

Postgraduate Taught Student Handbook

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Welcome to New Students

Computer Science at the University of Liverpool has a history going back to the 1960s. As the subject grew in importance, the Department of Computer Science was created in 1982, to provide a focus for continued development within the University. Since then the Department has grown and flourished. We currently have over 40 members of academic staff and more than 15 members of professional services staff who provide excellent support for the running of the Department. We now expect to welcome around 300 new undergraduate students including a number from Xi'an Jiaotong Liverpool University (XJTLU) in China, about 100 new postgraduate students, and many others embarking upon various joint degree and research programmes. Like other University departments, we see ourselves as having a dual role: in research, aimed at developing new knowledge and understanding of the subject of Computer Science, and in teaching and learning, through which we seek to pass on this knowledge and understanding to others. In our University, the two activities are interwoven, and both staff and students participate in both. The distinction between teachers and students is not as clear as it is in earlier education; we see learning as a co-operative process that requires effort from both sides. In addition to our research-led teaching provision, we also provide support for developing students' employability skills through a variety of formal and informal activities that students have the opportunity to participate in.

You will probably find that study at the University will be more open-ended and less tightly structured than you have been used to. It may take you some time, also, to familiarise yourself with the organisation and ways of working of the University and the Department. Don't worry if you find these changes difficult at first; you will not be the only one feeling this way. I am sure that you will soon get used to the new way of life and study that you find here. In addition to the support offered by staff, the Department has a lively student society, CompSoc, which organises a variety of activities for computer science students to get involved in and meet others who are also studying the subject at our University.

Finally, if you do encounter problems, with your work or otherwise, please remember that my colleagues and I are all here to help you in any way we can. Each student has an Academic Advisor who can be contacted to provide advice throughout the duration of their studies. We all hope that your time at the University of Liverpool will be a happy and rewarding experience for you, and we will do our best to make it so.

I look forward to getting to know you during the coming year.

Professor Katie Atkinson
Head of Department of Computer Science

Section 1 – Information about the Department

1.1 Introduction

The Department of Computer Science, together with the Department of Electrical Engineering and Electronics, is part of the School of Electrical Engineering, Electronics and Computer Science. The interface between computer science and electrical engineering is where hardware meets software, for example in the domain of signal processing. Although computer science also has strong connections with mathematics (for example in the field of algorithms) and to an extent philosophy (for example in the fields of logic programming and the theory of computation), the relation with electrical engineering means that the two departments within the school are well matched, thus allowing students in both departments to benefit from the experience and knowhow available across the entire school.

The Department is located in the Ashton and George Holt Buildings. The Ashton Building houses the offices of the academic and administrative staff and the Holt Building houses mainly the technical staff and the computer laboratories. The two buildings are linked by a corridor on the second floor.

1.2 Student Handbook

The purpose of this handbook is to give you information specific to the Department of Computer Science and your studies here. You will be able to find general information about the University, including the rules, regulations and policies governing your study in the separate handbook 'Your University', which is available at www.liv.ac.uk/student-administration/student-administration-centre/student-handbooks/; you should also have received a hard copy at registration. In the unlikely event that the information provided here conflicts with the information provided in the "Your University" handbook, you should, unless officially informed otherwise, follow the information provided in the "Your University" handbook. There is also a wealth of information on the University and departmental websites which will help you throughout your studies.

This Handbook will be updated as required and you will be informed of updates via email or 'message of the day'. If you would like a hard copy of this handbook or require a special format, please contact the Student Office, (email csstudy@liverpool.ac.uk, 0151 795 4275). We would also welcome any suggestions and comments you may have.

1.3 Communication within the Department

Email: Incoming students are provided with a University email account and once your registration is completed, all University communications will be sent to this account. It is very important that you check this daily during term-time, and also regularly during vacation periods.

Email is usually not a good way to get an answer to an urgent query; you will generally get the information you need more readily by visiting the School Student Support Centre or seeing your tutor in class or during their office contact hours.

If you do email academic staff or professional services staff, please do so only from your University email account. Write in a professional, polite style, and remember to use an appropriate greeting and sign-off in all mails.

