorithmic basis of products from a spinout company (Fo2pix Ltd).
- The School has devised new algorithms for classifying music directly from the audio signal. This is being developed in collaboration with Sun Microsystems.
- DynDom is a widely used package for analysing movements in proteins in terms of the relative motions of quasi-rigid parts. The associated on-line database automatically integrates new results from DynDom simulations and provides a major resource for structural protein biologists worldwide.
- A recent KDD project with Derbyshire Police Force led to a significant reduction in the crime rate and the cost of crime, with a saving of around £13 million in one year. This project won the Operational Research Society's Gold Medal in 2004.

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MSc(R)	1 year	MSc(R)	2 years

All students then have one additional year in which to write up and submit.

Entry Requirements

Candidates should have, or expect to have, a first class or upper second class honours degree (or equivalent) in computer science, electronics or an allied subject. Motivation for research is paramount and applicants will be expected to have formulated some preliminary ideas for research prior to application.

Related Taught Programmes

MSc Advanced Computing Science p 42
MSc Computational Biology p 43
MSc Computing Science p 44
MRes Computing Science p 45
MSc Games Development p 46
MSc Information Systems p 47
MSc Knowledge Discovery and Data Mining p 48
MSc Statistics p 49

Contact Details

Admissions Office
Faculty of Science
University of East Anglia, Norwich NR4 7TJ
Tel: 01603 593002 Fax: 01603 591045
Email: sci.pgr.admiss@uea.ac.uk

Research opportunities in Environmental Sciences

ENV – as the School is known to all its students, staff, alumni, and colleagues around the world - is regarded as one of the very best research and teaching institutions in the world for interdisciplinary environmental sciences. The School was established in 1967 and embarked on what Lord Zuckerman, the first UK Government Chief Scientific Adviser, described as "something absolutely new and fresh in science".

"I am having a really great time doing my PhD research at UEA. Enjoying one's work is a great experience and even better is being able to also enjoy one's time after work. I feel privileged to be part of this vibrant community."
Patricia Fai, postgraduate student, Environmental Sciences

The School was the first institution to bring together natural scientists, social scientists, geographers, economists and so on in the same building to work together to understand the way in which environmental and human systems interact with each other.

Since those early days, the School has developed and expanded greatly. In the 2001 UK Research Assessment Exercise, ENV was the only interdisciplinary environmental science department to have been awarded the top grade of 5**. In the 2008 assessment, 70% of our activity was classified as internationally excellent (3* or 4*), and 25% as world leading (4*) (equivalent to 5** in 2001 terms). Within the group of departments with which we were assessed - Earth Systems and Environmental Sciences - the School has the highest research output in the combined 3* and 4* category, and the joint highest 4* volume.

No less than eighteen members of ENV contributed to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) which received the 2007 Nobel Peace Prize jointly with former US Vice President Al Gore. Several ENV members helped co-author the United Nations Scientific Assessment of Ozone Depletion, also published in 2007; while still others contributed to the Stern Review on The Economics of Climate Change.

This expertise and involvement in the international scientific community directly contributes to excellence in teaching and research activities within ENV. ENV is a large School, which means that it can teach and research over a broad range of disciplines, something that is crucial to understanding the interactions and feedbacks between the natural and human components of the Earth System. It has outstanding facilities and equipment having attracted large amounts of the government investment in world-class research over the last several years.

Many members of ENV belong to Research Centres, embedded within the School. These include: the Climatic Research Unit (CRU); the Centre for Social and Economic Research on the Global Environment (CSERGE); the Tyndall Centre for Climate Change Research (TYN); and the Laboratory for Global Marine and Atmospheric Chemistry (LGMAC). The Zuckerman Institute for Connective Environmental Research (ZICER) provides further integration between these Centres. There are external joint research initiatives too, including the Earth and Life System Alliance (ELSA) in collaboration with the John Innes Centre in Norwich; a strategic alliance with the British Antarctic Survey in Cambridge, and likewise with the Centre for Environment, Fisheries & Aquaculture Science in Lowestoft.

Business and community links include the East Anglian Business Environment Club (EABEC), WeatherQuest Ltd, Renewables East, Carbon Connections, and the Community Carbon Reduction (CRed) programme.

Why should I come to UEA?

The School is recognised as one of the longest established, largest and most experienced Schools of Environmental Sciences in Europe.

In 2005 Sir David King, then UK Chief Scientific Advisor, called the School of Environmental Sciences "the strongest in the world".

95% of research activity classified as leading, excellent or recognised, RAE 2008.

The holistic approach to its teaching, integrating physical, chemical, geotechnical, biological and social science methodology into the study of natural and human environments is a truly modern philosophy.

The School is also a very friendly environment in which to undertake research, and students are supervised by some of the leaders in their fields.

Recent Thesis Titles

An integrated framework for natural hazard mitigation and development planning in the eastern Caribbean

Assessing the willingness to pay for water supplies in Mexico City: consumers and decision-makers' perspectives

Extreme daily temperature and precipitation events in western Europe and the role of atmospheric circulation

Acrylic acid - the forgotten part of the dimethyl sulphide story

The use of climate model data to understand palaeoclimate environments in the UK

Roman Butrint: a geophysical interpretation using artificial neural networks

Shore parallel breakwaters at Sea Palling: their interaction with tidal currents and contribution to sand transport

Plant population and community dynamics in a forested landscape

An epidemiological investigation into the influence of solar ultraviolet B radiation on human blood pressure

An ecological and socio-economic analysis of biodiversity conservation of East African wetlands

Areas of research

The School is a world-leading centre of expertise, with specialities that range from climate research to environmental politics and risk perception. Within the School, links between the disciplines are emphasised to reflect the integrated nature of the environment around us – for example, it hosts a major world laboratory studying global interactions between the chemistry of the atmosphere and the oceans, as well as the headquarters of the national Tyndall Centre for Climate Change Research.

Research in the School is carried out in environments ranging from the polar oceans to tropical forests and is applied to practical problems as diverse as adaptation to climate change and the preservation of cultural heritage.

Research interests include:

- Air, Water and Soil Pollution
- Aquatic Ecology
- Atmospheric Chemistry and Physics
- Climate Change Science
- Coastal and Estuarine Processes
- Earth System Science
- Ecosystem and Countryside Management
- Energy Studies and Policy
- Environmental Economics
- Environmental Impact Assessment
- Environmental Management and Policy
- Environmental Microbiology
- Geology
- Geomorphology
- Geophysics and Geochemistry
- Health and Epidemiology
- Human Geography
- Hydrology and Hydrogeology
- Landscape Ecology
- Marine and Freshwater Chemistry
- Marine Ecology
- Meteorology and Climatology
- Paleoclimate Studies
- Physical Oceanography
- Recycling and Waste Management
- Remote Sensing and Geographic Information Systems
- Resource, Agricultural and Forestry Economics
- Risk and Risk Management
- Rural and Urban Planning
- Soil Science
- Sustainable Development
- Tectonics and Sedimentology
- Vulcanology

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MSc(R)	1 year	MSc(R)	2 years

All students then have one additional year in which to write up and submit.

Entry Requirements

Candidates should have, or expect to have, a first class or upper second class honours degree (or equivalent) in either a science or social science discipline such as Biology, Chemistry, Computing, Economics, Engineering, Environmental Sciences, Geography, Geology, Mathematics, Physics and Social Science.

Related Taught Programmes

MSc Atmospheric Sciences p 50
MSc Climate Change p 51
MSc Environmental Assessment & Management p 52
MSc Environmental Sciences p 53
MRes Environmental Social Science p 54
MSc Energy Engineering with Environmental Management p 56

Contact Details

Admissions Office
Faculty of Science
University of East Anglia, Norwich NR4 7TJ
Tel: 01603 593002 Fax: 01603 591045
Email: sci.pgr.admiss@uea.ac.uk

Research opportunities in Mathematics

The School of Mathematics is a research-driven department with an international reputation across a range of topics in pure and applied mathematics. The School has research links with mathematicians in the rest of Europe, Israel, Russia, the United States, Canada and Australia. We have consistently excellent research ratings, including in the UK 2008 RAE which judged over half of the research activity in the School to be world-leading or internationally excellent.

"The maths department here at UEA is a great place to work and study. There is always lots going on with many research seminars and reading groups throughout the year that are always open to all. The healthy number of graduate students here are engaged in all sorts of strange and interesting work and I've found that this leads to a very stimulating and vibrant atmosphere."
Omar Selim, PhD student, Mathematics

Our commitment to research

The major research areas in Pure Mathematics are Number Theory, Combinatorics, Group Theory, Representation Theory, Model Theory, Set Theory and Ergodic Theory & Dynamical Systems. In Applied Mathematics these are Fluid Dynamics, Mechanics of Solids, Geophysical Fluid Dynamics and Mathematical Biology.

School life

Graduate students are an integral part of the School, valued for their contributions to research and teaching. They join faculty and post-doctoral researchers to create the lively research environment of the School. Postgraduate taught courses are available for all graduate students, including MAGIC internet-based courses. There are many reading seminars at an advanced level. As a postgraduate research student, you will have an expert supervisor who will help direct your research and learning and a secondary supervisor with a pastoral role. The School has its own research library housed in a graduate common room.

Seminars and conferences

We have a regular programme of research seminars given by visiting speakers. These highlight the wider research activities currently taking place in Mathematics. Funding is available for doctoral students to attend and contribute to conferences and instructional courses within the UK and abroad. Joint research with other scientists, at UEA and the Norwich Research Park institutes, is fostered by a regular series of seminars organised by the Centre for Interdisciplinary Mathematical Research within the School of Mathematics.

Demonstrating

Postgraduate students are encouraged to undertake some paid demonstrating work for the School. This will provide you with valuable experience and help integrate you into the life of the School; it is regarded by the School as an invaluable teaching resource.

Why should I come to UEA?

The School of Mathematics offers excellent research facilities and students carry out research with faculty who are leading experts in their fields. There are small research groups that make it easy to interact with peers and supervisors.

The School is very friendly! There is a good social life in the School, with many shared interests. UEA Science Faculty has its own Graduate School where science students get wider training in research and other skills.

Recent Thesis Titles

Prime appearance in elliptic divisibility sequences

Numerical and analytical studies on nonlinear free surface flows past disturbances

Asymptotic models for boundary-value problems of constrained and unconstrained thermoelasticity

Violent sea wave impacts on coastal structures

Reducts and expansions of stable and simple theories

Arithmetic and zeta functions

Modular homology in the Boolean algebra of subsets

Ocean-atmosphere interactions within the Madden-Julian oscillation

Receptivity of boundary layers to vertical disturbances

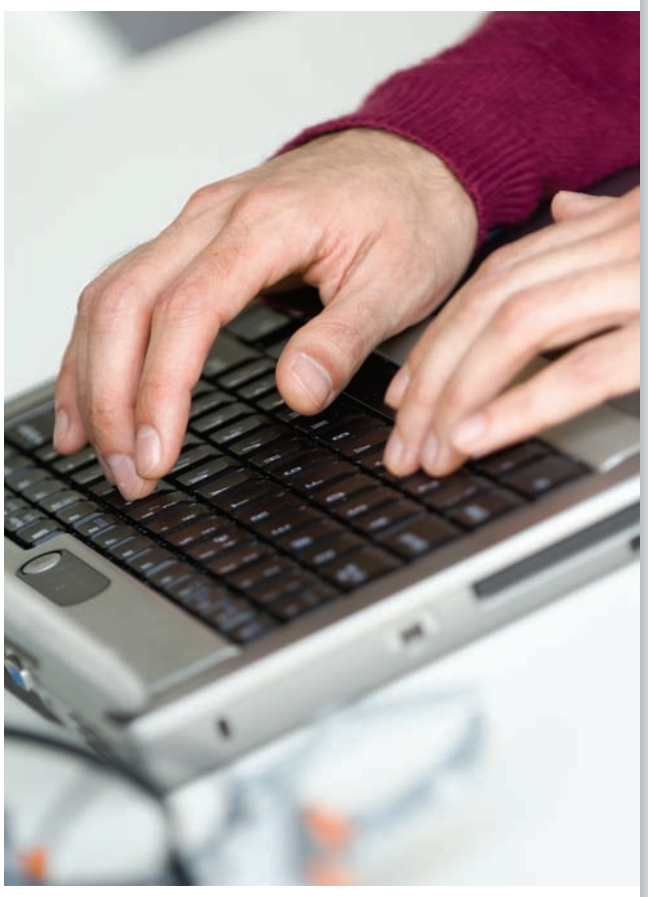
Set theoretic aspects of infinitary logics

Numerical and asymptotic approaches to boundary-layer receptivity and transition

The geometries of the Hrushovski constructions

Floating body impact

Marangoni instabilities in two-layer fluid flow



Areas of research

Algebra and Combinatorics Group Theory, including the automorphisms of designs, and the application of representation theory and incidence-transformation arguments to permutation groups. Algebraic Combinatorics and finite permutation groups, including partially ordered sets and reconstruction problems. Generation problems in profinite groups, probabilistic methods and asymptotic results. Representation Theory including: modular representation theory of the symmetric groups and related algebras, Hecke algebras, the q-Schur algebras and the Ariki-Koike algebras; Kazhdan-Lusztig theory, representation theory of finite dimensional algebras, algebraic groups and related algebras, connections with Lie theory, homological methods, categorification.

Mathematical Logic Set theory: pure set theory, set-theoretic model theory and topology, such as the problem of the existence of universal models, as well as problems in infinite combinatorics and associated independence results. Techniques include large cardinals, independence results, forcing iterations, and pcf theory. Model theory: strongly minimal sets, stability and simplicity theory, automorphism groups of saturated structures and categoricity, exponential algebra, applications to number theory, transcendence questions. A general interest concerns applications of model theory in mathematics, particularly algebra.

Number Theory Diophantine equations, elliptic curves, arithmetic dynamical systems and the representation theory of p-adic groups with a view to the Langlands programme.

Ergodic Theory and Dynamical Systems Higher dimensional Markov shifts, flows on homogeneous spaces of algebraic groups, examples of algebraic and geometric origin and examples motivated by number theory. Methods from commutative algebra, harmonic analysis, finite groups, Lie theory and representation theory are used to understand structural and rigidity properties of dynamical systems.

Fluid Dynamics Fluid flow stability from theoretical models to engineering applications: For example, boundary layer stability on aircraft wings. There is also research in quantum fluids. Areas of classical mechanics including turbulent flows, in situations ranging from oil pipelines to blood in arteries. Compressible flows including nonlinear sound waves such as sonic booms and propagation of waves in multiphase media like foams.

Solid Mechanics Thermoelastically constrained materials and purely mechanically constrained materials. Deformation-temperature constraints lead to instabilities but it has been shown that deformation-entropy constraints maintain stability. Ramifications of these results are studied, especially for elastic fluids and rubber-like solids. Also, elastic wave propagation in crystalline media, surface waves, viscoelastic waves, thermoelastic plate waves, energy propagation, materials with negative Poisson's ratio and composite materials.

Geophysical Fluid Dynamics Problems including improvements of numerical models of large-scale ocean circulation to deal with the complex topography of ocean floors.

Mathematical Biology Problems include bacterial denitrification, biomolecular aggregates and colloidal droplets, motion of red blood cells, cytoplasmic streaming in root hairs and cartillage modelling.

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Entry Requirements

Candidates should have, or expect to have, a first class or exceptionally, upper second class, honours degree (or equivalent) in Mathematics.

Related Taught Programmes

MSc Energy Engineering with Environmental Management p 56
MSc Mathematics p 57
MSc Mathematics with Mathematics Education p 58
Mathematics 1+3 p 59

Contact Details

Admissions Office
Faculty of Science
University of East Anglia, Norwich NR4 7TJ
Tel: 01603 593002 Fax: 01603 591045
Email: sci.pgr.admiss@uea.ac.uk

Research opportunities in Pharmacy

The School of Pharmacy is a recently developed initiative whereby we have recruited scientists of outstanding international reputation to form the first new school of pharmacy in the UK for over 30 years.

The School has developed a highly collaborative environment where traditional boundaries between subject areas have become deliberately blurred in order to reflect the cutting edge aspects of pharmaceutical science: hence research projects may be within an individual area or may be shared between groups. The four principal areas of research are drug delivery and nanocharacterisation, pharmaceutical cell biology, medicinal chemistry and pharmacy practice. We have excellent facilities in all four subject areas enabling postgraduates to be trained in state-of-the-art techniques and practices.

"I came to UEA to do a PhD in Pharmaceutical Materials Science, after obtaining a Pharmacy degree at the University of Belgrade and working in the pharmaceutical industry for several years. Being a postgraduate at UEA is a great thing: it's challenging, it's rewarding and it's fun. Friendly people and the lovely city of Norwich make this a fantastic experience that I would recommend to anyone."
Ljiljana Harding, PhD student, Pharmacy

Areas of research

Nanocharacterisation and Drug Delivery is a group that uses state-of-the-art techniques to study drug delivery systems and to optimise their development via fundamental understanding of their structure and properties. In particular we have expertise in the development of novel nanocharacterisation techniques and the application of such techniques to pharmaceutical and biological systems. We are also an internationally leading group in the field of thermal analysis and the development of novel analytical methods such as thermally stimulated current and muon spectroscopy. These techniques are applied to systems such as controlled release dosage forms, inhalation systems and amorphous drug systems. In addition we have a strong interest in the development of novel drug delivery systems such as delivery to the eye (in collaboration with the Pharmaceutical Cell Biology Group) and dosage forms for the older patient (in collaboration with the Pharmacy Practice and Medicines Management Group).

