

NATIONAL UNIVERSITY OF IRELAND

MAYNOOTH

**DEPARTMENT  
OF  
COMPUTER SCIENCE**

**[www.cs.nuim.ie](http://www.cs.nuim.ie)**

***STUDENT HANDBOOK***

Academic Year 2009/2010

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## 1 Welcome

Welcome to one of the youngest and most dynamic computer science departments in the country. The Department was founded in 1987 and currently has 17 full-time academic staff and an enrolment of around 500 students. You are in the enviable position of embarking on a career in an area that is vibrant and exciting and in a department that is actively contributing to the development of the discipline in key areas of research (see our web pages at <http://www.cs.nuim.ie>). Students at all levels are an integral part of the Department's dynamism, and we look forward to working with you to enhance further the development of the Department.

University education is a joint venture - we are here to facilitate your learning about the exciting fields of Computer Science, Software Engineering, and Information Technology - and you are here to learn (and also enjoy University life). You need to attend **all the lectures, all the laboratory sessions, and undertake independent study** if you are to do well. Work steadily throughout the year, and you will develop a good understanding of the subject, and should do well in the examinations.

In order to assist with **new students** entering third level education, the University has a **Mentoring** scheme - so make the most of your mentor if you have any difficulties adjusting to academic life.

If you have any questions about your course - then contact the Departmental Office or the **Course Director** for your course. If you have any questions about your lectures or course material, you should ask in lectures/tutorials/labs, or go as soon as possible to your **lecturer** - it is important that you do not ignore things that you don't understand, but approach a member of staff for guidance.

The Department is located in the Callan Building on the North Campus. The Departmental Office, all Staff Offices, and the Computer Science Laboratories are in this building. Lectures take place at various locations about the campus.

We have a few **rules** relating to using the labs – see Section 8.3 - with large numbers of students accessing the rooms these are necessary to ensure that the rooms remain **safe and pleasant** for your use, and to ensure that you have access to the **Internet**. Abide by these rules – and we all benefit.

## 2 Departmental Office

The Computer Science Departmental Office is located on the first floor at the end of the Callan Extension (Room 2.118). Reference the maps at the end of the handbook.

The office is open from 9.30-1:00 and 2.00-5.00.

### Contact information:

postal address: Department of Computer Science  
National University of Ireland, Maynooth  
Maynooth  
Co. Kildare  
email: **admin@cs.nuim.ie**  
telephone: **(01) 708-3847**

### 3 Useful Dates

#### 2009

Monday, September 21<sup>st</sup> - Semester 1 starts  
Monday, October 26<sup>th</sup> to Friday, October 30<sup>th</sup> - Study Week  
Friday, December 18<sup>th</sup> - Semester 1 ends

#### 2010

Friday, January 8<sup>th</sup> - Semester 1 Exams  
Monday, February 1<sup>st</sup> - Semester 2 starts  
Monday, March 15<sup>th</sup> to Friday, March 19<sup>th</sup> - Study Week  
Monday, April 5<sup>th</sup> to Friday, April 9<sup>th</sup> - Easter Holidays  
Friday, May 7<sup>th</sup> - Semester 2 ends  
Friday, May 14<sup>th</sup> - Semester 2 Exams

### 4 Course Directors & Year Coordinators for 2009/2010

#### 4.1 Course Directors

1. Computer Science & Software Engineering: **Mr. Phil Maguire**
2. Computer Science in the following Programmes (Science, Arts, Biotechnology, Venture Management, Astrophysics & Computer Science, Computational Biology, Finance, Psychology): **Mr. Dermot Kelly**
3. M.Sc. in Software Engineering : **Dr. Diarmuid O Donoghue**
4. Higher Diploma in Information Technology: **Mr. Dermot Kelly**
5. Music Technology & Multimedia: **Mr. Tom Lysaght**

#### 4.2 First Year Coordinator

1<sup>st</sup> year Computer Science in the following Programmes (Arts, Science, Biotechnology, Computer Science & Software Engineering, Astrophysics & Computer Science, Computational Biology, Finance, Psychology): **Dr. Susan Bergin**

#### 4.3 Final Year Project Coordinator

**Prof. Ronan Reilly** is responsible for organising the soliciting and assignment of final year projects for both the Science and Computer Science and Software Engineering undergraduate programmes.

#### 4.4 Postgraduate Coordinator

The Coordinator responsible for the handling administrative matters relating to research and taught postgraduates is **Dr. Joe Timoney**.

## 5 Staff Members

<u>Head of Department:</u>	<u>Room</u>	<u>Extension</u> <sup>1</sup>	<u>Email</u>
Dr. Adam Winstanley	2.36	3847	adam.winstanley@nuim.ie
<u>Academic Staff</u>			
Mr. Stephen Brown	2.111	3936	stephen.brown@nuim.ie
Dr. Tom Dowling	2.107	4526	tom.dowling@nuim.ie
Mr. John Harpur	2.27	3850	john.harper@nuim.ie
Dr. John Keating	1.38	3854	john.keating@nuim.ie
Mr. Dermot Kelly	2.31	3852	dermot.kelly@nuim.ie
Mr. Tom Lysaght	2.115	4592	tom.lysaght@nuim.ie
Dr. Charles Markham	2.120	3383	charles.markham@nuim.ie
Mr. John McDonald	2.29	4589	john.mcdonald@nuim.ie
Ms. Rosemary Monahan	2.105	3463	rosemary.monahan@nuim.ie
Dr. Philippe Moser	2.106	4597	philippe.moser@nuim.ie
Mr. Tom Naughton	2.104	4599	tom.naughton@nuim.ie
Dr. Diarmuid O'Donoghue	2.121	3851	diarmuid.odonoghue@nuim.ie
Prof. Barak Pearlmutter	2.106	4597	barak@cs.nuim.ie
Dr. James Power	2.103	3447	james.power@nuim.ie
Prof. Ronan Reilly	2.35	3846	ronan.reilly@nuim.ie
Dr. Joseph Timoney	2.114	4769	joseph.timoney@nuim.ie
<u>Contract Lecturers</u>			
Dr. Susan Bergin	2.108	6088	sbergin@cs.nuim.ie
Dr. Aidan Mooney	2.112	3354	amooney@cs.nuim.ie
Mr. Phil Maguire	2.110	6082	pmaguire@cs.nuim.ie
<u>Technical Staff</u>			
Mr. James Cotter	1.34	3904	support@cs.nuim.ie
Mr. Michael Monaghan	2.102	4596	support@cs.nuim.ie
Dr. Vanush Paturyan	1.37	4539	support@cs.nuim.ie
Mr. Patrick Marshall	1.32	3877	support@cs.nuim.ie
<u>Departmental Office</u>			
Ms. Ann Murphy	2.118	3847	admin@cs.nuim.ie
Ms. Bernadette Claxton	2.118	3847	bclaxton@cs.nuim.ie
<u>Industrial Placement Officer</u>			
Ms. Paula Murray	1.33	3457	studentplacement@cs.nuim.ie
<u>Departmental Administrator</u>			
Mr. Des Noonan	2.116	4685	dnoonan@cs.nuim.ie