When contacting the School Student Support Centre, it is important to indicate your student ID number, which degree programme you are on and your year of study in all communications. In a School with over 800 students, this will help us to identify you more easily and respond to your enquiry.

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Academic and professional services staff will not normally reply to emails outside of normal office hours—in other words you should not expect a reply to your email in the evenings or at the weekend.

Please try to find information in this handbook or through the School or University web pages in the first instance; if you cannot find what you are looking for, let us know so that we can post that information for the benefit of other students. The School Student Support Centre will also be able to answer many of your non-academic queries.

External post: If we need to contact you by letter, we will use your term time or permanent address as recorded on Liverpool Life. Please ensure that your addresses are correct at all times. If you have problems amending your address, please contact the Student Office (room G09, Ashton Building). **Please check that your postal details and mobile phone details are accurate and up to date!**

Online communication and Departmental website: Information about departmental systems and facilities may be communicated by means of a ‘message of the day’ when you log in to the departmental computer network. Information about particular modules may be provided via module specific web pages or the central University VITAL system. The Student Office also has Twitter and Facebook accounts which are used to inform students of important events. The Department of Computer Science websites can be found here:

External website: <http://www.liv.ac.uk/computer-science/>

Intranet: <http://intranet.csc.liv.ac.uk/index.php/>

The pages contain links to staff-student liaison committee minutes, the electronic module catalogue, programme specifications and other important documentation. It is regularly updated with news and information relevant to students.

Noticeboards: Student noticeboards are situated on the first floor of the George Holt Building adjacent to Lab 1. General information including details of the Staff Student Liaison Committee, COMPSOC and careers will be found here. Exams-related information is displayed on the noticeboard outside the Helpdesk on the second floor and in the Student Office on the ground floor of the Ashton Building.

Telephone contact: All staff have a direct telephone number and many have voicemail. Please note that when telephoning staff on a University telephone, you only need to dial the last 5 digits (e.g. for 7941234 you simply dial 41234). Calls made from outside the University or from a mobile require the full number. If you are dialling from outside the UK, use the prefix +44 (151).

VITAL: Where applicable, students are expected to monitor information concerning their modules on the VITAL network regularly. Information about your programme will be communicated via your VITAL programme page.

1.4 Online Attendance/Coursework Database

The Department maintains a database which contains information about student activity, including attendance and assessed coursework. This can be accessed at:

<http://intranet.csc.liv.ac.uk/sam.html>

By logging into this database with your departmental computer password, you will be able to view your personal attendance record, the date and time of any coursework submitted and deadlines for coursework. See also [Sections 4.5.1](#) and [5.1.3](#).

1.5 Student Representation within the Department

The views of students are valued by the Department and students are encouraged to provide feedback relating both to the content and provision of their programme of study, and also regarding any other aspects of the overall University environment. Students should feel able to provide informal feedback to any member of staff. However there are several mechanisms for providing formal feedback:

- **Staff Student Liaison Committee:** The School tries to be as open as possible in the way it runs, and students are encouraged to make their views heard. This is not to say every opinion will be acted upon because ultimately academic staff are responsible for using their judgement about how their subject should be taught and assessed. But student opinion will always be listened to and seriously considered. To facilitate this, staff/student liaison committees are run across the School usually once per semester. All students (undergraduate and postgraduate, including joint and combined honours students, both full- and part-time taking modules in the School) are invited to stand for election on the appropriate committee and are provided with training and support from the Guild of Students.

Staff/student liaison committees are formal but friendly forums for students to raise issues of general concern about their studies; they cannot deal with matters of an individual or personal nature. They may also be used to consult with students on policy changes, curriculum development, assessment, feedback, etc.

If you are interested in becoming a student representative please contact the Student Office. Elections (where required) are normally held at the start of the academic session and students may serve as representatives for one year or throughout their studies if they wish. The Department operates a Postgraduate Staff Student Liaison Committee (SSLC) which comprises members of staff together with MSc student representatives. One of the Committee members is also nominated to represent students at meetings of the Board of Studies. The contact for matters relating to the SSLC and postgraduate student representation in general is Dr Othon Michail (see [Section 2.1](#) for contact details).