Pharmaceutical Cell Biology uses biochemical, molecular and cell biological approaches to perform cutting-edge research into some of the major questions in the clinical therapeutics of drugs. We have expertise in understanding the molecular mechanisms that lead to eye diseases such as glaucoma and cataract formation within the lens. Additionally, much of our work focuses on the pro-inflammatory and anti-cancer nature of cytokine and chemokine molecules of the immune system, understanding how these agents act at a molecular and cellular level to achieve their actions, leading to new insights in the medical fields of HIV infection, auto-immunity, atherosclerosis, septic shock and leukaemia.

Pharmacy Practice and Medicines Management The professional diversity within the University of East Anglia provides an ideal setting for pharmacy practice research. Currently, whilst working in partnership with local primary care trusts and hospitals, the research team is working collaboratively with colleagues from the School of Medicine and the School of Education. Pharmacy practice research at UEA can be categorised into medicines management and pharmacy education.

Current projects include:

- Evaluation of pharmacist led support services for patients with difficulties in administering their medicines at home
- Identification of the pharmaceutical care issues surrounding patients with swallowing difficulties
- Development of formulations to aid dysphagic patients with their medication
- Research into the use of portfolios for pre-registration pharmacy education.

Why should I come to UEA?

The School of Pharmacy together with its collaborators across the Norwich Research Park, including the Norfolk and Norwich University Hospital, offers an opportunity to do research in a genuinely multidisciplinary environment seeking answers to problems rather than pursuing a narrow disciplinary focus.

85% of research activity classified as leading, excellent or recognised, RAE 2008

Voted top UK School for 3rd year running in National Student Survey 2009

Recent Thesis Titles

Nanocharacterisation and Drug Delivery

The development of novel thermoanalytical approaches for the characterisation of pharmaceutical polymorphs

A thermal and microscopic investigation into the physical characteristics and drug release behaviour of ethyl cellulose films

Pharmaceutical Cell Biology

Purine receptor signalling in retinal pigment epithelial cells

Detection of heterotrimeric G protein activation by CCR5 using a Fluorescence based FRET assay

Pharmacy Practice

Medicines Management: Optimisation of adherence interventions

Medicinal Chemistry

Calix[4]dendrimers: Multivalent ligands for molecular pharmaceutics

Synthesis of low molecular weight thiol cofactors from pathogenic bacilli

Design, synthesis and biological evaluation of 9-amino-acridines targeting Holliday junctions

Medicinal Chemistry Research in the group is clearly focused at the chemistry biology interface, with an emphasis on synthetic approaches to molecules with potential therapeutic application. Key strengths are in the areas of drug design and delivery, leading to significant collaboration both with colleagues in Nanocharacterisation and Drug Delivery and with those in Pharmaceutical Cell Biology. We have continuing interests in the design and development of supramolecular structures based upon calixarenes and resorcin[4]arenes that improve drug uptake and can be used in imaging or as therapeutic agents in themselves. Protein-DNA and protein-protein interactions are potential targets for intervention in cancer, inflammation and other diseases. Using natural products as a starting point, and through the development of solution and solid phase synthesis methods, we are investigating small molecules that can disrupt these interactions. The combination of synthetic chemistry with screening methods both in-house and through collaboration is a powerful approach to lead compound identification. Small molecules are being designed to unravel mechanisms of antibiotic resistance at the molecular level.

Current projects include:

- Natural products that target the p53/MDM2 interaction
- Targeting the Holliday junction in DNA repair
- Antibody-drug conjugates based on ultrapotent cytotoxins
- Unique antibiotic resistance pathways in pathogenic bacilli
- New drug delivery systems for cancer chemotherapy
- Multivalent dendrimers for gene delivery.

Thesis Word Length

PhD - 100,000 words
MPhil - 65,000 words
MSc(R) - 40,000 words

Period of Study

Full time		Part time	
PhD	3 years	PhD	6 years
MPhil	2 years	MPhil	2 years
MSc(R)	1 year	MSc(R)	2 years

All students then have one additional year in which to write up and submit.

PLEASE NOTE: It is also possible to undertake industry-based and Institute-based MSc and PhD degrees. Please contact our admissions staff for further information.

Entry Requirements

Candidates should have, or expect to have, a first class or upper second class honours degree (or equivalent) in either chemistry, biological science, pharmacy or related discipline.

Related Taught Programmes

MSc Industrial Pharmacy *Planned for 2011 entry*

Contact Details

Admissions Office
Faculty of Science
University of East Anglia, Norwich NR4 7TJ
Tel: 01603 593002 Fax: 01603 591045
Email: sci.pgr.admiss@uea.ac.uk

Research opportunities at the Institute of Food Research

The Institute of Food Research undertakes world class science in the relationship between food, diet and health. Its programme includes fundamental studies on the chemical and physical structures of foods, the identification and mode of action of dietary bioactive compounds, the molecular biology of food borne pathogens and the biology of the gastrointestinal tract.

IFR plays a leading role in driving food science in the UK and Europe and attracts many overseas visiting scientists. It undertakes a mixture of fundamental and strategic science, and has excellent and extensive links to the food industry. IFR scientists work closely with those from the John Innes Centre, the Faculties of Science and Health at UEA, and clinicians from the Norfolk and Norwich University Hospital to deliver innovative approaches to improve the nutritional qualities of food and to understand how food and diet can promote health.

IFR has an annual doctoral training account from the BBSRC for funding PhD studentships. IFR is recognised as a Marie Curie Early Stage Training site for postgraduate research and hosts students from around the world funded by a range of external scholarships. The Institute's Graduate Studies Committee monitors all aspects of postgraduate research and supports the student experience whilst on Norwich Research Park.

IFR's science

IFR's research is centred on four science programmes, the biology of the gastrointestinal tract, plant natural products and health, food structure and health and the biology of food borne pathogens. In addition, it has a programme on second generation biofuel production from waste products of the agro-food industry, and has a pilot bioethanol plant on site. It also maintains the UK yeast collection and has a major activity in developing and coordinating Europe-wide food compositional databases.

The central aim of research into the Integrated Biology of the GI Tract is to understand how the homeostasis between the GI tract microflora and the gut epithelium is maintained and how perturbation of this system can have consequences for health. This exciting approach, including the critical food dimension, differentiates the GI tract programme from work under-taken in a more medical setting.

Research into Plant Natural Products and Health aims to elucidate the fundamental mechanisms in humans by which diets that contain certain natural products help to maintain health and prevent the onset of chronic disease.

The Institute's food chemistry and biophysics approach is considered to be unique in the UK, and research into Food Structure & Health brings together expertise in food biopolymers, colloid and interface science with those of protein biochemistry, molecular modelling and gut epithelial biology, and has the overall aim of understanding how food structures behave in the gut and affect the breakdown and availability of macro- and micro-nutrients in food.

In studying Foodborne Bacterial Pathogens IFR scientists aim to discover new aspects of the biology of bacterial pathogens with the long-term goal of reducing the burden of foodborne disease in humans. Combining state-of-the-art molecular microbiology with mathematical biology reveals patterns in pathogen responses that are currently hidden by massive levels of complexity.

Why should I come to IFR?

IFR is a world-leading contributor to the task of harnessing food for the maintenance of health and controlling food-related disease.

Research is of international quality, often in international partnership to provide underpinning science for consumers, policy makers, the food industry and academia.

IFR is a leading European centre for postgraduate training in the food and health sciences, with state-of-the-art equipment and research facilities.

Recent Thesis Titles

Elucidation of polymers which confer crisp texture in Chinese waterchestnut

The effect of flavonoids on inflammatory mediator expression in human monocytic and endothelial cells

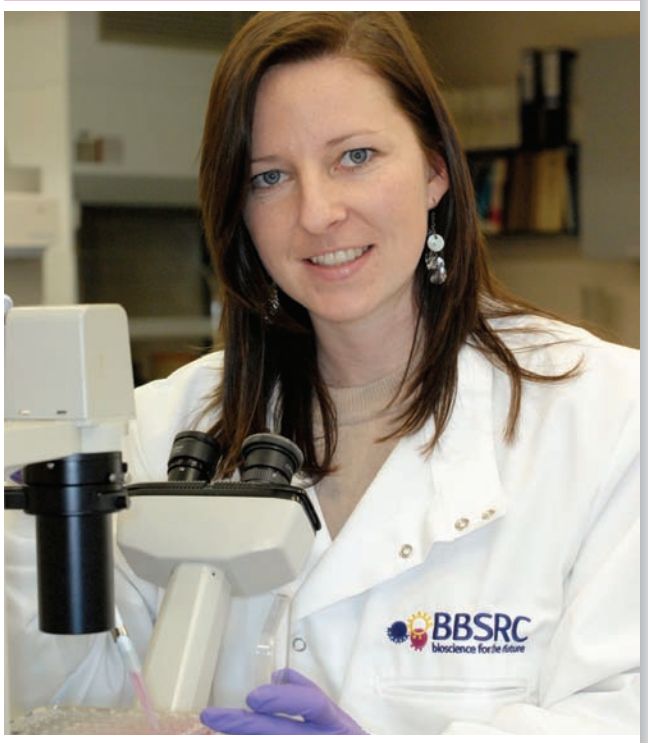
The role of dendritic cells in food allergy

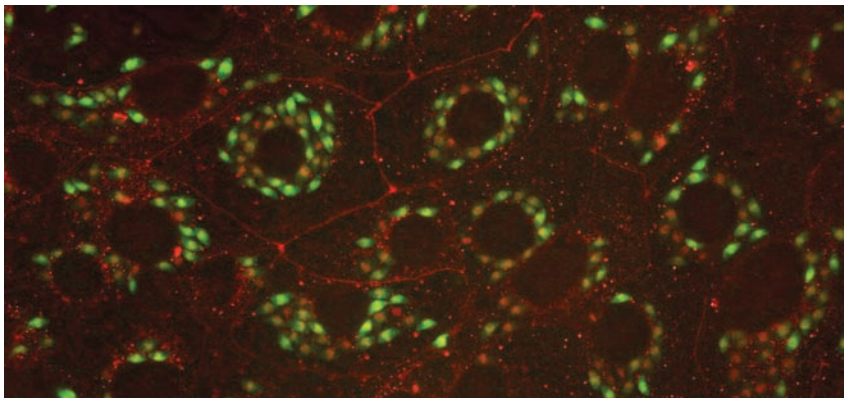
Control of water transport in structured starch films

Effects of apple-derived flavan-3-Ols on oesophageal adenocarcinoma cells *in vitro*

BeWo cells as an *in vitro* model for metal transport across the placenta

"Postgraduate study at a leading institute such as the IFR provides an invaluable opportunity to accomplish great scientific achievements as well as having access to a wide variety of training courses, seminars and conferences. Working in such a vibrant and supportive science community creates an atmosphere that will drive you to work at your best and enjoy your student life at the same time."
Olivia Kober (below), PhD student,
Institute of Food Research





pictured: Epithelial cells infected with the parasite *Toxoplasma gondii* (green). The cells are labelled with a membrane marker protein (red) and the intracellular parasites appear to be clustering around the nucleus of each cell. Image by BBSRC-funded PhD student, Caroline Weight

Our vision for the future

- Management of diet-related precancerous field changes in GI tract mucosa - an understanding of the effect of nutrition and gut microflora.
- Exploitation of dietary factors to suppress intestinal and other cancers.
- Control of allergy and inflammatory disease.
- Smart probiotics based on recombinant commensal bacteria and novel micro-encapsulation systems to deliver biologically active compounds.
- New biomarkers of health and early maladaptive response to diet to identify disease risk.
- Definition of genetic and epigenetic variables that explain differences in response to diet and quantification of individual variability in the UK population.
- Exploitation of protective compounds in fruits and vegetables and other foods that can help us remain healthy.
- Definition of “vulnerable” groups and individual genotypes with specific dietary requirements to reduce disease risk and morbidity.
- Improved barrier and encapsulation systems in foods to deliver micronutrients and retain processability, stability and shelf-life.
- Elimination or effective control of bacterial pathogens in the food chain via new interventions and vaccines.
- Fully quantitative microbiological food safety.
- New foods that provide consumer benefit and diet related health advantages without compromising microbial safety.
- Prediction, prevention or proactive management of emerging microbiological food safety issues.
- Insight into the effect of host stress on pathogens and strategies that avoid reliance on antibiotics.

Science for business

IFR scientists are encouraged to be entrepreneurial. The science generated is applicable to industrial innovation worldwide. IFR delivers effective knowledge exchange and commercialisation through industrial research partnerships with intellectual property management from PBL Ltd. The Food and Health Network, IFR’s knowledge transfer portal and IFR Extra, a commercial subsidiary of IFR, responsible for short-term contracts, troubleshooting and specialist analysis both offer practical opportunities for students with talent and ideas.

Thesis Word Length

PhD - 100,000 words
MPhil - 65,000 words
MSc(R) - 40,000 words

Period of Study

Full time		Part time	
PhD	3 years	PhD	6 years
MPhil	2 years	MPhil	4 years
MSc(R)	1 year	MSc(R)	2 years

All students then have one additional year in which to write up and submit.

PLEASE NOTE: It is also possible to undertake industry-based and Institute-based MSc and PhD degrees. Please contact our admissions staff for further information.

Entry Requirements

Candidates should have, or expect to have, a first class or upper second class honours degree (or equivalent) in a relevant subject.

Related Taught Programmes

MSc Plant Genetics and Crop Improvement p 38
MSc Sustainable Agriculture & Food Security p 39
MSc Computational Biology p 43

Contact Details

NRP Postgraduate Research Office,
Norwich Research Park, Colney,
Norwich NR4 7UH
Tel: 01603 450768
Email: graduates.nrp@bbsrc.ac.uk
Web: www.ifr.ac.uk

Research opportunities at the John Innes Centre and Sainsbury Laboratory

The John Innes Centre (JIC) is Europe's premier independent research centre for the study of plant science and microbiology and is an institute of the Biotechnology and Biological Sciences Research Council (BBSRC). The Sainsbury Laboratory (TSL) is co-located with JIC and undertakes basic and applied research in plant-microbe interactions. This is a dynamic, multinational community of scientists and students and its reputation for scientific excellence is known worldwide, attracting some of the best scientists and brightest students from around the globe.

Our Commitment to Research As a major centre, the site attracts funding to maintain a broad range of state-of-the-art facilities. These include specialist laboratories and controlled environment suites. It has an ongoing laboratory development programme and provides, or has access to, key platform technologies that underpin its science; for example it has invested heavily in electron and confocal microscopes, spectroscopy equipment and the advanced robotics and bioinformatics required for genomic, proteomic and metabolomic science. The Centre has strong collaborative links, globally, nationally and locally between labs and with other partners on the Norwich Research Park including The Genome Analysis Centre which is co-located with JIC. These links all contribute to the highest standards of research.

Students at JIC JIC prides itself on its proactive approach to training research students. It has a UEA Graduate Studies Committee that constantly monitors all aspects of postgraduate research and the student experience at the Centre. The Student Voice Committee, which is a forum for students to comment on issues and activities related to them, helps to integrate students into the life of the Centre. The students have their own website and they run a popular seminar series with speakers ranging from academics, alumni and scientists in the media. Students are also represented on many of the Centre's organisational committees.

Funding The JIC has an annual doctoral training account from the BBSRC for funding PhD studentships. Scholarships for its Rotation PhD are funded by the John Innes Foundation and the Sainsbury Laboratory. JIC is recognised as a Marie Curie Early Stage Training site for postgraduate research and in addition the Centre is host to students from around the world funded by a range of external scholarships. For more information about funding please see pages 12 and 13.

Rotation PhD This highly popular and prestigious PhD programme includes three research rotations in the first year before selection of the final research project. The Rotation PhD empowers the student in both choice of project and supervisor and it has attracted students with outstanding potential from the UK and all over the world. (Directors: Prof Nick Brewin, Prof Jonathan Jones and Prof Mike Merrick)

2009 Press releases include:

"Wheat genome project to underpin food security"

"Shatter-resistant Brassicas"

"New national genome centre opens in Norwich"

"Key seed size gene identified"

"Two heads better than one in new antibiotic method"

Why should I come to JIC?

The John Innes Centre and the Sainsburys Laboratory provide an internationally leading research environment.

JIC has a friendly and stimulating environment for research and professional development.

Students are supervised as members of small interactive research teams.

There is a vigorous and self-supporting student community.

It has outstanding research facilities especially in the platform technologies that underpin modern molecular biology.

It provides an excellent springboard for a wide range of careers in academia, industrial research or in the increasing range of science related careers.