Note: you can refer to the individual web pages for members of staff from [www.cs.nuim.ie/staff](http://www.cs.nuim.ie/staff)

<sup>1</sup> Extensions may be dialled from outside the University by using (01) 708-xxxx

## 6 General Information

### 6.1 Staff-Student Committee

1. Elections will be organised for representatives of each year of each course on the Computer Science Staff-Student Committee. We encourage you to take an active part in this - the Staff-Student committees are an essential part of ensuring that everything is running smoothly.
2. This Committee is in place to allow problems and issues to be aired. Note that, in the first instance, module-specific issues should be brought to the direct attention of the lecturer, and course-specific issues should be brought to the direct attention of the Course Director.
3. The Committee normally meets twice per semester.

### 6.2 Practical Assignments & Continuous Assessment

1. Continuous assessment is an important part of your course, and the marks contribute towards your end of year results. **Make sure that you do all the assignments**, and that your marks are correctly posted for all your continuous assessment (CA) practicals - query any missing marks. The CA marks are posted on the noticeboard opposite Lab 1.
2. It is important that you attend all your practical laboratory sessions. If you don't, then not only will you have a reduced continuous assessment result, but you also will miss out parts of the course, and will probably perform badly in the end of year examination. **Experience shows that poor lab attendance is almost invariably followed by failure in the summer examinations.**
3. **It is important to get good continuous assessment results.**

Even with an overall pass mark, you may fail through extreme weakness if you don't achieve a satisfactory continuous assessment result. If you have to repeat any examinations, the same continuous assessment result will count in the Autumn - so a low continuous assessment mark will require a correspondingly high examination mark in order to pass. You may even be **precluded** from sitting the Autumn examination if your continuous assessment is too low. If you have to repeat a year, you can do so externally (i.e. by Examination only) only if you have satisfactory continuous assessment results to be carried forward.

4. During the summer vacation, members of the Department may be consulted, by students who have failed the summer examinations, **only if they have had satisfactory attendance** at scheduled practical laboratory sessions, lab exams, and tutorials.
5. Note that the continuous assessment marks as posted are provisional and subject to review by the Extern and University Examination Board.

### 6.3 Medical Certificates

If you miss a scheduled practical session for medical reasons, then you should immediately (within one week) submit a medical certificate signed by a **medical doctor** (not a nurse) to the departmental secretary (Room 2.118). Talk to your lecturer immediately if you have missed an assignment for a medical reason.

## 6.4 Using e-mail

1. All students in Computer Science are provided with email accounts by the Department. Their use is subject to the Acceptable Usage Policy – refer to section 13 for details.
2. You will receive details of your email account during the first week of term.
3. You are expected to use these accounts - you will receive emails related to your courses and other Computer Science matters which you are expected to read.
4. Relaying email to other accounts you may have is not supported.
5. If you do not know how to use your email account, then contact James Cotter.

## 6.5 Login Accounts

All students in Computer Science are provided with Linux and Windows login accounts. Keep your password confidential.

If you do not know how to use your login account, then please contact James Cotter (Room 1.34).

## 6.6 Computer Science Laboratories

1. You will be provided with a Computer Science username & password in one of your first laboratory sessions. You will need these during the year!
2. The Department of Computer Science has a number of Laboratories. They are provided for use by Computer Science students.

<b>Lab 2</b> (Callan 2.17)	50 dual-boot PC's, for use by 1 <sup>st</sup> year undergraduate students
<b>Lab 3</b> (Callan Extension 1.104)	75 dual-boot PC's, for use by 4 <sup>th</sup> year students
<b>Lab 4</b> (Callan Extension 1.105)	100 dual-boot PC's, for use by the Department's 1 <sup>st</sup> , 2 <sup>nd</sup> , and 3 <sup>rd</sup> year students and H.Dip. IT students
<b>Software Lab</b> (Callan 1.39)	For use by MScSE students only
<b>Hardware Lab</b> (Callan Extension 1.106)	20 workstations, for use in scheduled laboratories only

**Provision of the computer laboratories is very expensive, and represents a significant contribution towards your education - make the most of them!**

3. The software labs are generally available for independent study outside of scheduled lab times - you are encouraged to make use of this. Consult the timetables at the lab doors for details.

## 7 Health and Safety

Your health and safety are of paramount importance. **Make sure you are aware of the emergency exits to any building you are in.** Report any risks to your health and safety to the Department Office. Report any accidents to the Department Office. Obey directions from Security and other University Staff.

### 7.1 Fire Alarm

**If the Fire Alarm sounds, leave the building immediately by the nearest emergency exit.** Do not re-enter the building until told to do so by Security or a member of Computer Science Staff.

### 7.2 Emergencies

If an emergency of any kind arises, call the following number for assistance: **3333**

### 7.3 First Aid

The following list shows the First Aiders in the Department of Computer Science.

<b>Name</b>	<b>Office</b>	<b>Extension</b>
Vanush Paturyan	Downstairs in Callan, Room 1.37	4539
Tom Dowling	Upstairs in the Callan Extension, Room 2.107	4526

If you are unable to contact any of the above, contact Security at **3929** for assistance.

### 7.4 Security

To contact Security, call **3929**.

### 7.5 Other Issues

To report any other Health and Safety problems that arise, contact the Departmental Office.

## 8 Regulations, Rules, & Procedures

1. Students in the Department of Computer Science are subject to the University Rules and Regulations (consult the University Calendar for details – [www.nuim.ie/calendar](http://www.nuim.ie/calendar)).
2. This is only a summary to help you understand what is required to succeed in the Computer Science courses.

### 8.1 Passing Examinations

1. You are strongly encouraged to achieve marks **well above the pass mark** - the rules and regulations determine the minimum requirements for passing a year. You should take the opportunity to excel.

**Think of it this way: 50% indicates that you only understand half the material!**

2. In general:
  - You must pass (40%) your examinations (written, continuous assessment, lab exams, reports etc.) in order to proceed to the next year of the course.
  - Under some circumstances, when you have an overall pass mark, a ‘pass by compensation’ at 25% is allowed in individual modules.
  - Even with an overall pass mark, you may fail through extreme weakness in either the written or practical part of an examination. Normally, in Computer Science, this is below 30%.
  - Your final year results determine the grade of your degree. Where it is advantageous to the student, 30% of the subject mark will be awarded on the basis of the results of the third-year University examination.