- **Representation on Committees**
There are committees at Faculty and Department Level and both include student representation on their membership. Committee reps are usually recruited through the SSLCs and you will hear more about these opportunities at the first SSLC. You can also find out more by contact the Faculty Student Voice Coordinator who is based in the Guild but works very closely with staff in the Faculty.
- **End of Module questionnaires:** You will be invited to complete a questionnaire on each module that you study. Please make every effort to complete this, as comments are noted and can help to lead to improvements in content/delivery.
- **End of Year questionnaires:** You will be invited to complete an end of year questionnaire at the end of your programme. Again, your views are important and will be taken into consideration by the Department.
- **Postgraduate Taught Experience Survey:** This survey is completed by students throughout the country. Results are published nationally and allow prospective students to compare overall satisfaction at different institutions

1.6 Student Society

The departmental student society is known as COMPSOC and all students in the Department are welcome to join. This society, which is associated with the University's Guild of Students, is run by students and involves various social and sporting activities. Further information can be found on the COMPSOC noticeboard (outside Lab 1 on the first floor of the George Holt Building), or by contacting the Student Office or the Departmental Coordinator, Prof Prudence Wong (P.Wong@liverpool.ac.uk). The Department also has a Facebook page, which can be found here: <https://www.facebook.com/groups/1459307740971304/>

1.7 Departmental Events

The Department holds weekly seminars which are open to students. Speakers include leading international researchers from the UK and beyond. The topics cover a wide range of computer science research. For details please see <http://intranet.csc.liv.ac.uk/research/seminars/>

From time to time, outside companies visit the Department to talk about careers. You will be advised of any such events by e-mail, and posters will be displayed on the noticeboards.

1.8 Opportunities to Enhance Your CV

In today's competitive job market, it is advisable for you to consider ways of enhancing your CV. Within the Department you might consider acting as a representative on the Staff Student Liaison Committee (see [Section 1.5](#)).

You may also consider membership of professional societies, such as the British Computer Society (BCS) or the Association for Computing Machinery (ACM). For information on student membership, please see

<http://www.bcs.org/category/10970>
<http://www.acm.org/membership/student/>

1.8.1 Voluntary Work in the Department

Welcome Week for new MSc Students

Each year the Department requires a number of previous MSc students to assist with meeting the new MSc students during Welcome Week in September, provide brief tours of the Department and answer any student related questions which may arise. If you would be available to help with this, please let the Student Office know (csstudy@liv.ac.uk).

Assisting with Open Days/Discovery Days

There are a number of occasions throughout the year when prospective students and their parents visit the Department to finalise their choice of a place to study. Current students are an important part of these visits and we generally look for a small number to help show visitors around the Department and to answer their questions.

1.9 Fire Alarms

If you have any problems or questions about safety, please raise them with a member of staff or with the Departmental Safety Coordinator. See [Section 2.4](#). The fire alarm in the Ashton building is tested weekly on a Wednesday at around 9:50. The fire alarm in the George Holt building is tested weekly on a Tuesday at around 10:00. If the fire bells ring continuously for longer than this (or at any other time), you should immediately leave the building by the nearest exit. Do not stop to

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collect personal items, or linger in the building. Do not use the lifts. Assemble in the quadrangle and do not attempt to re-enter the building until told by the fire safety officer that it is safe to do so. The Department has an EVAC chair in the George Holt building – this is a universal evacuation solution for smooth stairway descent during an emergency.

Once a year, a fire safety evacuation practice will be held. The alarm will be sounded and the bells will ring continuously. This should be treated as if it were a real fire, and everyone should leave the building immediately.

Section 2 –Contacts

A list of all staff including rooms and telephone numbers can be found on the departmental website at <http://intranet.csc.liv.ac.uk/people/staff.php>. The sections below list the key contacts in the academic, professional services and technical staff.

2.1 Academic Staff

If you wish to see any member of the academic staff, please contact them by e-mail in the first instance to arrange a mutually convenient time. Module co-ordinators will also schedule office hours or drop-in sessions for their modules.