Recent Thesis Titles

"Click chemistry" to synthesise glycosidase inhibitors

Actin cytoskeleton dynamics mediate sugar responses in *Arabidopsis thaliana*

Characterisation of putative transcription factors essential for nodulation in *Medicago truncatula*

The identification and mapping of candidate genes and QTL involved in the fatty acid desaturation pathway in *Brassica napus*

Yellow rust resistance in wheat, genetic and phenotypic characterisation of a durable form of resistance

A structure-function analysis of the final stages of novobiocin biosynthesis

Temporal regulation of root hair development by RHD6 family genes

The assembly of outer membrane proteins in *E.coli*

"The Rotation PhD Programme provides an excellent opportunity to explore the scientific variety that JIC can offer. In spite of the fact that I started my career as a Bioinformatics Scientist the freedom of choice offered by this programme allowed me to do research in different areas of biology. I am enjoying every bit of my experience which is enriching both my personal development and scientific career."
Shantanu Karkare (below), international PhD student

Areas of research

Biological Chemistry carries out fundamental research in chemistry, enzymology, bionanotechnology and structural biology in order to understand and exploit key biological processes. This enables the control and manipulation of key enzymes, proteins and pathways of agronomic, environmental, biomedical and industrial importance.

Computational and Systems Biology conducts theoretical and applied research across a broad range of the biological sciences, with a special focus on plant and microbial research. Particular strengths of the department include mathematical and statistical modelling, semantic modelling and data integration, computational comparative genomics, biological physics and structural biology.

Cell and Developmental Biology studies the interaction of the plant genome with internal developmental networks and the environment using a combination of genetic, cell, biological, molecular and evolutionary strategies.

Crop Genetics undertakes research on the biology of cereals, brassicas and legumes to understand the genetic and molecular basis of phenotypic variation. A major goal is to develop the technologies and knowledge base to provide a predictive framework that will underpin plant breeding strategies.

Disease and Stress Biology studies the interaction of plants with microbes and the environment. Its multidisciplinary programmes encompass genetics, microbiology, biochemistry, cell biology and population biology. Research into disease and symbiotic relationships and other stresses on plant performance contributes to advancing our knowledge of fundamental aspects of plant biology, and to meeting some of the major practical challenges of modern farming.

Metabolic Biology carries out research into fundamental aspects of plant metabolism in the broader context of plant biology. Major challenges are to understand how plant metabolism changes in response to environmental stimuli and to investigate the mechanisms underpinning metabolic diversification. Collectively these studies provide a foundation for the development of sustainable agriculture and bio-based industries.

Molecular Microbiology focuses on bacterial metabolism, physiology, gene regulation and development and plant-bacterial interactions. Major themes: *Streptomyces* research, studying antibiotic production, morphological differentiation and stress responses; the *Rhizobium*-legume symbiosis; the molecular bases of signal transduction and response to environment.

The Sainsbury Laboratory The Sainsbury Laboratory mission is to understand how plants interact with microbes and viruses and how plant pathogens cause disease. Research topics include: plant disease resistance genes, the biology of pathogen effector proteins, innate immune recognition in plants, signalling and cellular changes during plant-microbe interactions, post-invasion resistance to fungal pathogens, and the specificity of plant-pathogen interactions.

Degrees Available

- PhD
- M.Phil
- MSc by Research

Entry Requirements

Candidates should have, or expect to have, a first class or upper second class honours degree (or equivalent) in a relevant subject.

Related Taught Programmes

MSc Plant Genetics and Crop Improvement p 38

MSc Sustainable Agriculture & Food Security p 39

MSc Computational Biology p 43

Contact Details

NRP Postgraduate Research Office,
Norwich Research Park, Colney,
Norwich NR4 7UH

Tel: 01603 450768

Email: graduates.nrp@bbsrc.ac.uk

Web: www.jic.ac.uk
www.tsl.ac.uk
www.tgac.bbsrc.ac.uk

MSc Applied Ecology and Conservation

The MSc Applied Ecology and Conservation provides a flexible course structure suitable for students who wish to acquire the skills necessary for a range of careers in conservation and applied ecology. The programme aims to provide you with interdisciplinary training forming an ideal platform either for continuation to doctoral research or for direct access into conservation related employment.

The course runs over a full calendar year starting with a field course. You will take a combination of taught modules during the first half of the year with the second half spent on an individual research project, often overseas. In addition to core modules in ecological survey methods, current issues in conservation, research skills for ecologists and statistics, you will be able to choose from a broad range of optional modules, including Geographical Information Systems (GIS), practical conservation and work placement, restoration ecology, conservation genetics, biodiversity conservation and human society and ecological modelling.

Conservation biologists and ecologists in the Schools of Biological and Environmental Sciences and leading conservation organisations conduct most of the teaching.

In addition to in-depth exposure to global conservation issues the course provides training in a range of transferable skills and will provide you with an opportunity to establish valuable contacts with potential employers through short and long term work experience and research interaction with a range of national and international conservation organisations.

Examples of some recent research projects conducted by students on this MSc course include:

- The vulnerability of birds to climate change (with Birdlife International)
- Mandrills in Gabon: current status and threats (with the Wildlife Conservation Society)
- Microhabitat and dietary preferences of Telfair's skink on Round Island: implications for translocation (with the Mauritian Wildlife Foundation)
- Nest-site selection and poaching in Yellow-headed Amazon parrots (with the World Land Trust)
- Crab as indicators of habitat quality (with Nature Seychelles)

"I found the MSc in Applied Ecology and Conservation to be an excellent course to help develop my career. The diverse range of modules allows anyone to mould the course to their interests, while the core classes ensure a sound grounding in the whole process of planning, fundraising for, and running a research project."

Joe Hawes, former student currently studying for a PhD in the School of Environmental Sciences

Course Profile

Compulsory (150 credits)

Multivariate Statistics
Issues in Conservation
Ecological Survey Methods
Research Skills
Univariate Statistics
Dissertation

Options Range (30 credits)

Biodiversity Conservation and Human Society
Practical Conservation & Work Experience
Restoration Ecology
GIS for Ecology and Environmental Management
Conservation Genetics
Ecological Modelling

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

NERC Studentships may be available for outstanding applicants

Entry Requirements

This programme is open to students with a good first degree (minimum of a 2.1 or equivalent) in a biology-related subject plus evidence of additional conservation experience. First degrees in geography or environmental management are also accepted if these contain a strong ecological component. Non-scientists wanting to retrain may take the one year Graduate Diploma in Ecology and enter the MSc Applied Ecology & Conservation the following year.

Related Programmes

MSc Biotechnology for a Sustainable Future p 36
MSc Molecular Medicine p 37
MSc Plant Genetics and Crop Improvement p 38
MSc Sustainable Agriculture and Food Security p 39
Research Opportunities in the School of Biological Sciences pp 18-19

Contact Details

Admissions Office
Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ

Tel: 01603 593503 Fax: 01603 591045

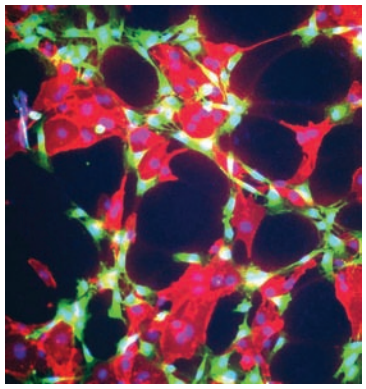
Email: bio.msc.admiss@uea.ac.uk

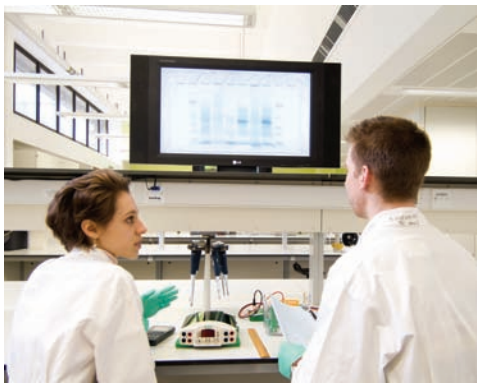
MSc Biotechnology for a Sustainable Future

Understanding and harnessing the metabolic diversity of living organisms, for example in the production of biofuels and pharmaceuticals, will make a huge contribution to developing a sustainable global environment in the 21st Century. This is the ethos that permeates the innovative MSc Biotechnology programme for UEA.

The one year course is divided into two parts. Part I is taught through face-to-face lectures, workshops and hands-on experiments in experimental biotechnology laboratories. Together these provide the opportunity to learn skills in data analysis, critical evaluation of data, laboratory working and report writing in the exciting new field of biotechnology for a sustainable future. The Programme is taught by subject specialists and supported by a number of local industries as well as the prestigious research institutes on the Norwich Research Park.

Part II is based around a major research project that provides the opportunity to design experiments and carry out original research on a chosen topic. The project provides an opportunity to enhance research skills gained at undergraduate level, through carrying out higher-level academic research and writing based on an awareness of knowledge at the very forefront of the field of biotechnology. The project is a substantial piece of individual work drawing on knowledge and understanding gained from the taught modules.





As well as learning fundamental theory, you will develop valuable transferable skills. The University supports this by providing personal development sessions including presentation skills, employability and time-management.

Assessment is through a combination of formal exams, laboratory reports, coursework assignments and presentations, as well as through the research project, which is submitted as a formal, bound dissertation and assessed by external as well as internal examination.

"I did my undergraduate degree (BSc Biotechnology) at The Sinhgad College of Science, University of Pune, India. I then joined the University of East Anglia (UEA) to complete a Masters in Biotechnology for a Sustainable Future in 2008 and successfully completed it in 2009. I chose UEA because the RAE rating was good for Biological Sciences and it has strong collaborations with the John Innes Centre (JIC) and the Institute of Food Research (IFR). All the modules for MSc Biotechnology for a Sustainable Future at UEA are based on current biotechnology research and its application in industry. The best thing about this course is the staff and the research facilities at UEA. All the staff are very helpful, kind and friendly. Currently, I am doing a PhD in Agriculture Biotechnology at Harper Adams University College, Shropshire, UK"
Kirtikumar Kondhare, former student

Course Profile

Compulsory (180 credits)

Part I
Microbial and Enzyme Biotechnology
Biofuel, Bioremediation and Bioplastics Biotechnology
Genetics, Genomics and Bioinformatics
Medical Biotechnology
Practical Class
Postgraduate Training programme

Part II
Research Skills
Research Project

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good degree or equivalent in life or physical sciences. Candidates without a relevant degree but with other experience, such as employment within a biotechnology company or relevant research experience, will also be considered.

Related Programmes

MSc Applied Ecology and Conservation p 35
MSc Molecular Medicine p 37
MSc Plant Genetics and Crop Improvement p 38
MSc Sustainable Agriculture and Food Security p 39
Research Opportunities in the School of Biological Sciences pp 18-19

Contact Details

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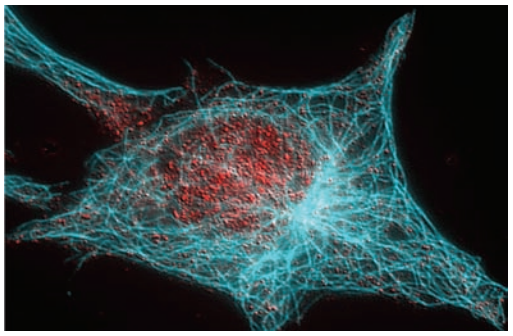
Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ
Tel: 01603 593503 Fax: 01603 591045
Email: bio.msc.admiss@uea.ac.uk

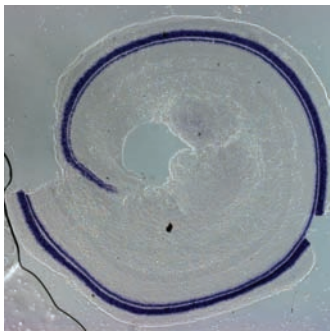
MSc Molecular Medicine

New for 2011 entry

Understanding the molecular and cellular mechanisms for disease is an important area of research in the 21st century. Massive steps forward in science, such as the completion of the Human Genome Project, mean that diseases can now be studied at the cellular and molecular level. This will help to understand them, to develop treatments and possibly, in the future, cures.

This new MSc in Molecular Medicine draws upon the world-renowned strength of research in biomedical sciences at UEA and on the Norwich Research Park. MSc graduate students will obtain skills that are sought in medical research, the pharmaceutical industry or the health services.





Part I of the programme will be taught through face to face lectures, workshops, problem based learning sessions and hands on experiments in our modern biomedical laboratories. These modules will provide the opportunity to learn skills in data analysis, critical evaluation of data, laboratory working and report writing in Molecular Medicine.

Part II of the programme will include a major research project where the student will design experiments and carry out original research in a chosen topic. The project will provide an invaluable training environment to enhance research skills. It will be a substantial piece of individual work drawing on knowledge and understanding gained from the taught modules. In preparation for the research project the student, in consultation with the project supervisor, will prepare an in depth proposal drawing on the current literature.

As well as learning fundamental theory, the student will develop valuable transferable skills. The University will support this by providing Personal Development Sessions including presentation skills, employability and time-management

Assessment will be through a combination of formal exams, laboratory reports, coursework assignments, presentations and problem based learning sessions. In addition the research project will be submitted as a formal bound dissertation and assessed by external as well as internal examination.

"We are excited to be offering this new MSc programme in Molecular Medicine. UEA and our partner Institutes across the Norwich Research Park have a great deal of expertise in the Medical Sciences, which will be available to the student as part of the course. The programme emphasises experimental sciences and will make use of our outstanding research facilities. The course will provide an excellent environment for the student to prepare themselves for a future career in research, for instance as a PhD student, or for direct entry into a career in healthcare or the pharmaceutical industry."
Dr Grant Wheeler, Course Director

Course Profile

Compulsory (180 credits)

Part I
Frontiers in Molecular Medicine I
Frontiers in Molecular Medicine II
Modern Experimental techniques in Molecular Medicine
Medicinal Biotechnology
Data Handling Linked to Molecular Medicine
Postgraduate Training Programme

Part II
Research Project Proposal
Research Project

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good degree or equivalent in life or physical sciences. Candidates without a relevant degree but with other experience, such as employment within a biomedical company or relevant research experience, will also be considered.

Related Programmes

MSc Applied Ecology and Conservation p 35
MSc Biotechnology for a Sustainable Future p 36
MSc Plant Genetics and Crop Improvement p 38
MSc Sustainable Agriculture and Food Security p 39
Research Opportunities in the School of Biological Sciences pp 18-19

Contact Details

Admissions Office
Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ

Tel: 01603 593503 Fax: 01603 591045

Email: bio.msc.admiss@uea.ac.uk

MSc Plant Genetics and Crop Improvement

The one-year MSc course in Plant Genetics and Crop Improvement provides training for students wishing to undertake a further degree in plant molecular genetics, or alternatively, a career in plant breeding and crop improvement. The course focuses on plant molecular genetics and its potential applications to crop improvement in the 21st century.

The course is run jointly by the School of Biological Sciences (BIO) at UEA and the John Innes Centre (JIC), which also includes The Sainsbury Laboratory. The John Innes Centre is one of the world's leading research institutes in plant genetics and crop improvement. The teaching staff includes members of the School of Biological Sciences together with scientists from the John Innes Centre and a number of leading plant breeding and plant biotechnology companies within the UK.

In recent years the career prospects for students with a postgraduate degree in Plant Genetics and Crop Improvement have been very good, often leading to a PhD or employment in the plant breeding industry. The course will provide you with a unique opportunity to study plant genetics and crop improvement in an environment of academic and research excellence.

The taught modules cover subjects including plant molecular genetics and biotechnology, target traits for crop improvement, and plant breeding. Training in a number of key transferable skills is also included. You will also undertake a six-month laboratory-based research project under the supervision of a member of BIO faculty or a senior scientist at the John Innes Centre. You will be required to submit a dissertation and present a seminar on your research project.

Research projects are offered in the following areas:

- Plant genetics
- Plant biotechnology and crop improvement
- Plant genome organisation
- Plant-microbe interactions
- Cell and developmental biology
- Plant gene function

"I found this course very beneficial but it was also tough for me as I did not have a molecular biology background in my first degree. However, there was always support from the lecturers, supervisors and staff of the course who are sympathetic to students and encouraging. The number of students is kept small, so the atmosphere of the class is friendlier than the other large courses. We are also privileged to have so much exposure to the latest Plant Science at John Innes Centre where renowned researchers gather from all over the world. Thanks to this course, I was offered the PhD studentship to research Crop Genetics at JIC and enjoy a life as a scientist there!"
Chie Hattori, former student

Course Profile

Compulsory (180 credits)
Plant Breeding
Genetics, Genomics and Bioinformatics
Plant Genomics and Biotechnology
Target Traits for Crop Improvement
Postgraduate Training Programme
Practical Class
Biofuel Biotechnology
Research Project Plan
Laboratory-based Project

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

BBSRC Studentships may be available

Entry Requirements

This programme is open to students with a good degree in biological sciences or plant biology. However, candidates with other experience, such as employment within a plant breeding company or relevant research experience, will also be considered.