In summary, in order to pass a subject a student must:

- Pass all required modules
- Obtain 40% on aggregate in the subject
- Pass modules to a credit value of at least half the credit value of the subject
- Not fall below 25% in any module

Further details on passing the examinations can be found in the University Calendar (<http://www.nuim.ie/calendar/rules/index.shtml>) or by contacting your course co-ordinator.

### 8.2 Academic Problems

1. If you are having problems with the **material** do not hesitate to ask questions in tutorials, or approach a demonstrator in the practical sessions, or to approach your Lecturer.
2. If you are having problems with **academic life**, consult with your mentor, the Course Director, the Head of Department, or the Academic Advisor (Professor Peter Carr).

### 8.3 Use of the Computer Science Laboratories

1. Use the Computer Facilities responsibly. Refer to section 13 for more details.

2. To report any abuse of the computer facilities (such as offensive pictures, serious misconduct in the labs, damage to computer equipment etc.) send an email to [abuse@cs.nuim.ie](mailto:abuse@cs.nuim.ie) with the subject header 'ABUSE'.

#### **8.4 Plagiarism and Guidance for Students**

It is recognised that nearly all assignments and essays draw on the work of others: published research and critical commentary, lecturers' notes and hand-outs, etc. The effective use and evaluation of existing material are among the skills that students are expected to develop. Material is cited in order to contribute to a larger line of argument, or to be subjected to scrutiny, or to be combined with other material in order to arrive at new perspectives; in all cases, the source of the material (an idea or opinion, a quote, data, etc) must be acknowledged in a standard form of referencing.

**Plagiarism is the passing off of another person's work as your own.** It includes copying without acknowledgement from a published source (print or electronic), or from unpublished sources (e.g. another student's essay or notes).

Plagiarism also occurs when the substance or argument of a text is copied even with some verbal alterations, such as in paraphrase or translation, without acknowledgement. Plagiarism includes using material from books or periodicals, from the internet, from grind tutors, or from other students, without full acknowledgement of the sources.

**Plagiarism in any form of assignment contributing to marks or a grade for a course is a serious offence.** It is a form of cheating on several counts: the perpetrator is attempting to obtain credit for work not done, and is also attempting to benefit from work done by somebody else. Plagiarism undercuts the whole thrust of scholarly enquiry that is the essence of education. Plagiarism will be severely penalised wherever it is detected. Students submitting assignments, essays, dissertations or any form of work for assessment may be required to sign a declaration that the material in question is wholly their own work except where indicated by referencing or acknowledgement

**Cases in which students knowingly permit others to copy their work shall also be subject to the procedures outlined here and considered an offence.**

#### **Disciplinary Consequences**

Plagiarism is a form of academic dishonesty and will be treated with the utmost seriousness wherever discovered. Examiners, tutors and markers are required to report instances of suspected plagiarism to the relevant Course Director and/or Head of Department concerned.

Any student submitting written work for continuous assessment can be asked by the marker or the department to take a further test. This may take the form of an oral examination on the assignment in question and related issues, or the writing of a test paper in controlled conditions. In instances where a significant part, or all of an assignment, is found to be plagiarised, **zero marks may be awarded for that assignment. Cases in which students have knowingly permitted others to copy their work may also be awarded zero marks.**

Proven cases of plagiarism will be reported to the Head of Department and kept on record. In serious or repeated cases, the plagiarism will be **reported to the Supervisor of Examinations and the Committee of Discipline.** Plagiarism in postgraduate or research material is a particularly serious offence.

Penalties imposed may involve **suspension or expulsion** from the course and from the University, in addition to deduction of marks. See pages 80 & 81 in the University Calendar for further details.

## 9 Modules & Lecturers 2009-2010

Module	Module Title	Semester	Lecturer
CS130	Databases	1	Dr. Aidan Mooney
CS141	Introduction to Programming	1	Dr. Susan Bergin
CS142	Introduction to Computer Science	2	Dr. Philip Maguire
CS143	Introduction to Computer Systems	1 & 2	Dr. Aidan Mooney
CS151	Discrete Structures 1	1	Dr. Philippe Moser
CS153	Sound Synthesis	2	Dr. Joe Timoney
CS155	Introduction to Computer Music	1	Mr. Matthieu Hodgkinson
CS210	Algorithms & Data Structures 1	1	Dr. Philip Maguire
CS211	Algorithms & Data Structures 2	2	Dr. Philip Maguire
CS220	Computer Architecture 1	1	Mr. Dermot Kelly
CS230	Web Information Processing	2	Dr. Susan Bergin
CS240	Operating Systems	2	Mr. Dermot Kelly
CS253	Computer Architecture 2	2	Dr. Charles Markham
CS258	Empirical Software Engineering	1	Mr. Stephen Brown
CS260	Humanities Computing 1	1	An Foras Feasa
CS261	Multimedia Technology	2	Mr. Tom Lysaght
CS264	Software Design	1	Ms. Jane Reilly
CS265	Software Testing	2	Mr. Tom Lysaght
CS310	Programming Languages & Compilers	1	Dr. James Power
CS320	Computer Networks	1	Ms. Jane Reilly
CS321	Music Programming 1	1	Mr. Tom Lysaght
CS322	Music Programming 2	2	Dr. Joe Timoney
CS335	Software Engineering & Software Process	2	Dr. Aidan Mooney
CS353	Team Project	1	Mr. Stephen Brown
CS354	International Project	1 & 2	-
CS355	Theory of Computation	2	Dr. Philippe Moser
CS356	Signal, Image and Optical Processing	1	Mr. Pdraig Corcoran
CS357	Software Verification	1	Dr. James Power
CS361	Industrial Work Placement	2	-
CS401	Machine Learning & Neural Networks	1	Dr. Diarmuid O'Donoghue
CS402	Parallel & Distributed Systems	2	Mr. Dermot Kelly
CS404	Artificial Intelligence & Natural Language Processing	1	Dr. Diarmuid O'Donoghue
CS410	Computer Vision	1	Mr. Pdraig Corcoran
CS413	Neurocomputation	2	Prof. Ronan Reilly
CS416	Cryptography	1	Dr. Tom Dowling
CS417	Numerical Computation	2	Dr. Tom Dowling
CS424	Programming Language Design & Language Semantics	1	Ms. Rosemary Monahan
CS425	Audio & Speech Processing	2	Dr. Joe Timoney
CS426	Computer Graphics	2	Dr. Charles Markham
CS430	Advanced Concepts and Issues in Computer Science 1	1	CS Lecturers
CS431	Advanced Concepts and Issues in Computer Science 2	2	CS Lecturers
CS432	Advanced Concepts and Issues in Computer Science 3	2	CS Lecturers
CS435	Industrial Work Placement - Double Honours Students	1 & 2	-
CS440	Final Year Project - CSSE	1 & 2	-
CS450	Final Year Project - Single Honours Science	1 & 2	-
CS451	Diploma Project	1 & 2	-
CS460	Final Year Project - Double Honours Science	1 & 2	-
CS462	Final Year Multimedia Technologies	1 & 2	-
CS603	Rigorous Software Development	2	Ms. Rosemary Monahan