Related Programmes

MSc Applied Ecology and Conservation p 35
MSc Biotechnology for a Sustainable Future p 36
MSc Molecular Medicine p 37
MSc Sustainable Agriculture and Food Security p 39
Research Opportunities in the School of Biological Sciences pp 18-19

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MSc Sustainable Agriculture and Food Security

New for 2011 entry

World food production is facing the challenge to become sustainable by reducing inputs of fertiliser, pesticides, and irrigation to levels that can be sustained in the long term. At the same time, world food production will have to increase its output by 50% to meet the anticipated demand of a population which will have grown by 50% from its current level of 6 million, to 9 million by 2050. To meet these dual challenges of sustainability and feeding the world, we need to invest heavily in improving the efficiency of agricultural production. This course examines the potential of sustainable agricultural food production to meet the challenge of feeding the world.

This one-year MSc course provides students with an opportunity to discover and explore solutions for the most pressing problems currently facing humankind: to establish sustainable agricultural approaches. The course is run from within the School of Biological Sciences, and is taught by scientists from the school and by others from institutes that make up the Norwich Research Park, including the John Innes Centre, the Sainsbury Laboratory, and the Institute of Food Research, as well as by other agricultural Institutes in the East of England.

The course provides novel training and education for students wishing to understand the magnitude of the challenges we currently face, including the many obstacles in the path for sustainable agriculture, and the opportunities and solutions that are emerging. An understanding of the current challenge is presented within the context of its historical development and the limitations of current agricultural practice and its effect on the environment.

The major taught components include sustainable agriculture, the principles and practice of domestication of plants and animals, and opportunities for improving these by breeding, the need for biodiversity, agricultural degradation of the environment, the effects of legislation, and the contributions that different farming types can make. There is a strong focus on analysis and interpretation of large data sets.

The taught component of the programme is complemented by a six month research project which will involve detailed analysis and projection from existing databases. There will be an opportunity also for supplementing these analyses with field studies.

The course provides excellent training for students wishing to contribute to a sustainable future in the 21st century.

"This one-year MSc in Sustainable Agriculture and Food Security will provide students with the necessary background to understand the current and future challenges in agriculture, an awareness of modern agricultural practices and in particular those that contribute towards sustainability and food production, as well as the legislative framework that influences agricultural practices in the UK."
Prof John Turner, Course Director

Course Profile

Part 1
Compulsory (100 credits)
Plant Breeding
Postgraduate Training Programme
Sustainable Agriculture
Food Domestication
Research Skills

Options Range (20 credits)
Plant Genomics and Biotechnology OR
Target Traits for Crop Improvement

Part 2
Compulsory (60 credits)
Research Project

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree (or equivalent) in a related subject or to students with a good first degree (or equivalent) in a non related subject such as finance, law, history, who want to move into careers in which a knowledge of sustainable agriculture and food security is important.

Related Programmes

MSc Applied Ecology and Conservation p 35
MSc Biotechnology for a Sustainable Future p 36
MSc Molecular Medicine p 37
MSc Plant Genetics and Crop Improvement p 38
Research Opportunities in the School of Biological Sciences pp 18-19

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MSc Advanced Organic Chemistry

"This intensive course has evolved over many successful years to keep up with the changing demands of modern research. Graduates have a superb record of achievement, securing a wide range of industrial and academic positions."
Dr Andrew Cammidge, Course Director

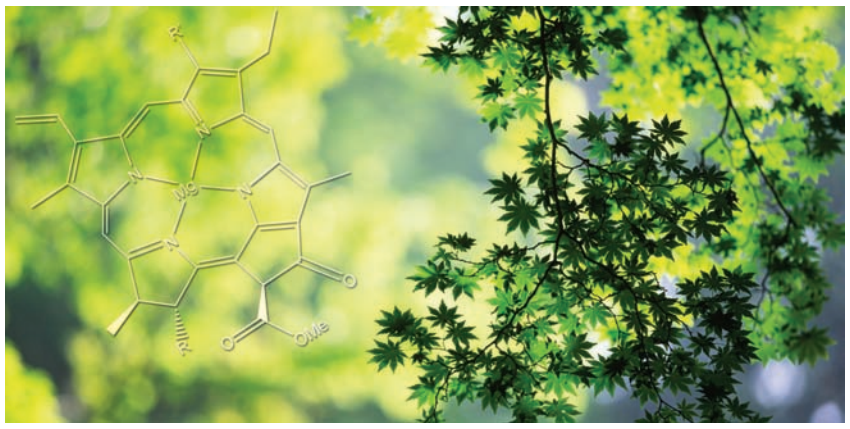
Organic chemistry underpins research and development in many areas of the chemical industry where the demands of contemporary research are such that advanced training beyond honours degree level is becoming increasingly necessary.

There has been a long tradition of postgraduate lecture courses in the School of Chemistry. This taught MSc Advanced Organic Chemistry builds on such expertise and aims to provide an in-depth understanding of industrially relevant applications of the subject.

The course is designed for both chemistry graduates and those with degrees in combined sciences which include a chemistry component, and aims to enhance their broad understanding of chemistry and perfect their skills in underlying aspects of organic chemistry (organic reaction mechanisms, spectroscopy, and synthetic strategy).

You can expect to reach the frontiers of knowledge in key aspects of this subject through a series of specialised advanced lecture courses, problem solving classes, advanced laboratory exercises and a part-year laboratory research project.

The course is 45 weeks long. Typically you will take nine tested general and advanced level lecture courses and three or four problem-solving classes. Recent topics have included synthesis, asymmetric target oriented synthesis, spectroscopy, organometallic chemistry, stereochemistry, medicinal chemistry, organometallics, oxidation and reduction, and natural products. These courses are specifically selected to enhance your training on techniques and subjects needed by the pharmaceutical, agrochemical, speciality and fine organic chemicals industries.



The laboratory component of the course runs throughout the working year. It starts with an eight-week programme of advanced laboratory exercises and experiments designed to provide a realistic training in experimental chemistry by building on basic preparative skills. This is followed by a research project, which will be assessed through a written dissertation and oral examination.

Recent Dissertation Titles

- Gold catalysed syntheses of complex heterocylic systems.
- Enzymes in synthesis.
- Extending the utility of palladium in cross-coupling reactions.

Course Profile

Compulsory (180 credits)
Organic Chemistry Laboratory Unit
Organic Chemistry Lecture Unit
Research Training
Dissertation

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

The MSc Advanced Organic Chemistry includes a significant laboratory based project for which a bench fee of £2,000 (2010 entry) is normally required. However in some cases this fee may be waived.

Entry Requirements

This programme is open to students with a good first degree in chemistry or appropriate related joint discipline.

Related Programmes

MSc Forensic Archaeometry and Provenancing Studies p 41

Research Opportunities in the School of Chemistry pp 20-21

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MSc Forensic Archaeometry and Provenancing Studies

New for 2011 entry

"We especially created this unique course to address the demand for highly specialised hands-on training in geographical provenancing and/or authentication of food, humans, archaeological and cultural artifacts, protected species and many other natural materials. Besides offering training in specific techniques we hope that our course teaches our graduates to develop a holistic multi-disciplinary scientific approach to provenancing problems."

Dr. J.A. Hoogewerff Course Director

In recent years the University of East Anglia has developed specific scientific expertise in interdisciplinary forensic provenancing techniques. With this new MSc course this unique experience has now been made available for students. The course takes relevant aspects of forensic chemistry, geochemistry, food science, archaeology and phylo-genetics and teaches the students to use them for forensic provenancing and geographical authentication of materials like human remains, food, archaeological artifacts, plants and animals.

A background in the natural sciences is required to be able to attend and comprehend the taught material. Non-archaeology students will be given an introduction into archaeology. Together the students will be introduced to the principles and application of geology, geochemistry and isotope geochemistry, physical anthropology and DNA. Practical fieldwork skills will be taught on our experimental site on campus which includes a small "body farm". Spatial data recording, statistical processing and interpretation with Geographic Information Systems are other essential parts of the course. The students will be trained to develop all the necessary practical laboratory skills in our ancient DNA and isotope laboratories. Additional aspects of research ethics, working in challenging environments and expert witness reporting and presenting are part of the curriculum. The training offered in concise reporting will become an asset in a later career. The final MSc project can be either fundamental scientific method development, research to support specific ongoing casework at UEA or in collaboration with the student's home country and/or institution.

On completion of the programme graduates will be able to confidently apply all these techniques and the course will be the foundation for developing specialist careers in academia or with law enforcement agencies.

Course Profile

Compulsory (180 credits)
Archaeology for Natural Scientists
Forensic Geochemistry
Forensic Archaeometry
Stable Isotope Geochemistry
Forensic Provenancing Using GIS
Forensic Genetics and Ancient DNA
Forensic Archaeometry Field Techniques
Research Project

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

The MSc Forensic Archaeometry and Provenancing Studies includes significant laboratory based projects for which a bench fee of £5,000 (2011 entry) is required. For excellent applicants bursaries covering tuition fees and bench fees may be available.

Entry Requirements

This programme is open to students with a good first degree in natural sciences, food science or archaeology.

Related Programmes

MSc Advanced Organic Chemistry p 40
Research Opportunities in the School of Chemistry pp 20-21
Research Opportunities in the School of Biological Sciences pp 18-19
Research Opportunities in the School of Environmental Sciences pp 24-25

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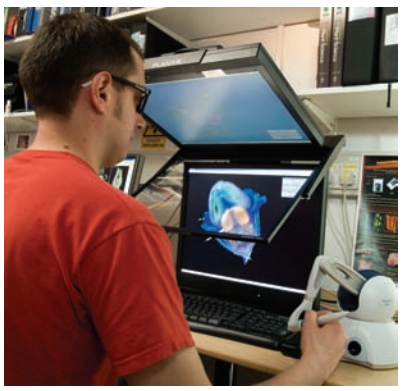
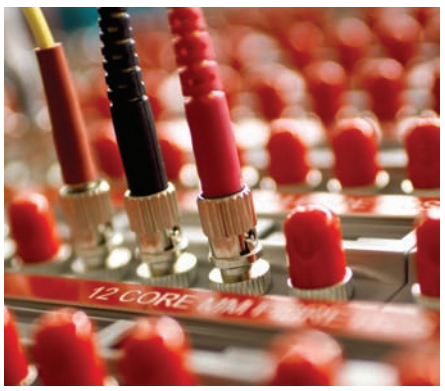
MSc Advanced Computing Science

The rapid development of computing in all its forms is prompting many recent graduates to broaden and deepen their knowledge through studying a Master of Science course. Many practitioners also want to expand their expertise and refresh their skills. The MSc Advanced Computing Science offers a flexible programme that covers a broad spectrum of computing reflecting the research interests and specialisms of the School.

The MSc Advanced Computing Science is a full-time, one-year taught programme; it can also be taken part-time over two years. The course is aimed at students with a first degree in computing science who wish to broaden and deepen their knowledge of the subject. The course offers greater flexibility than our other more specialised MSc courses. Once on the programme you will affiliate with one of the broad areas of the School's research. You will normally take five optional modules, of which at least two are related to your chosen research area. Other modules are designed to complement these and to allow you to broaden your knowledge. You will choose your dissertation topic and undertake preliminary work on it during the spring semester and work on it full-time after the exams until mid-September.





This course will give you enhanced technical and analytical skills in your chosen area of specialisation. Your prospects as a graduate will therefore depend on your specialisation and may include consultancy, software development, project management, web services designer or builder, etc. Computing scientists are generally sought after and well paid and work in diverse environments including small and large international businesses, government agencies and research institutions. The programme will also prepare you for further education through a PhD in order to pursue a career in industrial or academic research.

Some project work may be done with companies and could involve paid placement at a company.

Recent Dissertation Titles

- Systems and internet security
- Video shot detection
- Web-based interface for a static remote sensor configuration

"I enjoyed studying the MSc course in Computing. I gained lots of valuable knowledge as well as many transferable skills. The lecturers and staff were very helpful. Overall, it was a wonderful experience."
Reham Abualhamayel, former student

Course Profile

Compulsory (100 credits)
Research Techniques
Dissertation
Advanced Programming Concepts and Techniques

Options Range A (40 credits)
Artificial Intelligence and Algorithmics
Data Mining
Distributed Computing
Computer Networks
Computer Games Development
Human Computer Interaction

Options Range B (40 credits)
Artificial Intelligence and Algorithmics
Internet and Multimedia Techniques
Systems Engineering Issues
E-Business Systems Development
Information Retrieval
and Natural Language Processing
Data Mining
Applied Statistics
Distributed Computing
Computer Networks
Computer Games Laboratory
Computer Games Development
Audio and Visual Processing
Computer Vision (for Digital Photography)
Human Computer Interaction

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in computer science or a cognate subject (or equivalent qualifications and experience).

Related Programmes

MSc Computational Biology p 43
MSc Computing Science p 44
MRes Computing Science p 45
MSc Games Development p 46
MSc Information Systems p 47
MSc Knowledge Discovery and Data Mining p 48
MSc Statistics p 49
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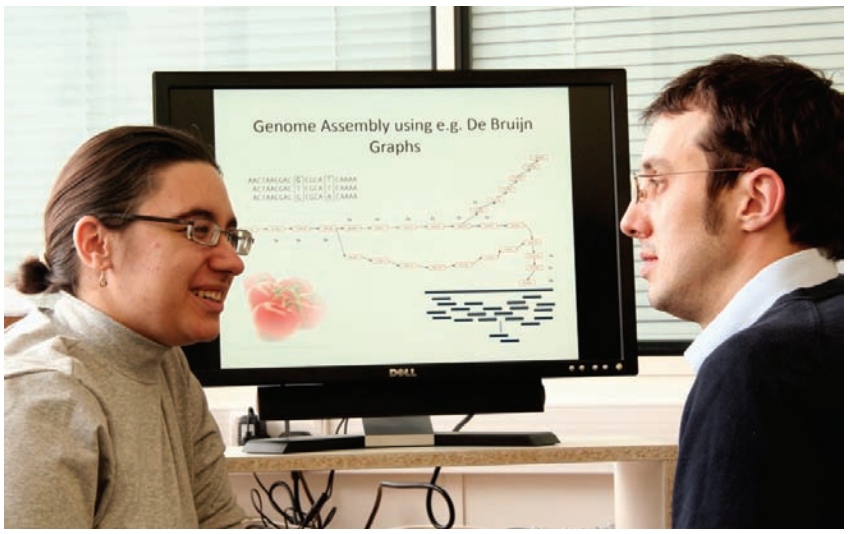
MSc Computational Biology

"I would highly recommend the MSc in Computational Biology course at UEA in partnership with the Norwich Research Park (NRP), due to which I got this wonderful opportunity of working in NRP as a Scientific Programmer."
Purnima Pachori, former student

A major driver behind the revolution in molecular biology in recent years has been the remarkable advances in biotechnology that have led to cheaper, more accessible and more reliable methods to generate vast amounts of biological data. In response to the rapidly growing demand for researchers with the right mix of computational skills and biological knowledge necessary to collect, interrogate and analyse such data, UEA was one of the first UK universities to provide a cutting-edge MSc programme in the field of computational biology.



Built on the previous MSc Bioinformatics, the MSc Computational Biology is offered by the School of Computing Sciences (CMP) and run in close collaboration with the School of Biological Sciences and our partners at NRP (see pages 30-33). It has two streams, one for students with a computing/mathematics/engineering background and one for students with a background in the biological sciences. It aims to provide a high quality and challenging postgraduate degree programme and is delivered by research scientists at the cutting-edge of their field. It equips students with the required skills and state-of-the-art knowledge in computational biology and bioinformatics to build successful careers in academia or industry.

The course, which is also offered as a part time version (2 years, 4 years), is 12 months in duration and starts with taught courses, which are offered to a large extent by CMP. It ends with a three-month research project which can be undertaken also at one of the associated research institutes, written up in the form of a dissertation and counting for one third of the final mark.

A unique aspect of the programme is that up to seven scholarships will be available to undertake projects at the associated research institutes. Also some project work may be done with companies and could involve paid placement at a company.

Recent Dissertation Titles

- Integration of next-generation short-read assemblies for bacterial genomes
- Predicting RNA pseudoknots
- Molecular paleontology of repetitive DNA in yeasts
- Loop modelling server for proteins

All of the students who completed the course in 2009 are now employed at The Genome Analysis Centre (see the John Innes Centre, pages 32-33).

Course Profile

Compulsory- both streams (130 credits)
Dissertation
Research Techniques
Fundamentals of Computational and Structural Genomics
Techniques for Biological Database Exploitation
Genome Informatics

Compulsory- Biology stream (50 credits)
Applications Programming
Database Manipulation
Mathematics and Algorithms for Computational Biology

Compulsory- Computing stream (50 credits)
Data Mining
Genetics, Genomics and Bioinformatics
Plus a choice from:
Information Retrieval and Natural Language Processing
Internet and Multimedia Techniques
Applications Programming

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Up to seven scholarships will be available for students undertaking projects at the associated research institutes.

Entry Requirements

This programme is open to students with a good first degree in the biological or related sciences (biology stream) and the computing or related sciences (computing stream).

Related Programmes

MSc Advanced Computing Science	p 42
MSc Computing Science	p 44
MRes Computing Science	p 45
MSc Games Development	p 46
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MSc Computing Science

The MSc Computing Science is designed for graduates of non-computing subjects to study computer technologies and skills to broaden their knowledge and to create new career prospects. It is a 12-month full-time course but may be studied part-time over 24 months.

The training in this course not only teaches essential computing technical knowledge but also develops generic and transferable skills such as in communication, critical thinking and reasoning, problem solving, independent and team working and project management, with an aim to make the graduates of this course professionally competitive and flexible in a challenging and changing employment environment. Thus, the graduates can find employment in a wider range of careers in industry, business, public sector, education and research institutions, working in diverse roles, ranging from, software developers, systems analysts, data analysts, IT managers, to independent consultants and academic or commercial researchers.

The course is delivered through lectures, seminars, directed studies and laboratory exercises, involving individual and team work. The assessments are carried out by coursework and/or written examinations. Students will learn modules including Research Techniques, Object-Oriented Programming (in java) and Software Development Methodologies with UML (Unified Modelling Language), Databases, and Internet and Multimedia Technology. These are all integrated in a Web based framework and students are grouped in teams to design and implement a substantial Web-based application. Students also take a few optional modules, from the optional module list, which includes Data Mining, Networks, Systems Engineering, Systems Development, Artificial Intelligence, Image, and Speech and Language Processing.

Starting in the Spring Semester, students undertake an MSc Dissertation project on a topic that is usually related to the School's main research areas, often in collaboration with an outside body. A project requires students to apply the knowledge and skills they have learned from the course to carry out in-depth research on a topic, or develop a working system for various applications. Some project work may be done with companies and could involve paid placement at a company.

Recent Dissertation Titles

- Hybrid positioning technologies for location based services with iPhone
- Predicting earthquakes with time series data mining
- An application of video shot detection
- Ensemble of Bayesian models for identifying spam emails
- Predicting the results of tennis matches in real time

"I have found a job as a junior software developer and I am finding this course has prepared me well for this. Once again I'd like to thank you for getting your students ready for the real-world."

Rungano Mudimu, former student

Course Profile

Compulsory (80 credits)
Dissertation
Research Techniques

Options Range A (60 credits)
Applications Programming
Internet and Multimedia Techniques
Database Manipulation

Options Range B (40 credits)
Artificial Intelligence and Algorithmics
Systems Engineering Issues
Data Mining
Computer Networks
Applied Statistics
E-Business Systems Development
Distributed Computing
Computer Vision (For Digital Photography)

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is designed for graduates of any discipline. A good honours degree or equivalent is required. A postgraduate diploma entry route, with the possibility to upgrade during the course, is available for applicants whose qualifications do not meet the MSc entry requirements. You are encouraged to contact the Admissions Office to discuss the suitability of your qualifications.

Related Programmes

MSc Advanced Computing Science p 42
MSc Computational Biology p 43
MRes Computing Science p 45
MSc Games Development p 46
MSc Information Systems p 47
MSc Knowledge Discovery and Data Mining p 48
MSc Statistics p 49
Research Opportunities in the School of Computing Sciences pp 22-23

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MRes Computing Science

The MRes Computing Science provides students with foundation training in the basic and advanced research skills sufficient to enter a Doctoral programme. The MRes programme is also suitable for candidates who may wish to obtain a research-oriented degree, but do not wish to commit themselves to a longer period of study. The MRes pathway has a greater research element than the other MSc programmes offered by the School, whilst also giving students the opportunity to gain credit for the taught components. MRes programmes are designed to bridge the gap between undergraduate studies and the skills required by professional researchers.

The MRes Computing Science is a full-time, one-year programme; it can also be taken part-time over two years. Once on the course, you will specialise in one of the broad areas of the School's research. You will normally take three taught modules that are related to your area of specialism or that provide you with important background knowledge. You will also take a module in research techniques and a directed study module. The directed study module will be related to your area of specialism and, often, it will have a project component. Your academic advisor will guide you through your module choices and assist you in choosing suitable study topics. There will be an emphasis on transferrable skills applicable to a future research career, including analytical and critical research skills, communication skills and project management.

The dissertation element of the programme will be larger than that of our taught MSc courses, counting for 80 credits. You will choose your dissertation area early in the academic year, undertaking preliminary work on it during the spring semester and working on it full-time after the examinations until mid-September.

As a graduate from this course, you will have an excellent foundation for entry to a Doctoral programme. You can also pursue a career in a commercial or public sector setting where you can exploit your research skills and specialist knowledge.

Course Profile

Compulsory (120 credits)

Research Techniques
Research Dissertation
Directed Study

Option Range (60 credits)

Any M-level module(s) offered by the School of Computing Sciences and approved by the Course Director. Examples below:

Applications Programming
Artificial Intelligence and Algorithmics
Database Manipulation
Internet and Multimedia Techniques
Systems Engineering Issues
E-Business Systems Development
Information Retrieval and Natural Language Processing
Data Mining
Applied Statistics
Advanced Programming Concepts and Techniques
Distributed Computing
Computer Networks
Computer Games Laboratory
Computer Games Development
Audio and Visual Processing
Computer Vision (for Digital Photography)
Human Computer Interaction

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in computer science or a cognate subject (or equivalent qualifications and experience).

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MSc Games Development

Computer games companies have dictated the advancement of computer graphics hardware and software over the last decade. The MSc in Games Development will give you an in-depth knowledge of both Computer Graphics foundations and more advanced techniques by focusing on Games Development. This MSc is an excellent platform to a career in the games and entertainment industries. However, it can also serve as an entry for a PhD Degree in Computer Graphics or in related topics such as Computer Vision, Medical Imaging and Human Computer Interaction.

This course is designed for students with a degree in computing, engineering, mathematics or physics with additional programming experience, who wish to gain specialist knowledge of advanced Computer Graphics, Virtual Environments. and Games Development. Applicants should have some experience in programming (C/C++ or JAVA) whilst graphics programming experience (OpenGL, DirectX, XNA) is a bonus though not essential.

Course modules cover a wide range of topics including games architecture and engines, GPUs and shader languages, character animation, motion capture, games physics, collision detection and response, specialist input/output devices (e.g. haptic/force feedback, stereoscopic displays, HMDs, motion tracking), virtual environments, advanced rendering, movie animation and special effects.

Development platforms taught include OpenGL with C/C++ and XNA with C# (XBOX). 3D Studio Max is also used for geometry creation and character animation. Coursework exercises and projects are incremental hence leading to a number of final products, including 2D/3D games and animation videos for student's future portfolios.

Some project work may be done with companies and could involve paid placement at a company.

The School has an excellent record in both post-BSc and post-MSc placements and currently we have several of our graduates working in the entertainment and games development industries.

Recent Dissertation Titles:

- Virtual humans for crowd simulations
- Controlling vehicle animation
- Motion capturing of dance movements to create the 'dancing avatar'
- Game-playing for linked image retention in education

"After graduation, I opened a game and multimedia company which, four years on, counts over 60 employees. All the work I am currently doing is related to my studies, especially in the field of Computer Graphics at UEA. Recently, I became a part-time new media arts lecturer in three universities."

Yuxi Zhong, former student

Course Profile

Compulsory (120 credits)
Research Techniques
Dissertation
Computer Games Development
Computer Games Laboratory

Options Range (60 credits)
Computer Vision (for Digital Photography)
Human Computer Interaction
Artificial Intelligence and Algorithmics
Internet and Multimedia Techniques
Advanced Programming Concepts and Techniques
Computer Networks
Audio and Visual Processing

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in computer science, engineering, mathematics or physics with additional programming experience (or equivalent qualifications and experience). Some knowledge of computer graphics is desirable but not essential.

Related Programmes

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MSc Computational Biology p 43
MSc Computing Science p 44
MRes Computing Science p 45
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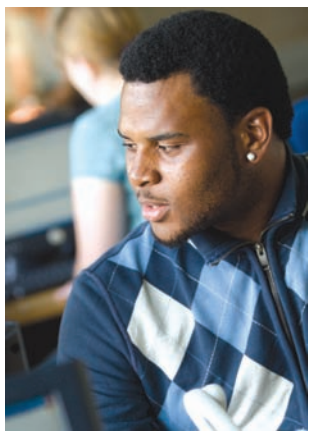
MSc Information Systems

The design, development and management of the large-scale computerised information systems critical to organisations in the 21st century offers major challenges and opportunities. This course focuses on the complex social and technical issues involved in building and maintaining large systems, drawing on ideas and techniques from a wide range of disciplines.

The MSc Information Systems offers you a flexible programme of study which provides, firstly, an understanding of the issues in designing and developing information systems; secondly, a grasp of the fundamentals of rapid systems development, contemporary approaches to analysis and design; and thirdly, a broad understanding of the context and success factors for successful information systems projects. You will explore current problems relating to the development of industrial-strength information systems for conventional and web-based implementations and gain practical experience of e-commerce systems development.



You will take a number of taught modules covering technical and organisational aspects of the development, management and use of modern information systems. The choice of modules is made according to your academic background, experience and interests. You will also complete a dissertation on a subject in the field of information systems; this is often done in collaboration with a company or other organisation. The MSc Information Systems is a full-time, one-year taught programme; it can also be taken part-time over two years.

As a graduate from this course you will be able to pursue a career in a number of fields, including software engineering, systems analysis, IT management or general management with a technical bias. You might also choose to continue your education through a PhD in order to pursue a career in industrial research or an academic career.

Recent Dissertation Titles

- An enterprise ordering information system for a pharmaceutical supplier
- Collaborative development of web-based information resources
- Investigation into web accessibility and usability
- Stakeholder participation in web information systems
- Context and preferences for mobile computing

Course Profile

Compulsory (100 credits)
Research Techniques
Dissertation
Information Systems Issues

Options Range A (40 credits)
Internet and Multimedia Techniques
Systems Engineering Issues
E-Business Systems Development
Database Manipulation

Options Range B (40 credits)
Database Manipulation
Internet and Multimedia Techniques
Systems Engineering Issues
E-Business Systems Development
Information Retrieval and Natural Language Processing
Data Mining
Applied Statistics
Human Computer Interaction

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

The programme is open to students with a good first degree (or equivalent qualifications and experience) which includes a substantial computing component. A basic knowledge of programming (Java) and database systems is assumed.

Related Programmes

MSc Advanced Computing Science	p 42
MSc Computational Biology	p 43
MSc Computing Science	p 44
MRes Computing Science	p 45
MSc Games Development	p 46
MSc Knowledge Discovery and Data Mining	p 48
MSc Statistics	p 49
Research Opportunities in the School of Computing Sciences	pp 22-23

Contact Details

Admissions Office
Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ

Tel: 01603 593503 Fax: 01603 591045

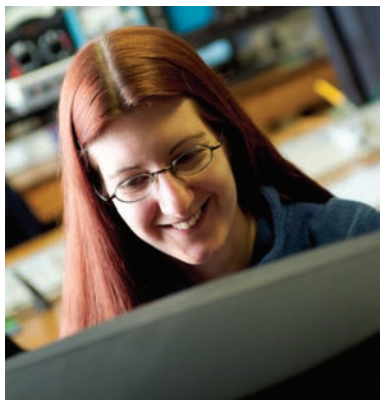
Email: cmp.msc.admiss@uea.ac.uk

MSc Knowledge Discovery and Datamining

"I can thoroughly recommend the KDD course. It has given me a fascinating insight into the management of large databases as well as a grounding in programming, statistics and artificial intelligence. The teaching is excellent, and the course is organised to a high standard."
Margaret Robins, (former student) Campaign Insight Consultant, Aviva

All modern organisations depend on high quality information for making strategic decisions, much of which is derived from the rapidly growing mountains of raw data that are generated from organisations' computerised operational systems. To analyse this data and recognise useful patterns and trends requires a new generation of analysts.

This specialism requires people who understand techniques for effective and efficient data analysis methods. These techniques are encompassed within Knowledge Discovery and Data Mining (KDD). The popularity of this area is driven by its tremendous application potential in areas as diverse as finance, medicine, biology and the environment.



This MSc programme addresses training needs in this area. On this programme you will undertake a mix of specialised modules that will give you a thorough knowledge of techniques and tools for knowledge discovery and data mining. You will gain a comprehensive understanding of the role of data in modern business, its collection, storage, maintenance and access. You will take compulsory modules in research techniques, data mining, statistics and artificial intelligence as well as two optional modules from a range that includes applications programming, database manipulation or information retrieval and natural language processing, or a research topic. You will acquire experience of working with the commercial tools used to undertake data analysis.

Some project work may be done with companies and could involve paid placement at a company.

You can either choose from a number of related dissertation topics proposed by faculty or formulate your own project proposal. These projects often address real-world problems.

Recent Dissertation Titles

- Classification rule induction for atmospheric circulation patterns
- Keyword-based e-mail classification
- Data analysis of orthopaedic operations

As a graduate from this course, you will be prepared for a career in data analysis. The degree can also act as a very good platform for a research degree in KDD. The course is a full-time, one-year taught programme, designed for advanced students and practitioners; it can also be taken part-time over two years.

Course Profile

Compulsory (140 credits)
Research Techniques
Dissertation
Artificial Intelligence and Algorithmics
Data Mining
Applied Statistics

Options Range (40 credits)
Applications Programming
Database Manipulation
Information Retrieval and
Natural Language Processing
Human Computer Interaction

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in computing, mathematics or a related subject (or equivalent qualifications and experience). Students with little computing experience may be required to undertake a pre-sessional course.

Related Programmes

MSc Advanced Computing Science p 42
MSc Computational Biology p 43
MSc Computing Science p 44
MRes Computing Science p 45
MSc Games Development p 46
MSc Information Systems p 47
MSc Statistics p 49
Research Opportunities in the
School of Computing Sciences pp 22-23

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MSc Statistics

New for 2011 entry

Statistics is an exciting profession with a rapidly increasing remit. More and more professions, from the everyday to the exotic, depend on data and numerical reasoning. Data are not just numbers, but numbers that carry information about a specific setting and need to be interpreted in that setting. With the growth in the use of data comes a growing demand for the services of statisticians, although, as stated by the Royal Statistical Society, there is a lack of statisticians across all areas of applications in the UK and internationally. The need is especially pronounced in the finance, insurance and pharmaceutical industries. To help meet the demand for well trained statisticians, the School of Computing Sciences, in close collaboration with the School of Medicine and the School of Economics, offers a 1-year MSc in Statistics. Students will have the ability to choose specialist pathways out of medical, finance/insurance or knowledge discovery. The programme will prepare you for employment across a range of industries and for further education through a PhD in order to pursue a career in industrial or academic research.

The MSc Statistics is normally a 12-month full-time intensive course but may be studied part-time over 24 months. The course develops statistical thinking and provides training in the advanced aspects of statistical theory as well as an acquaintance with applications of statistics and exposure to practical problems. Particular attention is given to statistical computing, with a core module in the first semester, and exposure to R and SAS statistical programming languages throughout the course.

The course is broadly divided into three parts. The first part is a set of core modules that are taught in the first semester. The second part comprises specialised pathways in either financial statistics, medical statistics or knowledge discovery and takes place in the second semester. This allows students to build on or broaden their existing knowledge. The third part of the course is a three-month research project that is written up in the form of a dissertation. Part-time students follow a similar structure, except that the modules are spread over four semesters plus two summers.

"SAS actively supports this new MSc Statistics degree and is delighted that the University of East Anglia is expanding its portfolio of statistics courses. The University of East Anglia's reputation for research excellence means that SAS customers in the financial services and pharmaceutical industries will know where to look for their recruitment needs."
Geoffrey Taylor, SAS Academic Programme Manager

Course Profile

Compulsory (140 credits)
Dissertation
Computational Statistics
Inference
Statistical Modelling
Multivariate Analysis

Option A: Medical Statistics (40 credits)
Statistics for Clinical Trials
Epidemiology

Option B: Financial Statistics (40 credits)
Applied Econometrics
Financial Mathematics

Option C: Knowledge Discovery (40 credits)
Artificial Intelligence and Algorithmics
Data Mining

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in Mathematics/Statistics/Operational Research or any other degree with a significant statistics content (or equivalent qualifications and experience).

Related Programmes

MSc Advanced Computing Science	p 42
MSc Computational Biology	p 43
MSc Computing Science	p 44
MRes Computing Science	p 45
MSc Games Development	p 46
MSc Information Systems	p 47
MSc Knowledge Discovery and Data Mining	p 48
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MSc Atmospheric Sciences

The MSc Atmospheric Sciences provides an opportunity to study the physics and chemistry of the atmosphere in an integrated manner. It provides ideal training for a career or further postgraduate study in atmospheric science or climate system science. The course is unique in the UK in trying to strike a balance between physics and chemistry in understanding the behaviour of the atmosphere. Some elements of the course draw attention to the science-policy interface, particularly in our treatment of air pollution, climate change and issues such as stratospheric ozone depletion. This focus means that our graduates are capable of applying their knowledge within government agencies and consultancies.

The taught part of the course has recently been made more flexible to allow for students with different backgrounds and different interests.

The course lasts 46 weeks, beginning at the start of the academic year in mid-September and finishing in mid-August. Approximately two-thirds of your time will be devoted to taught courses and the remainder to a research project.