CS605	The Mathematics and Theory of Computer Science	1	Mr. Tom Naughton
CS607	Requirements Engineering and System Design	1	Dr. Diarmuid O'Donoghue
CS608	Software Testing	2	Mr. Stephen Brown
CS610	Human-Computer Interaction	2	Prof. Ronan Reilly
CS613	Object-Oriented Programming and C++	1	Ms. Rosemary Monahan
CS615	Internet Solutions Engineering	2	Dr. Susan Bergin / Mr. Patrick Marshall
CS616	Practical Cryptography	2	Dr. Tom Dowling
CS619	Program Comprehension	1	Dr. James Power
CS620	Structured Programming	1	Prof. Ronan Reilly
CS621	Spatial Databases	1	Dr. Adam Winstanley
CS630	M. Sc. Industrial Work Placement	2	-
CS640	M. Sc. Project	2	-
MT101S	Differential Calculus	1	MATHS
MT102S	Integral Calculus	2	MATHS
MT111S	Data Analysis	1	MATHS
MT122S	Finite Mathematics	2	MATHS
MT201S	Calculus 3	1	MATHS
MT212A	Linear Algebra 2	2	MATHS

### **Module Material on the WWW**

Each module has its own web page – start at <http://www.cs.nuim.ie/courses/> and follow the links for the course, year, and module.

## 10 Undergraduate Courses

### 10.1 Computer Science (as a Science Subject)

Science students take four subjects in 1<sup>st</sup> year, three subjects in 2<sup>nd</sup> year, and two subjects in 3<sup>rd</sup> and 4<sup>th</sup> year (for Single or Double Honours).

*Arts students take three subjects in 1<sup>st</sup> year, two subjects in 2<sup>nd</sup> year, and two subjects in 3<sup>rd</sup> year (see page 18 for full details).*

If your principle interest is in another science, then knowledge of Computer Science is a valuable adjunct. Computers are heavily used in all areas of science - programming is obviously important, but a background in more theoretical aspects can have significant value also. If your principle interest is in Computer Science, then you have an opportunity to also study other science subjects. **In final year Science you can take single-honours Computer Science, or double-honours along with another Science subject.** Refer to the calendar for details of the course structure and the modules.

In general, continuous assessment will count up to 50% of the total mark awarded in a module.

You will be using the following laboratories for practical work: Lab 2, Lab 4.

Final year projects will use the following lab: Lab 3.

#### Module Summary 2009-10 - refer to section 9 for module titles

Year	Module Codes
1	CS141 CS142 CS143
2	CS130 CS210 CS211 CS240
3 (Honours)	CS220 CS230 CS253
	CS265 CS320 CS355
4	See section 10.5 for details

Single-Honours students in 4<sup>th</sup> year take 9 modules and also undertake a final year project.

Double-Honours students in 4<sup>th</sup> year take 5 modules and also undertake a final year project.

### 10.2 Physics with Astrophysics

Students on this course take the same modules as the Double-Honours computer science students for the first three years.

Refer to the calendar for full details of the course structure and module descriptions.

You will be using the following laboratories for practical work: Lab 4.

### **10.3 Biotechnology, Computational Biology, and Chemistry with Pharmaceutical Chemistry**

Students on these courses take **computer science** for one or two years; students taking MH207 (Genetics and Bioinformatics) can take 4 years of computer science. Refer to the Calendar for details.

Refer to the calendar for full details of the course structure and module descriptions.

You will be using the following laboratories for practical work: Lab 3 & Lab 4.

### **10.4 Computer Science and Software Engineering (CSSE)**

Year 1 comprises a 7 module lecture load while Year 2 contains 12 modules.

Year 3 comprises a 6 module load in semester 1, and a 6-month industry placement in semester 2 (normally starting in February). You will be given more details about preparing your CV and the interview process during 2<sup>nd</sup> year. Interviews take place during the first semester of 3<sup>rd</sup> year. The placement programme requires extensive co-operation with the companies involved, so do make sure to follow the guidelines you are given for CV preparation, interviews, and the placement itself.

Year 4 comprises a 9 module lecture load and a final year project.

Assessment will be by combination of examination and continuous assessment based on laboratory assignments, term tests, and practicals. Continuous assessment may count for up to 50% of the total mark awarded in a module, but this will vary from module to module.

Refer to the calendar for full details of the course structure and the modules.

You will be using the following laboratories for practical work: Lab 2, Lab 4, & Hardware Lab.

Final year projects will use the following lab: Lab 3.

**Module Summary (CSSE) - refer to section 9 for module titles**

Year 1	
Module Code	ECTS
CS141	5
CS142	5
CS143	5
MT101S	5
MT102S	5
MT111S	2.5
MT122S	2.5

Year 2	
Module Code	ECTS
CS130	5
CS151	5
CS210	5
CS211	5
CS220	5
CS230	5
CS240	5
CS253	5
CS265	5
CS335	5
MT201S	5
MT212A	5

Year 3	
Module Code	ECTS
CS258	5
CS264	5
CS310	5
CS320	5
CS353	5
CS357	5
CS361	30

Year 4
Students in 4 <sup>th</sup> year take nine modules and also undertake a final year project. Refer to section 10.5 for more information on the modules available this year.

**10.5 Final Year Modules**

1. The following 4<sup>th</sup> Year modules will be available for the academic year 2009-2010:

CS310*	Programming Languages & Compilers
CS321	Music Programming 1
CS322	Music Programming 2
CS355*	Theory of Computation
CS357*	Software Verification
CS401	Machine Learning & Neural Networks
CS402	Parallel & Distributed Systems
CS404	Artificial Intelligence & Natural Language Processing
CS410	Computer Vision
CS413	Neurocomputation
CS416	Cryptography
CS417	Numerical Computation
CS424	Programming Language Design & Language Semantics

\* Not available to CSSE

CS425	Audio & Speech Processing
CS426	Computer Graphics
CS430	Advanced Concepts and Issues in Computer Science 1
CS431	Advanced Concepts and Issues in Computer Science 2
CS432	Advanced Concepts and Issues in Computer Science 3

2. Refer to section 10.6 for details of **Final Year Projects**.
3. **Computer Science and Software Engineering** students select 9 from the above modules, in addition to the final year project;
4. **Computer Science (Single Honours)** select 9 from the above modules, in addition to the final year project;  
**Computer Science (Double Honours)** select 5 from the above modules, in addition to the final year project;

Note: **Double Honours** students may have a restricted choice of these modules depending on the timetable of your other subject – consult your timetables for details.

## 10.6 Final Year Project

1. Students in 4<sup>th</sup> year (in the Science Single Honours, Science Double Honours, and Computer Science and Software Engineering courses) complete a final year project as part of the course. Final year project guidelines are available from the Final Year Project Coordinator (Dr. John Keating)
2. This provides you with an opportunity to carry out a non-trivial software project, and develop a significantly sized piece of software.
3. You will be provided with a PC in the final year project lab (Lab 3). Discuss any special software requirements with your supervisor.
4. The Course Director will publish details of available projects, and also of project areas for student-proposed projects (including those resulting from your Industrial Placement). See the noticeboard or [www.cs.nuim.ie/internal](http://www.cs.nuim.ie/internal) for details. Talk to supervisors whose projects you are interested in, and then put your name down for the projects you prefer. Project assignment is done by the Department about a week into the first term – priority is given to students with the best results in 3<sup>rd</sup> year.
5. Organise a weekly meeting with your supervisor. Use this to keep your supervisor up to date with progress, discuss any problems with him/her, and listen to their guidance.
6. !!! Keep a regular backup of your work !!!
7. At the end of the project, you will make a presentation on your work, and submit a project report. This will be marked.

### 8. COMPUTER SCIENCE AND SOFTWARE ENGINEERING

Assessment: by project presentation and project report. The final year project counts towards 25% of your final year mark.

### 9. SCIENCE/SINGLE-HONOURS COMPUTER SCIENCE

Assessment: by project presentation and project report. The final year project counts towards 25% of your final year mark.

### 10. SCIENCE/DOUBLE-HONOURS COMPUTER SCIENCE

Assessment: by project presentation and project report. The final year project counts towards 16.6% of your final year mark in Computer Science.

Note: there are arrangements in place with some other departments to allow you to complete your Computer Science project in the first semester. Contact the Course Director for details.

### 10.7 Computer Science in Arts

It is possible to take computer science as a subject in the BA Joint Honours programme. The following is the course structure:

#### 1<sup>st</sup> Computer Science in Arts

Semester	Module	Topic
1	CS141	Introduction to Programming
1 & 2	CS143	Introduction to Computer Systems
1	CS151	Discrete Structures 1 (discrete mathematics applied to computer science)
2	CS142	Introduction to Computer Science

#### 2<sup>nd</sup> Computer Science in Arts

Semester	Module	Topic
1	CS130	Databases
1	CS210	Algorithms & Data Structures 1
2	CS211	Algorithms & Data Structures 2
2	CS240	Operating Systems
1	CS260	Humanities Computing 1
2	CS261	Multimedia Technology

#### 3<sup>rd</sup> Computer Science in Arts

Semester	Module	Topic
1	CS220	Computer Architecture 1
2	CS230	Web Information Processing
1	CS320	Computer Networks
2	CS335	Software Engineering & Software Process
1	CS353	Team Project
2	CS355	Theory of Computation

#### Postgraduate options

To progress to postgraduate level in computer science, Arts graduates with a 2nd class honour or higher in computer science may take 4th Science Single Honours as an MSc qualifier. Entry to PhD is possible after completion of the MSc.

## 11 Postgraduate Courses

### 11.1 Higher Diploma in Information Technology (HDipIT)

Students take twelve modules (see below). The course starts in September.

Refer to the calendar for full details of the course structure and module curricula.

You will be using the following laboratories for practical work: Lab 4.

#### Module Summary

CS130	CS230
CS141	CS240
CS142	CS260
CS143	CS261
CS210	CS320
CS211	CS335

Students who excel in the HDipIT course may apply to enter the MSc (Software Engineering) course - contact the Course Director for details.

## 11.2 M.Sc. in Software Engineering (MScSE)

The first workshop starts in mid-September. This course must be completed before any of the other modules can be taken.

Occasional students may register for individual modules at any reasonable time before the module has begun. These students must meet a minimum entry requirement (in terms of academic and/or industrial experience) before they will be accepted. (This is at the discretion of each module co-ordinator.)

The course is run as a series of nine two-week modules and two one-week workshops.

In general each module consists of one week of full-time lectures and one week for the completion of marked assignments (which may be done off-campus).

The modules will run approximately every second week from the end of September to the beginning of December, and from the beginning of February to the end of April. Each module is run only once per year.

Some of these modules will be taught by staff of the Department of Computer Science, Maynooth University; and some will be taught by other Irish and International experts.

Participants will also be required to complete a six-month period working in an industrial setting. We will help you to find such a placement, if required.

Normally, participants will take the course over a single year. (This is not an evening course.)

Refer to the calendar for full details of the course structure and module curricula.

All lectures take place in the following location: Software Engineering Lab (1.39).

You will be using the following laboratories for practical work: Software Engineering Lab (1.39).

### Module Summary

Code	Title	Notes
CS603	Rigorous Software Development	Compulsory
CS605	The Mathematics and Theory of Computer Science	Compulsory
CS607	Requirements Engineering and System Design	
CS608	Software Testing	
CS610	Human-Computer Interaction	
CS613	Object-Oriented Programming and C++	Compulsory
CS615	Internet Solutions Engineering	
CS616	Practical Cryptography	
CS619	Program Comprehension	
CS621	Spatial Databases	
CS630	M. Sc. Industrial Work Placement	
CS640	M. Sc. Project	

**Dissertation.** As part of your placement in industry during the course, you will be required to participate in a software engineering team and to contribute to the execution of a non-trivial software engineering project. You will present a dissertation on the software engineering issues pertaining to the execution of this work. The marks for the dissertation contribute to 25% of the final course mark. Make sure to follow the guidelines provided when writing your thesis. The submission date is in late September.

## 12 Postgraduate Research Degrees

### 12.1 MSc & PhD

1. Postgraduate research students in the Department are assigned places in two purpose-built research laboratories (RL1 and RL2). Contact the Head of Department if you have not been assigned a place or a PC when you arrive. In addition, a number of dedicated research laboratories contain specialist equipment. Contact your supervisor about getting access.
2. Contact Mr. James Cotter to set up your email and login accounts.
3. Your supervisor is your first port of call if you have any questions, problems etc. You should talk to your supervisor about funding issues also.
4. You should organise regular meetings with your supervisor; keep your supervisor up to date with your progress.
5. You should produce an annual status report for your supervisor (and the Department's records). You may be asked to submit this to the Dean of Research and Graduate Studies if you are receiving Scholastic Funding from the University.
6. Postgraduate students are encouraged to publish in journals and conferences. Discuss this with your supervisor.
7. It is possible to change your registration from MSc to Ph.D or *vice versa*. Contact your supervisor to discuss the issues involved.
8. A separate research committee is formed for each student. The committee normally consists of three academic staff members from the Department: the supervisor, the supervisor's nominee, and the Head of Department's nominee.
9. Each research student is expected to give at least two research presentations in the Department each year. There are two seminar series to choose from: the Special Research Postgrad Seminar Series and the official Department Seminar Series.
10. Each student should set up a standardised web page with information such as title of research project, abstract, supervisor(s), expected completion date, and so on.