You will choose your own dissertation topic, decided around the start of the second semester. Supervision is provided on a one-to-one basis by staff within the School. Your project will involve a competent survey of the field of interest, including a literature review, and some original research. The research will typically involve laboratory-based experiments, data gathering/mining and data analysis, or numerical modelling.

Recent Dissertation Titles

- Katabatically generated gravity waves in Antarctica
- Investigation of the latitudinal distribution of halon emissions
- Statistical prediction of the Madden-Julian Oscillation
- Biogenic and anthropogenic hydrocarbon concentrations in Norfolk and Suffolk

"The interdisciplinary nature of the course gives a great overview of the processes occurring in the atmosphere. The mixture of practical and fieldwork ensured this was a great starting point to my career as an atmospheric scientist."
Zak Buys, former student and current PhD student at the British Antarctic Survey

Course Profile

Compulsory (80 credits)
Research Skills
Dissertation

Options Range A (60 credits)
Atmospheric Chemical Change
Air Pollution Chemistry
Modelling Environmental Processes
Fundamentals of Meteorology

Options Range B (40 credits)
Air Pollution Chemistry
Modelling Environmental Processes
Fundamentals of Meteorology
The Carbon Cycle and Climate Change
Earth and Life
Ocean Circulation
Climate Change: Physical Science Basis
Understanding Climate Change in Society
Atmospheric Chemical Change
Atmospheric Composition: Measurement and Modelling
Stable Isotope Geochemistry

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

NERC Studentships may be available

Entry Requirements

This programme is open to students with a good first degree in physics, chemistry, mathematics, environmental sciences and related subjects. A good grounding in mathematics is expected.

Related Programmes

MSc Climate Change p 51
MSc Environmental Assessment & Management p 52
MSc Environmental Sciences p 53
MRes Environmental Social Science p 54
Research Opportunities in the School of Environmental Sciences pp 24-25

Contact Details

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MSc Climate Change

"Spending a year studying with the experts in climate change at UEA and doing research for my dissertation has helped me perform better in my job. In addition, the relationships that I built during the course will be useful throughout my career working on climate change related issues in Egypt."
Saber Osman, former student

The MSc Climate Change is based in the Climatic Research Unit (CRU) in the School of Environmental Sciences (ENV). The course is designed to provide you with in-depth interdisciplinary knowledge of climate change science, society and policy. The course content equips our graduates for careers in areas as diverse as government agencies, business consultancies and academia.

Climate change and variability has played a major role in shaping human history and the prospect of global warming as a result of human activities presents society with increasing challenges over the coming decades.

This course provides an authoritative assessment of the subject, including recent climate history, present-day variations and climate prediction, the ways in which ideas of climate change impact on the environment, society and human welfare, and the role of climate science in policy development. Its temporal focus spans the Holocene period through to the year 2100, with particular emphasis on contemporary issues. You are encouraged to interact with the course content through a series of student-led debates.

The course covers the fundamentals of the changing climate, including the Earth's energy balance, the general circulation of the atmosphere, causes of climate change and variability and the greenhouse effect. You will also learn about research methods, consisting of empirical approaches to climate reconstruction (e.g. tree ring analysis), data preparation and analysis, detection of anthropogenic changes and theoretical or model-based approaches to climate prediction. You will study the evidence and causes of recent climate change with a focus on the period from 1 AD to the present, including the atmospheric build-up of greenhouse gases and its consequences for the behaviour of the Earth system.

The ways in which climate change is understood by societies and how it influences the development of policy and stimulates social action is a key component of the course. This covers the social history of climate change, climate risk perception, climate economics, mitigation and adaptation. This includes an assessment of the Framework Convention of Climate Change, prospects for emissions control at the national and international level, climate geo-politics and equity and reconciling development issues with climate change.

Recent Dissertation Titles

- Mainstreaming climate change adaptation policies within the National Development Plan in Egypt
- UK tree phenology and its relationship to climate, past and present
- Local community responses to climate change in Chiang Mai, Thailand
- The cement industry and climate change - motivations, drivers and barriers for change

Course Profile

Compulsory (120 credits)
Research Skills
Dissertation
Climate Change: Physical Science Basis
Understanding Climate Change in Society

Options Range (60 credits)
examples of available modules:
Atmospheric Chemical Change
Environmental Assessment Effectiveness
Sustainable Consumption
Fundamentals of Meteorology
Air Pollution Chemistry
Natural Resources and Environmental Economics
Climate Change Policy for Development
Earthquake and Volcanic Hazards
Modelling Environmental Processes
Biodiversity Conservation and Human Society
The Carbon Cycle and Climate Change
Earth and Life
Ocean Circulation
Ecological Responses to Climate Change
Participatory Environmental Decision Making
Palaeoclimatology
Catchment Water Resources
Theory of Environmental Assessment
Ecological Modelling
Atmospheric Composition: Measurement & Modelling
Stable Isotope Geochemistry
GIS for Ecology and Environmental Management
Qualitative Research Methods
Statistics for Research
Geosciences Fieldcourse
Research Topics in Earth Science

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in environmental science or a related discipline.

Related Programmes

MSc Atmospheric Sciences	p 50
MSc Environmental Assessment & Management	p 52
MSc Environmental Sciences	p 53
MRes Environmental Social Science	p 54
MSc Energy Engineering with Environmental Management	p 56
Research Opportunities in the School of Environmental Sciences	pp 24-25

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Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ

Tel: 01603 593503 Fax: 01603 591045

Email: env.msc.admiss@uea.ac.uk

MSc Environmental Assessment and Management

There has been a rapid growth in Environmental Assessment (EA) requirements around the world, at both project and strategic levels, which has generated a need for additional personnel. In Europe thousands of environmental assessments are carried out annually, and new legislation has placed obligations on many organisations to carry out strategic environmental assessments of their plans and programmes without the trained personnel to do so. EA places demands upon those involved in both planning and authorising development proposals. Scientists must use their technical expertise to provide inputs into EAs; lawyers must establish and operate the procedures; developers must formulate their proposals within the legislative framework; agencies must review the adequacy of EAs; and decision makers must learn how to respond to the increased breadth and depth of information on potential impacts.

The focus of environmental assessment has shifted from the project level, where the implications of individual project proposals are assessed, to the strategic level, where the implications of policies, plans and programmes are assessed. Strategic EA Practice varies around the world and at different levels of decision making. Some jurisdictions focus on environmental aspects only, whereas others undertake sustainability appraisal which balances the environmental impacts alongside social and economic (including health) impacts. Whatever the focus, there is a need to establish groundrules for the scope of the assessment, and a need to apply suitable assessment methods to fully understand the potential outcomes of policy, plan or programme development.

To meet the demand for skilled personnel in these areas, this is a vocational course designed to provide a rigorous and professional training in the broad range of skills required. It combines theory, much of which has been developed by internationally renowned staff based in the School, with practice through collaboration with local businesses.

Recent Dissertation Titles

- Waste management in offices: a case study of the Norfolk and Norwich Hospital
- An evaluation of perceptions of barriers to the utilisation of crop biomass as a source of renewable energy
- Determining significance in environmental impact assessment: A review of impacts upon the socio-economic and water environments

"My MSc was recognised as a big advantage when I was applying for my first job in Environmental Consultancy. Being taught in a specialist department meant I gained directly relevant knowledge and skills which are invaluable in my working life."
Frances Kirwan, former student

Course Profile

Compulsory (120 credits)
Theory of Environmental Assessment
Environmental Assessment Effectiveness
Research Skills
Dissertation

Options Range (60 credits)
examples of available modules:
Air Pollution Chemistry
Earthquake and Volcanic Hazards
Modelling Environmental Processes
Biodiversity Conservation and Human Society
Fundamentals of Meteorology
The Carbon Cycle and Climate Change
Earth and Life
Ocean Circulation
Natural Resources and Environmental Economics
Ecological Responses to Climate Change
Climate Change: Physical Science Basis
Participatory Environmental Decision-Making
Palaeoclimatology
Catchment Water Resources
Ecological Modelling
Understanding Climate Change in Society
Atmospheric Chemical Change
Atmospheric Composition: Measurement and Modelling
Sustainable Consumption
GIS for Ecology & Environmental Management

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in a related discipline and/or relevant work experience. Related disciplines cross the sciences, social sciences and arts. Please contact us if you are unsure about the suitability of your background.

Related Programmes

MSc Atmospheric Sciences	p 50
MSc Climate Change	p 51
MSc Environmental Sciences	p 53
MRes Environmental Social Science	p 54
MSc Energy Engineering with Environmental Management	p 56
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MSc Environmental Sciences

Environmental Sciences is the interdisciplinary study of atmospheric, oceanic, freshwater and terrestrial environments coupled with an understanding of the interactions with human society.

A major study area is the science of climate change and how we should adapt to increasing global temperatures and the rise in sea levels. It is the link between the study of natural processes, the effects of pollution, mismanagement and overexploitation of resources and other anthropogenic processes, and the desire to find ways to solve environmental problems that makes environmental sciences a particularly challenging and rewarding subject in the new millennium.

Training in environmental sciences equips you with useful transferable skills. The ability to collect, analyse, interpret and present often diverse datasets and to use analytical tools such as numerical models and geographic information systems (GIS) provides you with a number of technical and presentational skills that are valuable in the job market. Environmental management decisions are often complex involving an assessment of risk associated with different options and learning how to participate in such decision-making is also a valuable skill.

The MSc in Environmental Sciences will offer you a range of subjects to choose from and a wide array of career options, both in postgraduate research and vocational employment. Our flexible course structure suits both students seeking to gain additional training in environmental sciences and non-environmental science graduates from related areas seeking to widen their environmental knowledge and skills.

A modular structure allows these divergent aims to be met within the same programme. You can choose from several areas of expertise in the School including earth sciences, atmospheric sciences, oceanography, ecology, soil sciences and environmental economics and can integrate your knowledge with practical methods of environmental impact assessment and management.

The course lasts 46 weeks, beginning at the start of the academic year in mid-September and finishing in mid-August. Approximately two-thirds of the time is devoted to taught courses and the remainder to an original research project. All courses are taught by faculty and research staff in the internationally renowned School of Environmental Sciences and its associated centres, which gives you the opportunity to learn from scientists actively involved in furthering knowledge in environmental sciences.

Recent Dissertation Titles

- Potential impacts of climate change and sea-level rise on recharge and saline intrusion in northeast Norfolk
- Application of traditional user's knowledge to the management of tropical marine fisheries
- Economics of forest protected area management in Latin America.

"My year as an Environmental Science student was a very positive experience. Teaching within the school at MSc level was consistent, supportive, fair and flexible to individual needs, as was the feedback and communication from both my advisor and project supervisor."

Jackie Barrow, former student

Course Profile

Compulsory (80 credits)
Research Skills
Dissertation

Options Range (100 credits)
examples of available modules:
Ecological Survey Methods
Air Pollution Chemistry
Earthquake and Volcanic Hazards
Qualitative Research Methods
Modelling Environmental Processes
Biodiversity Conservation and Human Society
Fundamentals of Meteorology
The Carbon Cycle and Climate Change
Earth and Life
Ocean Circulation
Natural Resources and Environmental Economics
Ecological Responses to Climate Change
Climate Change: Physical Science Basis
Participatory Environmental Decision-Making
Palaeoclimatology
Research Topics in Earth Science
Catchment Water Resources
Theory of Environmental Assessment
Environmental Assessment Effectiveness
Ecological Modelling
Understanding Climate Change in Society
Atmospheric Chemical Change
Atmospheric Composition: Measurement & Modelling
Sustainable Consumption
GIS for Ecology and Environmental Management

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in geography, earth and environmental sciences or related disciplines. It is also suitable for graduates with single-discipline degrees in chemistry, physics, biology, mathematics, computing, engineering, economics and politics. A good honours degree (or equivalent) is required.

Related Programmes

MSc Atmospheric Sciences p 50
MSc Climate Change p 51
MSc Environmental Assessment & Management p 52
MRes Environmental Social Science p 54
Research Opportunities in the School of Environmental Sciences pp 24-25

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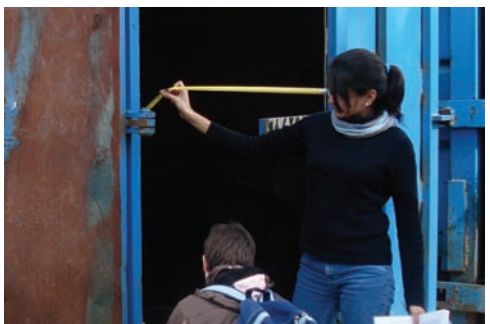
MRes Environmental Social Science

The MRes Environmental Social Science is for highly motivated students from across the social and natural sciences who want to develop expertise in interdisciplinary research and practice to help address urgent environment-society issues at local, national and global scales. The MRes provides its students with both the theoretically informed understanding and the practical research skills in interdisciplinary environmental social science research training necessary for progression into a PhD programme or into a research-related post in government service, NGOs or the private sector. The MRes is recognised by the UK's Economic and Social Research Council (ESRC) as meeting its current Postgraduate Research Training requirements and is eligible for ESRC 1+3 Studentships. Successful MRes graduates also have the necessary research training to apply, where eligible, for joint ESRC-NERC studentships.

As a member of the MRes group, you will study core course modules in the theory and practice of social science research. These modules explore the intellectual challenges of conducting interdisciplinary social science research, and develop your skills in both quantitative and qualitative research methods. They also give you the opportunity to study together with PhD students, which enhances the research focus and learning culture of the course. You will choose additional social science course modules from a range offered by the School and, where appropriate to your specific research interests and training needs, by other faculties. Students wishing to develop their interdisciplinary skills may also choose one module from the wide range of natural science MSc modules on offer in the School.



You will draw on your MRes experience to design and complete an independent research project from which you will produce a 15,000 word dissertation. You will be supported by an academic supervisor to ensure you achieve your full potential. Supervision is available for dissertation topics in a wide range of areas including climate change policy, consumption and sustainability, environmental assessment and management, environmental economics, environmental policy and politics, environmental sociology, geographical information systems and participatory environmental decision making.

Examples of recent dissertation topics:

- Examining carbon reduction policies for existing UK Housing
- The role of attitudes as moderators and mediators of outdoor recreation behaviour
- Making models move: the geography of the PRECIS climate model
- An economic analysis of the impact of biofuels on welfare in developing countries

"I found the MRes course well structured, stimulating and challenging. It provided me with a comprehensive training in social research methods and I am more confident moving into the early stages of my academic career."
Danyel Hampson, former student

Course Profile

Compulsory (120 credits)
Challenges of Interdisciplinary Social Science
Qualitative Research Methods
Statistics for Research
Dissertation (MRes)

Options Range A (40 credits)
Natural Resources and Environmental Economics
Participatory Environmental Decision Making
Theory of Environmental Assessment
Environmental Assessment Effectiveness
Understanding Climate Change in Society
Sustainable Consumption
GIS for Ecology & Environmental Management

Options Range B (20 credits)
Any module not already taken from Options Range A;
OR any other MSc-level Environmental Science module;
OR, with the approval of the Course Director, any relevant Masters-level social science module offered by another school (for example, Economics, International Development or Political, Social and International Studies).

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

ESRC 1+3 Studentships may be available

Entry Requirements

This programme is open to students with a good first degree or equivalent in a relevant social science, such as human geography, politics, sociology or economics. Applications are also welcome from those with a first degree in other subjects who wish to move into the field of environmental social science and to receive training in appropriate research methods.

Related Programmes

MSc Atmospheric Sciences p 50
MSc Climate Change p 51
MSc Environmental Assessment & Management p 52
MSc Environmental Sciences p 53
Research Opportunities in the School of Environmental Sciences pp 24-25

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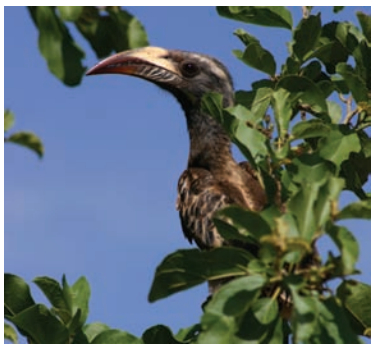
European Masters in Applied Ecology (EMAE)

The current human ability to change the face of the planet and to cause global environmental change is unprecedented. Environmental protection and sustainable use of resources are among the greatest challenges humans face today. Over the last decades, work carried out by ecologists has revealed the great fragility of natural balances and the dramatic ecological consequences of unwise human activities. The aim of the EMAE programme is to train environmental specialists able to carry out a variety of applied ecology projects that focus on improving our knowledge of the consequences of global environmental change on natural habitats and on managing natural resources in a sustainable way for a rising human population.

EMAE is an ERASMUS MUNDUS Master of Science based at 4 European institutions with a wide-ranging leadership in Ecology: UP-University of Poitiers (France, Coordinating institution), CAU-Christian Albrechts Universität in Kiel (Germany), UC-University of Coimbra (Portugal) and UEA-University of East Anglia in Norwich (UK).



The EMAE study programme runs for 2 years and includes 20 months of study. The first year of the programme starts in Poitiers (September to December), then all students move to Norwich (January to March). Half of the students will then move to Coimbra and the other half to Kiel (April-July). In the second year students will be doing their specialisation which is hosted in one of the EMAE institutions, these include the overseas partners based in Australia, Brazil, Ecuador, New Zealand and the USA.

The main specialisation areas are:

- Environmental Sciences & Conservation, *Norwich (United Kingdom)*
- Applied and Theoretical Approaches in Animal Ecology and Population Biology, *Poitiers (France)*
- Advanced Studies on Dynamics and Function of Terrestrial and Aquatic Ecosystems, *Kiel (Germany)*
- Environmental quality & Ecotoxicology, *Coimbra (Portugal)*

This programme will also give you training in research planning and transferable skills, and the opportunity to carry out research with a national or international conservation organisation.

Recent Dissertation Titles

- Ethnobotany of rubber tappers communities in sustainable development reserves in western Amazon, Brazil
- Modelling species distribution from atlas data for selection of priority areas for bird conservation

"The European Masters in Applied Ecology is a rare opportunity to learn from three universities (or even four) and a great excuse to travel around Europe. Doing my second year at UEA has helped me redefine myself as a researcher and scientist, particularly in the field of conservation ecology. It's an intense two year programme, but I've established great contacts in my field and have met really awesome people from around the world who I am proud to call my friends."
Camille Concepcion, current student

Course Profile

Year One

Compulsory Modules - University of Poitier
Multivariate Statistics and Data Analysis in Ecology
Basics of Population Genetics & Evolutionary Ecology
Animal Strategies and Basics in Behavioural Ecology

Compulsory Modules - University of East Anglia
Ecological Modelling
Ecological Responses to Climate Change

Compulsory Modules - University of Coimbra
Environmental Quality Assessment
Laboratory and Fields studies in Ecology – Practical
Bio-monitoring and Biodiversity Management
Stream Ecology and Monitoring
Ecotoxicology and Ecological Risk Assessment

Compulsory Modules - University of Kiel
Terrestrial Ecosystems (Field studies)
Coastal & Marine Ecosystems – Field Studies
Freshwater & Wetland Systems – Field Studies
Long-Term Development of Landscapes – Field Studies

Year Two - University of East Anglia

Compulsory Modules
Issues in Conservation
Ecological Survey Methods
Biodiversity Conservation and Human Society
Practical Conservation

Optional Modules
Multivariate Statistics
Introduction to the Economics of the Environment
Conservation Genetics
Climate Change: Science, Society and Policy
Restoration Ecology
Introduction to GIS

Please note: The universities regularly review and update programmes of study. The profile shown is the current course profile and may change in the future.

20-24 studentships will be offered, half to non-European students and half to European students

Entry Requirements

This programme is open to students with a good first degree in Environmental Sciences, Ecology, Zoology or related discipline.

Language of the Programme

The teaching language is English, except for one sub-specialisation in France during the 2nd year where it will be mainly French. While in Poitiers all students have access to intensive language training in French according to their initial proficiency. During the whole programme language courses are offered (e.g. French, Portuguese and German).

Contact Details

Apply online at www.master-emae.org/EMAE_how.php

Email: contact@master-EMAE.org

MSc Energy Engineering with Environmental Management

New for 2011 entry

This new MSc programme combines new investment in engineering with existing and substantial engineering expertise across the Faculty of Science in the fields of applied mathematics, energy resource, environmental management and electronic engineering. The programme has been developed in partnership with industry and employers, through close collaboration with the East of England Energy Group (EEEGR), and aims to address the national and regional shortage of high-calibre qualified graduates in the field of Energy Engineering.

The Faculty of Science houses an impressive range of engineering expertise, particularly in the Schools of Mathematics, Environmental Sciences, Biological Sciences, Computing Sciences and Chemistry. We are internationally renowned for our research and teaching in many relevant fields, including Applied Mathematics, Computer Systems Engineering, Geophysical Sciences and Physical Oceanography and Physical Chemistry, to name but a few. This existing expertise, combined with significant new investment by the Faculty of Science, will ensure that this MSc programme equips students with training in the fundamentals of engineering, along with its application to the energy industry.

All students will be required to undertake a substantial engineering project as part of the MSc programme, and it is anticipated that many students will have the opportunity to undertake the practical elements of this project in an industrial setting with an employer in the energy sector. Accreditation is being sought from the Energy Institute to allow graduates partial exemption towards CEng status.

This programme will offer excellent career prospects to graduates. Employers have identified a shortage of engineers, particularly in the energy sector, so high calibre graduates from this programme will be in demand.

This MSc programme is 12 months in duration, but may also be offered as a part time version (over 2 years, 3 years or 4 years).

"The UEA Masters and Bachelors programmes are just what the energy industry in the East of England needs. Because of the involvement of the industry from the outset in the design of the courses and support through their delivery, the results should be far more applicable to the industry's needs and what we need in the graduates that we employ. They will underpin long term career opportunities by increasing the ability to work across the energy sectors in an area where the industry is vibrant and growing."
Blair Ainslie, MD, Seajacks (and Chairman of Skills For Energy)

Course Profile

Compulsory (140 credits)
Energy Engineering Fundamentals
Fossil Fuels
Electrical Energy Generation, Distribution and Storage
Wind Energy Engineering
Energy Engineering Dissertation

Options Range (40 credits)
Theory of Environmental Assessment
Climate Change Governance and Compliance
Economics of Low Carbon Environment
Biofuel Technology
Wave, Tidal and Hydro Energy Engineering
Environmental Accounting and Finance
Economics of Low Carbon Environments
Environmental Assessment Effectiveness
Corporate Climate Change Management
Low Carbon Technologies and Solutions

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good degree (or equivalent) in a relevant subject, which includes significant mathematical content. The minimum mathematical qualification will be A-level mathematics (or equivalent). Entry with other qualifications or experience will be considered if the necessary mathematical and technical expertise has been acquired elsewhere (e.g. relevant industrial experience).

Related Programmes

MSc Climate Change p 51
MSc Environmental Assessment and Management p 52
MSc Mathematics p 57

Contact Details

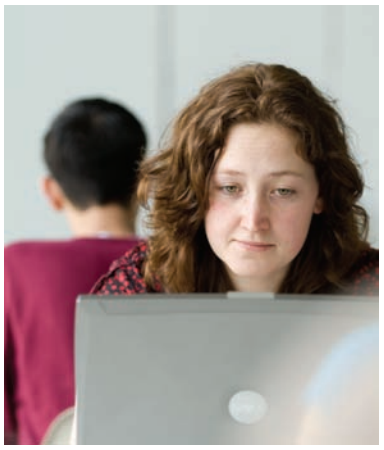
Admissions Office
Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ
Tel: 01603 593503 Fax: 01603 591045
Email: mth.msc.admiss@uea.ac.uk

MSc Mathematics

This programme introduces you to a higher level of mathematics than can be achieved in an undergraduate course. You will be able to study a variety of topics in advanced-level taught modules, designed specifically for students who have a keen interest and ability in the subject. As part of the course you will also write a dissertation under the supervision of an established researcher. The programme provides maximum flexibility to take account of your mathematics background and your interests.

The degree offers a sought-after qualification leading to employment in industry, business, education, public administration and to research careers in mathematics. The course also strengthens your general and academic competence and helps to develop important transferable skills, including the ability to analyse complex situations and to model them carefully. Mathematics will also help you solve abstract or concrete problems by the correct application of logical and scientific procedures.

Approximately half of the programme consists of four advanced taught modules from several areas of mathematics. The topics of these modules range from number theory, algebra and combinatorics to logic and set theory in pure mathematics, and in applied mathematics from fluid dynamics, geophysical flows to mathematical biology, solid mechanics and financial mathematics (the choice of modules varies from year to year). These lecture courses take place in the autumn and spring semesters.



The second half of the programme consists of a dissertation. This is a critical survey in an area of mathematics or in the applications of mathematics. It also includes an introductory module on relevant research methods. Early in the academic year, you will agree the topic of the dissertation with your supervisor, who will often have particular expertise and research experience in your chosen area. During the preparation period your supervisor will guide you in frequent one-on-one sessions. The work on the dissertation usually begins in the autumn semester and should be completed by September of the next year.

Recent Dissertation Titles

- Numerical solution of Burger's Equation
- The Moebius function and its applications
- Finite reflection groups and Lie theory
- History of primality testing and the AKS algorithm
- Measure theory

"My MSc course was a difficult, challenging but unforgettable experience. I had the privilege to get into the inner world of mathematics and understand that behind everything that surrounds us there is a logical explanation. I had to do a lot of research and studying but the material that I had to study was interesting and inspiring."
Stavri Hadjivasilio, former student

Course Profile

Compulsory Modules (100 credits)
Dissertation
Research Methods in Mathematics

Options Range A (20 credits)
Model Theory
Boundary Element and Finite Element Methods

Options Range B (60 credits)
Set Theory with Advanced Topics
Galois Theory with Advanced Topics
Graph Theory with Advanced Topics
Asymptotic Analysis with Advanced Topics
Dynamical Oceanography with Advanced Topics
Electricity and Magnetism with Advanced Topics
Financial Mathematics with Advanced Topics
Applied Statistics
Statistical Mechanics with Advanced Topics
An Introduction to Lie Groups with Advanced Topics

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

The programme is open to students with a good first degree of at least upper second class with a high mathematics content (or equivalent).

Related Programmes

MSc Energy Engineering with Environmental Management p 56
MSc Mathematics with Mathematics Education p 58
Mathematics 1+3 p 59
Research Opportunities in the School of Mathematics pp 26-27

Contact Details

Admissions Office
Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ

Tel: 01603 593503 Fax: 01603 591045

Email: mth.msc.admiss@uea.ac.uk

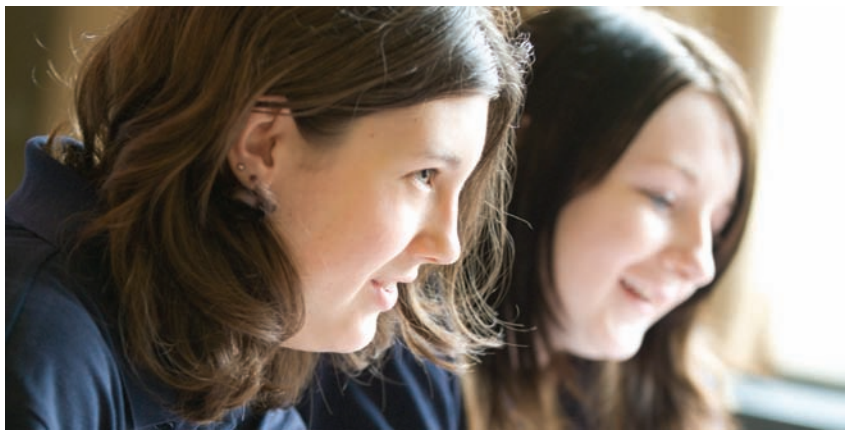
MSc Mathematics with Mathematics Education

New for 2011 entry

This new degree course is shared equally between the School of Mathematics and the School of Education. Each student has two academic advisers: one in each discipline. The programme is designed to give you equal experience in studying postgraduate level Mathematics and Mathematics Education. Apart from some compulsory lecture material and a choice of lecture courses, you will write two short dissertations (from a choice of topics): one in a specialised area of Mathematics, and the other involving a small-scale research study in a topic of your interest, in Mathematics Education.

In the School of Education you will take two taught modules to introduce you to mathematics education. In the first module you will read and discuss theories of mathematical learning, curriculum and pedagogy across the educational levels, as well as acquaint yourself with elements from philosophy, history/epistemology, psychology and sociology that influence mathematics education research.

The second module will provide you with sufficient grounding in the methodology of qualitative enquiry to be able to start to do research in your own specialist area, for the assignment for this module and for the dissertation.



In the School of Mathematics the first semester contains a module to help you carry out independent study, in critical reading, writing, and mathematical typesetting. The other taught modules change from year to year. They cover the wide range of research interests of the lecturing staff. From pure mathematics we offer lectures such as number theory and representation theory. In applied mathematics we offer topics ranging from financial maths to dynamical meteorology.

All lecturers carry out research and both Schools were highly rated for their research by the 2008 Research Assessment Exercise.

The lecture courses on offer reflect possible dissertation topics. As with the Mathematics Education project, the Mathematics dissertation is worth 40-credits (of the 180-credits total for the MSc). The Mathematics dissertation topic is agreed with an expert lecturer as a supervisor. The topic is in that supervisor's area of research. During the work of the dissertation you meet your supervisor regularly, from the early spring to discuss available literature, planning the writing-up and progress to submission. Similar arrangements are agreed with a lecturer who will be the supervisor of your Mathematics Education dissertation. Examples of dissertations, written by Mathematics Education students in the past, were research projects on the teaching and learning of key mathematical concepts such as function; or on psychological and social issues affecting students' mathematical learning.

The experience of working one-to-one with each of your dissertation supervisors gives you an idea of what it would be like to carry out research at a higher level, e.g. for a PhD in Mathematics Education.

Course Profile

Compulsory (140 credits)
Research Methods in Mathematics
Introduction to Research in Mathematics Education
Introduction to Educational Research Methods
Mathematics Dissertation
Mathematics Education Dissertation

Optional (40 credits)
Fluid-Structure Interaction
Diophantine Problems and Ergodic Theory
Theory of Finite Groups with Advanced Topics
Mathematical Logic with Advanced Topics
Representation Theory with Advanced Topics
Advanced Math. Techniques with Advanced Topics
Fluid Dynamics with Advanced Topics
Continuum Mechanics with Advanced Topics
Dynamical Meteorology with Advanced Topics
Fermat's Last Theorem with Advanced Topics
Free Surface Flows with Advanced Topics
Advanced Statistics

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

This programme is open to students with a good first degree in mathematics (minimum 2.1 or equivalent). Applicants should have a strong interest in Mathematics Education as an academic discipline. The course is designed for those who seek a pathway into PhD research or higher professional development.

Related Programmes

MSc Mathematics p 57
Mathematics 1+3 p 59
MA Mathematics Education (Faculty of Social Sciences)
Research Opportunities in the School of Mathematics pp 26-27

Contact Details

Admissions Office
Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ

Tel: 01603 593503 Fax: 01603 591045

Email: mth.msc.admiss@uea.ac.uk

Mathematics 1+3

New for 2010 entry

This programme introduces you to a higher level of mathematics than can be achieved in an undergraduate course, and it also gives you an opportunity to start working on your PhD as soon as you are ready. You will be able to study a variety of topics in advanced-level taught modules during your first year, and, subject to satisfactory performance, you can continue directly to do a PhD for the next three years. In the first year you will also write an MSc dissertation and at the end of the whole programme you will write a PhD dissertation. The programme is meant for excellent students who are planning to do a PhD but need to improve their mathematical background. For overseas students entrance to such a combined degree greatly simplifies administrative details by having to apply for a scholarship and visa only once, as opposed to first doing an MSc and then a PhD.

The degree offers a sought-after qualification leading to employment in academia industry, business, education, public administration. The course strengthens your general and academic ability and helps to develop your knowledge and skills, including the ability to analyse complex situations and to model them carefully. The degree includes a very considerable amount of dissertation study which means that those obtaining this degree are capable not only of independent research but also of writing complex documents in English.

Applicants who do not perform well enough after one year will be able to exit the degree and still get an MSc award.

In the first year of study half of the programme consists of four advanced taught modules from several areas of mathematics. The topics of these modules range from number theory, algebra and combinatorics to logic and set theory in pure mathematics, and in applied mathematics from fluid dynamics, geophysical flows to mathematical biology, solid mechanics and financial mathematics (the availability of modules varies from year to year). These lecture courses take place in the autumn and spring semesters.

The second half of the programme consists of a dissertation. This is a critical survey in an area of mathematics or in the applications of mathematics, and it is supplemented by an introductory module on relevant research methods. Early in the academic year you will agree the topic of the dissertation with your supervisor, who will often have particular expertise and research experience in your chosen area. During the preparation period your supervisor will guide you in frequent one-on-one sessions. The work on the dissertation usually begins in the autumn semester and should be completed by September of the next year.

The last three years of the programme follow the description of the standard PhD degree, with the possibility of connecting the topic of the PhD thesis with the topic of the MSc dissertation.

Course Profile

Year One

Compulsory Modules (100 credits)

Dissertation

Research Methods in Mathematics

Options Range A (20 credits)

Model Theory

Boundary Element and Finite Element Methods

Options Range B (60 credits)

Set Theory with Advanced Topics

Galois Theory with Advanced Topics

Graph Theory with Advanced Topics

Asymptotic Analysis with Advanced Topics

Dynamical Oceanography with Advanced Topics

Electricity and Magnetism with Advanced Topics

Financial Mathematics with Advanced Topics

Applied Statistics

Statistical Mechanics with Advanced Topics

An Introduction to Lie Groups with Advanced Topics

In the subsequent years the course follows the standard PhD programme

Please note: The University regularly reviews and updates programmes of study. The profile shown is the current course profile and may change in the future.