### 12.2 Staff Research Interests

**Professor R. Reilly:** Ronan Reilly's main research interests are in the areas of visual perception and language understanding. His interest in vision research primarily relates to eye movement control in reading, which also conveniently combines a language dimension. His research in this area involves data collection using an eye tracking system, and the computational modeling of these data. More recently he has started to look at the application of my reading model to web usability analysis. Within the language area, he has a specific interest in alternatives to the currently dominant nativist accounts of language acquisition. Again, this work is underpinned by computational modelling.

Prof. Reilly has also been working on a theoretical approach to modelling cortical computation, which he refers to as "Cortical Software Re-Use". The goal of this theory is to try to account for the construction of cognitive capabilities within a developmental and evolutionary framework. The main assumption of this line of research is that cognitive and linguistic capabilities are incrementally constructed from sensory-motor functions. These act as a repertoire of neural functionality that get exploited in the development of more complex neural capacities.

**Dr. S. Bergin:** Susan Bergin's work includes project-management; software development; and machine learning and statistical analysis research-based projects.

**Mr. S. Brown:** Primary research interest is in embedded networking systems: Sensor Networks, Software Engineering Education; Design and Analysis of routers/bridges for Performance and Stability, especially under overload; Engineering for Software Systems (Software Engineering); Embedded Operating Systems (especially support for latency, throughput, & buffering).

**Dr. T. Dowling:** Theory and practice of cryptography and cryptanalysis. Information warfare. Java and perl based implementation of cryptographic protocol and systems. Smart card development and integration. Numerical computing. Developing computer based simulations of algebraic constructs. Theory and application of Elliptic curves over finite fields and extension fields. Performance analysis of elliptic curve algorithms. Computer forensics and network security protocols and tools.

**Mr. J. Harpur:** Modelling features of autism; social competence enhancement through computer game based learning; human computer interaction; assistive technology development.

**Dr. J. Keating:** John Keating is interested in Information Processing using Artificial Neural Networks, Chaotic-based Watermarking and Image Processing. He has also recently been working on Virtual Learning and Collaborative Environments and manages the Virtual Telescopes in Education project which will provide a VLE for science education to second-level schools. He is also a Visiting Scientist at IBM's Centre for Advances Studies at Dublin, where he is working on eLearning and on-demand mechanisms.

**Mr. D. Kelly:** Distributed Systems, the Internet and its application to the emergence of virtual societies, grid computing, e-commerce and database backed services, mobile internet services, multimedia delivery, collaborative applications, network centric games, virtual reality environments and remote monitoring and control. Entertainment Technology Systems for sound and lighting resources, analyzing and synthesising, visualising and controlling these resources.

**Mr. T. Lysaght:** Digital signal processing with application to real-time audio. Sound synthesis. Computer vision.

**Dr. C. Markham:** Charles Markham is currently collaborating with the Engineering Department at NUIM to develop a brain computer interface based on optical tomography. The work involves developing accurate methods of photometry to allow blood oxygen levels to be measured and so infer brain activity. In collaboration with the Vision Groups, Institute for Technology, Blanchardstown and NUIM Dr. Markham is developing a mobile computer vision system. This project has created interest from the National Roads Authority for road infrastructure management. The Vision Group (NUIM) is also investigating the use of sensor fusion to improve performance of pedestrian detection systems. Initial work has been carried out using a combined LIDAR and Vision System as part of the autotram project. Dr Markham has special interest in the design of novel imaging sensors. He has developed techniques for Infrared imaging using coded apertures and wide-baseline stereo imaging methods to achieve a visual radar system.

**Dr. A. Mooney:** Aidan Mooney's research interests include digital watermarking with emphasis on digital chaos-based techniques.

**Ms. R. Monahan:** Rosemary Monahan's research is concerned with the development of reliable software systems. In particular she is interested in the development of a mathematical model for object-oriented specifications and a corresponding program construction theory that will ensure that object-oriented software is designed in a precise unambiguous manner. Her main interests include formal methods for program construction (Refinement, the Z specification language, Weakest

Precondition Calculus) as well as the exploration of the theoretical foundations of programming languages, with a particular emphasis on type systems and their impact on reliable software development.

**Dr. P. Moser:** Phillippe Moser's research interests include Computational Complexity, Derandomization, Resource-bounded Measure Theory, Effective Fractal Dimensions, Algorithmic Information and Randomness.

**Mr. J. McDonald:** John McDonald's primary research interests lie in the areas of computer vision, image processing, and pattern recognition. In the past he has worked on topics such as face recognition systems, 3-dimensional surface registration and analysis, and intelligent vehicle systems. More recently he has been involved in the development a novel computational model of facial expression and techniques for 3-dimensional holographic image processing. He is a member of the Computer Vision and Imaging Laboratory in the Department of Computer Science ([vision.cs.nuim.ie](http://vision.cs.nuim.ie)).

**Mr. T. Naughton:** Thomas Naughton has research interests at intersections of computer science, optics, and biology. In the field of optical information processing, he has developed tools for the processing and analysis of three-dimensional scenes encoded in digital holograms, has built matrix-algebra optical computers that utilise an optical Fourier transform, and has applied computational complexity theory to the analysis of analog optical computing architectures. At the intersection of computer science and biology, he is interested in biologically-inspired computation (genetic algorithms, neural networks), biocomputation (computing with molecules), and bioinformatics (for example, applying distributed computing to phylogenetic tree construction and genome database searching). In computer science, he is working on dynamic scheduling for distributed computing, and provably reliable operating systems.

**Dr. D. O'Donoghue:** Diarmuid O'Donoghue's research is focussed on computational models of how people reason with analogical comparisons. He has been focusing on geometric proportional analogies, typified by those problems found in IQ tests. These analogies take the form  $A:B$  as  $C:D$  (read as,  $A$  is to  $B$  as  $C$  is to  $D$ ), with the objective being to generate  $D$  from the given information ( $A$ ,  $B$  and  $C$ ).

We consider analogies where each of the objects include attributes, such as colour and shading. Solutions being developed combine (isomorphic) structure mapping between parts  $A$  and  $C$  of the analogy, with an attribute matching process - resulting in a family of structure matching algorithms. These algorithms are also being applied to the domain of qualitative spatial reasoning, particularly to interpreting and enhancing topographic maps. Other areas of interest include mathematical models of the web, genetic algorithms and simulated genetic-repair operators.

**Professor Barak Pearlmutter:** Prof. Pearlmutter's primary technical interest is in systems that adapt: how to analyze them, how to understand them, how to build them. Because the most flexible and competent adaptive systems available is the nervous system, he is interested in artificial neural networks and computational neuroscience. He is most focussed on the construction of novel architectures and algorithms that enable us to understand and attack previously unassailable problems, and to understand previously mysterious aspects of nervous system function. A secondary interest of Prof. Pearlmutter's is in programming systems, especially advanced programming language design and implementation. One of his projects is to build a new efficient advanced programming language with novel constructs that allow many numeric algorithms and scientific computations to be expressed very clearly and succinctly.

**Dr. J. Power:** James Power's research is focused on the application of techniques and tools from compiler design to software engineering problems, particularly program comprehension, reverse engineering and software visualisation. One thread of this research involves studying workloads and

profiles of Java programs in order to provide a quantitative foundation for the design of intermediate representations, such as Java bytecode, as well as the virtual machines that execute them. Another thread of the research is the development of an open source reverse engineering and analysis framework for ISO C++, a syntactically complex and heavily context-sensitive language. Common to both the Java and C++ threads of the research is an emphasis on applying the results to software testing and verification.

**Dr. J. Timoney:** Digital audio signal processing with an emphasis towards multimedia applications. Specifically, in the area of speech signal processing current projects include the development of a diphone speech synthesiser for Irish gaelic and the investigation of post-processing methods to improve the synthesised speech. These are being carried out in collaboration with the members of the Department of Electronic Engineering. Additionally, a research group consisting of staff from the computer science department with researchers from DIT is creating new methods for the analysis of the partial envelopes of musical sounds. Another project in collaboration with researchers from DIT is the development of ASIC technology to implement an adaptive filtering approach for speech enhancement.

**Dr. A. C. Winstanley:** 1. A.I. and statistical approaches of graphical data including using shape, context, and statistical Language Modelling for recognition and validation of graphical objects.

Applications include:

- (re-)structuring topographic data for GIS
  - Validation and Quality assessment of Geographic Data
  - Recognition of complex objects within graphical data
  - Structuring data for multi-media systems
2. Electric vehicle control systems
- Control systems for electric rail vehicles
  - Development of sensory algorithms to control autonomous public-transport vehicles in unsegregated environments
3. Transport information systems
- Journey planners optimised on multiple criteria
  - In-vehicle passenger information systems using global positioning systems

## 13 Timetable 2009/2010

The Computer Science timetables for the Academic Year 2009-2010 are available at:

<http://www.cs.nuim.ie/timetables/>

Printed copies of the timetables are available on the noticeboards outside the **Departmental Office** (Callan 2.118) and the **Software Lab** (Callan 1.39).

Please note that timetables are subject to minor changes, particularly early in the academic year, so check the web site for updates.

## Appendix

### 13.1 North Campus Map



### 13.2 Lecture Halls

JH1-6 : John Hume Building

BL : Biology Seminar Room, Callan Room 2.28

CH : Callan Hall, South Campus, next to Stoyte House

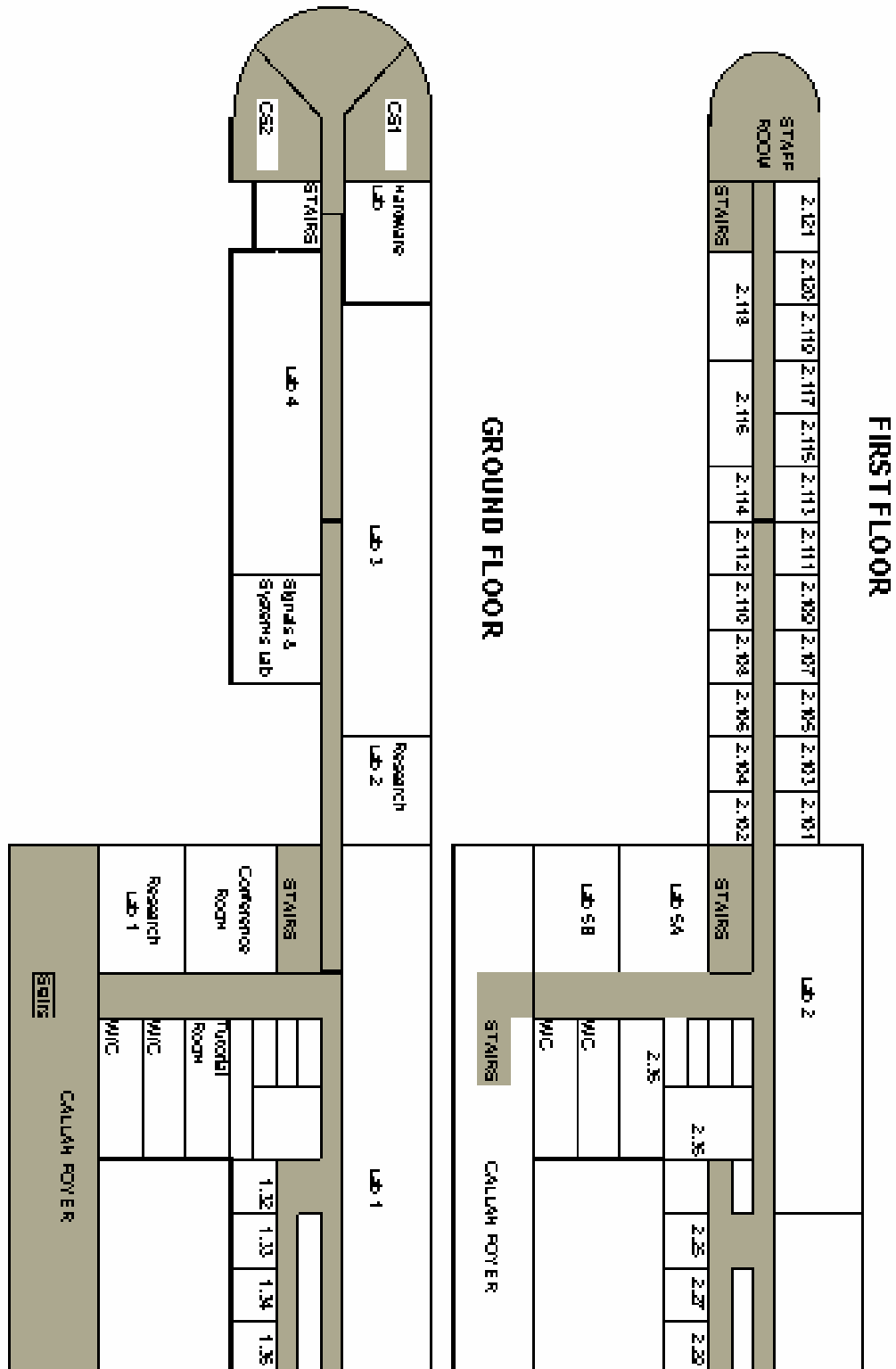
CS1 & CS2 : Callan Extension

HA through HF : Arts Building

SLT : Callan

TH1 & Th2 : Theatres 1 & 2, Arts Building

### 13.3 The Callan Building (and Callan Extension)



### **13.4 Department of Computer Science - Code of Conduct**

#### **Relating to the Use of Computing Facilities in The Department of Computer Science at the National University of Ireland, Maynooth**

To safeguard the standing of the University in the community, you are required to abide by the following rules in your use of Information Systems and Computing Facilities :

1. Respect the rights of the other users of these facilities, and the rights of others on the networks and facilities to which you gain access. Please remember that bandwidth and disk storage space are scarce resources.
2. Do not break the law.  
  