Entry Requirements

The programme is open to students with a first class degree or in exceptional circumstances a strong upper second class in mathematics (or equivalent). Candidates who have not attained the required entrance level may be offered a place in the standard MSc programme.

Related Programmes

MSc Mathematics p 57

MSc Mathematics with Mathematics Education p 58

Research Opportunities in the School of Mathematics pp 26-27

Contact Details

Admissions Office
Postgraduate Taught Programmes, Faculty of Science
University of East Anglia, Norwich NR4 7TJ

Tel: 01603 593503 Fax: 01603 591045

Email: mth.msc.admiss@uea.ac.uk


ORIGINS

Norwich

Norwich strikes a unique balance between history and progress, urban facilities and rural character. Recently a finalist in the International Awards for Liveable Communities, Norwich has all the characteristics of a university city, and more.

The striking Norman Cathedral and Castle, cobbled streets lined with charming half-timbered houses and over 30 medieval churches are complimented by vibrant new developments including the Forum, which houses the Millennium Library and hosts regular concerts, comedy nights and craft fairs.

One of the top five shopping destinations in the country, Norwich is served by a new £275m shopping centre, the largest six-day open-air market in the country, and a diverse range of independent stores and speciality shops in the Norwich Lanes.

Norwich has a wide range of reasonably priced restaurants offering cuisine from around the world including Japanese, Chinese, Greek, Lebanese, Italian, Moroccan, Thai and Indian. There are numerous pubs ranging from cosy real-ale inns to stylish pre-club bars. In addition to the University's renowned LCR (where live bands play throughout the year), many pubs and clubs in the city host live music. Among the most popular are the Norwich Arts Centre and The Waterfront, a city centre venue run by the UEA Student Union. Opportunities to enjoy classical and folk music range from intimate lunchtime recitals at small venues such as the King of Hearts, to major international concert tours.

Film lovers can choose from two multiplexes and Cinema City, an arthouse cinema recently redeveloped to offer greater choice and state-of-the-art facilities. Norwich has six theatres including the Theatre Royal, the most successful regional theatre in the country, and the Playhouse, which offers big names from the world of stand-up comedy.

Museums and galleries in the city centre include the contemporary Norwich Gallery and the Castle Museum and Art Gallery which hosts regular touring exhibitions as well as a gallery devoted to works by artists of the Norwich School.

Events not to miss include the multi-venue Norfolk and Norwich Festival, the carnival and firework display for the Lord Mayor's celebrations, the largest annual real ale festival outside London and the Norfolk Comedy Festival.

The surrounding area offers a range of diversions – beautiful countryside, characterful market towns, fun-filled seaside resorts and the unique Norfolk Broads. Norwich is well served by public transport and, at peak times, there are trains every 30 minutes to London and every hour to Cambridge. Norwich International Airport is only 15 minutes from the city centre and has links worldwide via four daily flights to Amsterdam.

Life at the University

UEA has a high standard of achievement in teaching and research across both sciences and the humanities. Founded in 1963 it has a student body of almost 14,000, including almost 2,000 non-UK students. The University is set in 320 acres of stunning parkland, just three miles from Norwich city centre. Regular bus connections and plenty of cycle paths ensure the city is easily accessible 24 hours a day, 7 days a week. The central bus and railway stations are only 15 minutes away by bus or taxi.

There are four Faculties comprising a total of 24 Schools of Study at UEA. They cover an array of subjects including the sciences, humanities, arts and professional studies (for example teaching, medicine and law). The campus has expanded greatly over the last ten years with several new buildings for teaching, accommodation, library facilities, a pharmacy, health centre and the East Anglia Sportspark which includes a fitness centre, a 50m swimming pool, squash courts and a multifunctional sports hall. As a student living on campus you will have all the facilities you need including bars, live music venues, cafés, bookshops, a post office, banks, a travel agent, supermarket, laundrettes and religious facilities.

The student experience is not just about academic study. As a student at UEA you will automatically become a member of the Union of UEA Students, and have access to all the Union facilities as well as receiving a discount on ticket prices for several club nights, gigs and other Union events. The LCR (UEA's live music venue, situated on campus) regularly stages major gigs, featuring bands from a whole spectrum of music styles. There is an average of 60 gigs on campus each year, more recent examples including Jools Holland, Maccabees, Jamie T, Proclaimers, Editors, Biffy Clyro, Beverley Knight, Paul Weller, NME Tour, Hot Chip and Peter Andre. The LCR is also host to the weekly 'LCR Disco', Club Retro, balls, fashion shows and film showings.

As a postgraduate student you will automatically become a member of the Graduate Students' Associate (GSA), which represents the interests of postgraduate students within the University and beyond. The GSA offers support to graduate students during their course as well as providing social facilities, such as the "Grads Bar", a members only venue open to all graduate students automatically.

UEA has over 100 student organisations for you to get involved in. They range from the bizarre to the sporty, so no matter what your interests are, there is something for everyone. If you're the sporty type there are not only the more traditional sports clubs but also clubs such as fell and cave walking, parachuting, rock climbing, sub aqua, various martial arts clubs and many more. For those less sporty, why not join Amnesty International, the Cocktail Society, the Conservation and Wildlife Club, Juggling Society or the Green Party, to name but a few. There is also an International Student Society where you can meet with students from your home country or other countries worldwide. They organise international student events which are enjoyed by both UK and overseas students. For more information on the clubs and societies available at UEA and what the Union of UEA students has to offer please visit: www.ueastudent.com.

Life after University

Our excellence in science research and teaching produces graduates with rewarding experience and cutting edge knowledge of their disciplines. It follows that postgraduate study at UEA leads to exciting career opportunities.

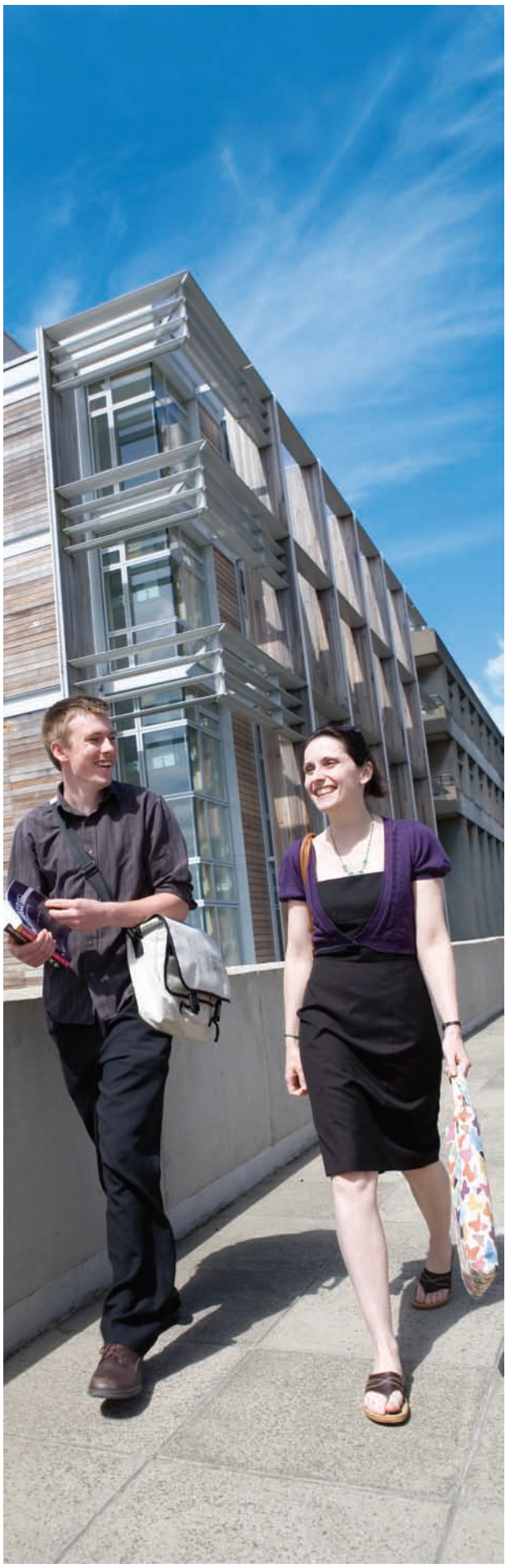
Science postgraduates across the faculty have consistently high levels of employment when they leave UEA, with over three quarters going directly into work. They are in demand from employers locally, nationally and internationally and have at their disposal a breadth of skills valued in any work environment. Employers increasingly recognise the added benefits that postgraduates can bring to their workplace, through self motivation and numerous higher level skills including problem solving and strategic thinking.

Typical employers include universities and other research institutions, Government research laboratories, large multinationals and small technology start-up companies. One local example is the neighbouring Norwich Research Park which provides excellent opportunities for graduates to develop their careers in state-of-the-art surroundings at the forefront of their research field.

At least a third of our science Masters postgraduates choose to continue their research by doing a higher degree, with many remaining at UEA or moving to other institutions in the UK or internationally. Our graduates with doctorates have an excellent record of securing research-based employment in higher education institutions, government research laboratories or commercial organisations. They also take management roles in, for example, the NHS and other public sector organisations.

As a postgraduate student at UEA you will be supported in all careers matters by the Careers Centre, providing help with planning working life after university, help with applications and interviews and contact with employers. This service does not stop when you graduate – you can continue to use the Careers Centre free of charge for up to a year after you leave UEA.

UEA also has a thriving Alumni Association with more than 70,000 members around the world. Graduates from UEA automatically become members of the Association. To keep in touch with developments at UEA and amongst fellow alumni, graduates receive a copy of the award-winning magazine Ziggurat. The UEA society network provides invaluable contacts ranging from career development to meeting old friends.



Contacts and useful information

If you would like to apply to any of the programmes listed in this brochure you should submit a completed application form, two references and an up-to-date transcript of your previous studies to the appropriate address given below. Please apply online at: www.uea.ac.uk/futurestudents/uk/postgraduates/admissions/pgradmissions or use the enclosed application forms.

Research Programmes

Admissions Office

Faculty of Science
University of East Anglia
Norwich, NR4 7TJ UK

t: +44 (0) 1603 593002
f: +44 (0) 1603 591045
e: sci.pgr.admiss@uea.ac.uk

Postgraduate Research Office

Norwich Research Park, Colney
Norwich, NR4 7UH, UK

t: +44 (0) 1603 450768
f: +44 (0) 1603 450040
e: graduates.nrp@bbsrc.ac.uk
www.ifr.ac.uk www.jic.ac.uk
www.tgac.bbsrc.ac.uk www.tsl.ac.uk

International Students

International Office

t: +44 (0) 1603 593280
e: intl.office@uea.ac.uk
www.uea.ac.uk/international

Dean of Students' Office

t: +44 (0) 1603 592761
e: dos@uea.ac.uk
www.uea.ac/dos

Taught Programmes

Admissions Office

Faculty of Science
University of East Anglia
Norwich NR4 7TJ, UK

t: +44 (0) 1603 593503
f: +44 (0) 1603 591045

School of Biological Sciences

t: +44 (0) 1603 593503
e: bio.msc.admiss@uea.ac.uk
www.uea.ac.uk/bio

School of Chemistry

t: +44 (0) 1603 593503
e: che.msc.admiss@uea.ac.uk
www.uea.ac.uk/che

School of Computing Sciences

t: +44 (0) 1603 593503
e: cmp.msc.admiss@uea.ac.uk
www.uea.ac.uk/cmp

School of Environmental Sciences

t: +44 (0) 1603 593503
e: env.msc.admiss@uea.ac.uk
www.uea.ac.uk/env

School of Mathematics

t: +44 (0) 1603 593503
e: mth.msc.admiss@uea.ac.uk
www.uea.ac.uk/mth

School of Pharmacy

t: +44 (0) 1603 593503
e: pha.msc.admiss@uea.ac.uk
www.uea.ac.uk/pha

Accommodation

Accommodation Office

(university accommodation)
t: +44 (0) 1603 592092
e: accom@uea.ac.uk
www.uea.ac.uk/accom

Students Union Advice Centre

(private accommodation)
t: +44 (0) 1603 593463
e: advicecentre@uea.ac.uk
www.ueastudent.com/advice

Student Life

Union of UEA Students

t: +44 (0) 1603 593272
e: su.info@uea.ac.uk
www.ueastudent.com

Graduate Students Association

e: gsa@uea.ac.uk
http://gsa.uea.ac.uk

UEA Sportspark

t: +44 (0) 1603 592398
e: sportspark@uea.ac.uk
www.sportspark.co.uk

The Careers Centre

t: +44 (0) 1603 593452
e: careers.centre@uea.ac.uk
www.uea.ac.uk/careers

Equal Opportunities Policy: The University of East Anglia operates an equal opportunities admissions policy. It aims to ensure that no applicant will receive less favourable treatment on the grounds of sex, marital status, race, colour, nationality, ethnic origin, sexual orientation, or political or religious belief. The University welcomes applications from candidates with disabilities.

Brochure Design
Woolf Designs
Drayton Old Lodge
146 Drayton High Road
Norwich, NR8 6AN

t: 01603 861669
e: enquiries@woolfdesigns.co.uk
www.woolfdesigns.co.uk

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Dave Gutteridge, The Photographic Unit

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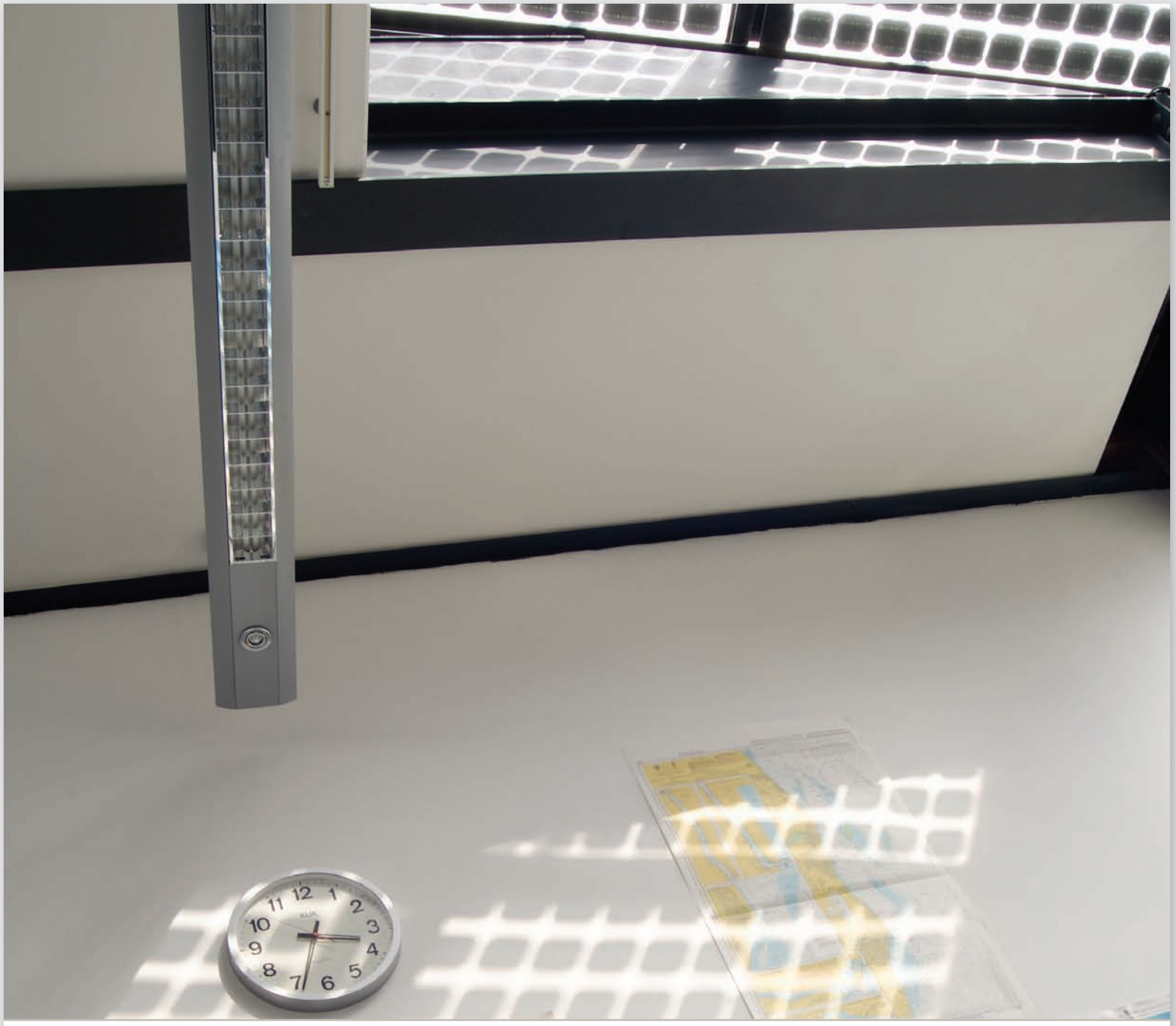

Faculty of Science, University of East Anglia, Norwich UK NR4 7TJ
Taught Courses Telephone: +44 (0)1603 593503 **Research Courses Telephone:** +44 (0)1603 593002 **Web:** www.uea.ac.uk/sci