Examples. It is a maxim of the law that ignorance of the law is no excuse: everyone is taken to know the law. If you publish an untruth which damages a person's reputation you are open to an action in defamation. Blasphemy, sedition, obscenity, harassment and incitement to racial hatred can constitute crimes. Breach of copyright, (such as by the unauthorised copying of programs or copyright images, music, graphics, or cartoons) can leave you open to civil and criminal liability.
3. Connection of any device (e.g. pda, laptop etc.) to the Computer Science network without written permission from either the Head of the Computer Science Department or the Computer Science Technical Staff is strictly prohibited.
4. In communications, do not use language inappropriate to the status and circumstances of the recipients or language inappropriate to the forum in which discussion is taking place.
5. Do not seek or obtain unauthorised access to the data of others, or infringe its integrity or confidentiality. The Criminal Damage Act, 1991 contains a provision which amounts to the proposition that to interfere without justification with data stored on a computer constitutes the crime of criminal damage.
6. Do not infringe the privacy of the communications of others.
7. Do not generate pornographic material in any way whatsoever.
8. Observe the rules imposed by any information systems facility or network that you use.
9. Computer games should not be played at any time.
10. Do not disclose your access password(s) to anyone. Do not allow anyone to access a University or Departmental Information System or computer facility with your password, or to use your account for any purpose. You will be held responsible for any use to which your account is put.
11. Do not obstruct the use of rooms as teaching facilities. When a class is about to begin, vacate the terminal where this is necessary. Do not interrupt a class in progress. Follow instructions given by Members of Staff, or by Security, regarding use of the laboratories.
12. Observe any rules on behaviour or conduct, which are posted in the rooms containing the University or Department Information Systems and computer facilities.

#### **NOTES**

- 1) This Code of Conduct augments but does not supersede the "Code of Conduct for Users of Computing Facilities" as set out in the General Rules of the University in the NUI Maynooth Calendar.
- 2) Finally, these facilities are provided to help you learn - please use them and enjoy them.

### **13.5 HEAnet Acceptable Usage Policy**

As a condition of use of the HEA (Higher Education Authority) networking facilities (which provide Internet access for email, WWW, etc. for you) all students must comply with the HEAnet usage policy.

#### **Background and Definitions**

1. HEAnet is the name given to the collection of networking services and facilities which support the communication requirements of the Irish education and research community.
2. HEAnet provides services to three categories of organisation - member, user and connected.
3. Member organisations are those organisations that have involvement in the management of HEAnet and form the Board of HEAnet. These are the seven Universities, the HEA, the ITs, DIT and the Government.
4. User organisations are those organisations that the Board has decided are eligible to subscribe for HEAnet services.
5. Connected organisations are those organisations that the Board has decided are eligible to connect to HEAnet. Such organisations are only allowed to connect to sites directly connected to HEAnet - i.e. they are not allowed to transit HEAnet into other networks.
6. This policy statement applies to all three categories of organisation. It is the responsibility of User Organisations to ensure that members of their own communities use HEAnet services in an acceptable manner and in accordance with current legislation.
7. Organisations using HEAnet should establish their own acceptable usage policies in a form that is compatible with the conditions expressed in this policy.
8. An organisation availing of HEAnet services is a user organisation. It is acceptable for a user organisation to extend access to others on a limited basis (subject to 9 below), provided no charge is made for such access.
9. A user organisation must provide HEAnet services to organisations which support the aims and objectives of HEAnet and which, in the opinion of the user organisation, have a contribution to make to the HEAnet community of members.
10. HEAnet must provide services to third parties (not members of HEAnet) provided that, in doing so, there is benefit to the membership of HEAnet.

#### **Acceptable Usage**

HEAnet services should be used in such a way as to:

- apply public funding only to the purposes for which it was voted;
- abide by the law of the land;
- and not conflict with or override the rules and regulations of member organisations.

HEAnet will actively seek grants, subventions and other assistance towards its aims and objectives from public and private sources as appropriate.

## HEAnet Code of Behaviour

HEAnet provides enabling and enhancing services for member organisations in the pursuance of their official activities of instruction, research and development, and associated academic activities, and for administration in direct support of such use.

It is not permitted to use HEAnet services for any activity which purposely:

- seeks to gain unauthorised access to the resources of member organisations
- adversely affects the operation of HEAnet services or jeopardises the use or performance for other users
- wastes resources (people, capacity, computer)
- destroys the integrity of computer-based information
- compromises the privacy of users
- creates or transmits (other than for properly supervised and lawful research purposes) any offensive, obscene or indecent images, data or other material, or any data capable of being resolved into obscene or indecent images or material
- creates or transmits defamatory material
- transmits material in such a way as to infringe the copyright of another person or organisation
- transmits unsolicited commercial or advertising material
- causes offence or discriminates on grounds of race, creed or sex
- conflicts with practices as laid down from time by the Board
- contravenes the law of the State ( in particular, but not exclusively, the Data Protection Act and the Criminal Damages Act(1991)).

It is the responsibility of user organisations to restrict traffic according to their own requirements and to secure themselves against the misuse of HEAnet services.

It is the responsibility of the user organisation to take all reasonable steps to ensure compliance with the conditions of acceptable usage and to ensure that unacceptable usage of HEAnet services does not occur. The discharge of this responsibility must include informing all users of HEAnet services of their obligations in this respect.

Where necessary, HEAnet service may be withdrawn from the user organisation. This may take one of two forms:

- An indefinite withdrawal of service, should a violation of these conditions persist after appropriate warnings have been given by HEAnet. Such a withdrawal of service would only be made on the authority of the Board. Restoration would be made only when the Board was satisfied that the appropriate steps had been taken at the organisation involved to ensure acceptable behaviour in future.
- A suspension of service, should a violation of these conditions cause serious degradation of the service to other users. Such a suspension would be made on the judgement of the Board, and service would be restored when the cause of the degradation of service to others had been removed.

The responsibility for interpreting these terms lies with the Board. The Board reserves the right to review these conditions from time to time.

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