Role	Name	E-mail	Room (Ashton Building)
Head of Department	Prof Katie Atkinson	K.M.Atkinson@liverpool.ac.uk	215
Chair, Board of Studies	Prof Paul Dunne	P.E.Dunne@liverpool.ac.uk	204
Chair, PGT Board of Examiners Chair, PGT Extenuating Circumstances Committee	Dr John Goulermas	J.Y.Goulermas@liverpool.ac.uk	219
School Publicity/Contact with Industry	Dr Terry Payne	T.R.Payne@liverpool.ac.uk	218
Disability Officer	Mr Phil Jimmieson	Danushka.Bollegala@liverpool.ac.uk	224
Examinations Officer	Dr Andre Hernich	hernich@liverpool.ac.uk	113
Academic Integrity & Assessment Officer	Dr Alexei Lisitsa	A.Lisitsa@liverpool.ac.uk	319
Postgraduate Programme Director	Dr John Goulermas	J.Y.Goulermas@liverpool.ac.uk	219
PGT Staff-Student Liaison Committee (Student Representation Officer)	Dr Othon Michail	Othon.Michail@liverpool.ac.uk	Holt 214

2.2 Professional Services Staff

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The professional services staff provide administrative support to the Department, and the Student Experience Team is responsible for all matters relating to undergraduate and postgraduate taught students. The first point of contact for students is the Student Office, which is located on the ground floor of the Ashton Building. The office is open Monday to Friday all year round from 9:15 to 16:45, with the exception of Wednesday afternoons when it closes at 14:00. The members of the Student Experience Team are as follows:

Role	Name	E-mail	Tel	Location
Student Experience Team Leader	Mrs Jan Harding	Jharding@liverpool.ac.uk	0151 794 4511	5 th floor, Electrical Engineering & Electronics (building no 235)
Student Experience Co-ordinator	Mrs Judith Birtall	Judith.Birtall@liverpool.ac.uk	0151 795 8459	Student Office (Ashton Building, Ground Floor, G09)
Student Experience Administrator	Miss Lindsay Chadwick	Lindsay.Chadwick@liverpool.ac.uk	0151 795 4234	
On-Line Student Experience Administrator	Mrs Helen Mattocks	H.Bradley@liverpool.ac.uk	0151 795 4276	
Student Experience Administrative Assistant	Miss Bethan Birch	Bethan21@liverpool.ac.uk	0151 795 4275	

2.3 Technical Staff

The first point of contact for students with queries relating to the departmental computer system is the Helpdesk, which is located on the second floor of the George Holt Building. During term time, it is open Monday to Friday from 10:30 to 12:30 and 14:00 to 15:30 (except Wednesday afternoons). Technicians are available in the Helpdesk on a rota basis as follows:

Name	E-mail	Tel
Mr Andrew Craig	csc-helpdesk@liv.ac.uk	0151 795 4287
Mr Patrick Colleran		
Mr Dave Nixon		
Mr Dave Shield		

2.4 Health and Safety Contacts

Role	Name	E-mail	Tel.	Location
Departmental Safety Coordinator	Mr Phil Jimmieson	P.Jimmieson@liverpool.ac.uk	0151 795 4236	Room 120, Ashton Building
First Aider	Miss Rebekah Martin	Rebekah.Martin@liverpool.ac.uk	0151 795 4273	Room G07, Ashton Building
First Aider	Mr Andrew Craig	acraig@liverpool.ac.uk	0151 795 4269	Room H205, George Holt Building

2.5 Contact Details for the Department

Address: Ashton Building
Ashton Street
Liverpool
L69 3BX

Tel: 0151 795 4275

Fax: 0151 795 4235

External website: <http://www.liv.ac.uk/computer-science/>

Intranet: <http://intranet.csc.liv.ac.uk/index.php/>

Facebook: <https://www.facebook.com/groups/1459307740971304/>

Student Office email: csstudy@liv.ac.uk

Helpdesk email: csc-helpdesk@liv.ac.uk

Section 3 – Programme Information

3.1 Introduction

The Board of Studies in Computer Science has overall responsibility for all aspects of the provision and assessment of undergraduate and taught postgraduate programmes within the Department. The Postgraduate Board comprises key academic members of staff and is chaired by Dr John Goulermas. In addition, the degree programmes have a Director of Studies, Dr John Goulermas, who is responsible for the day to day running of the programme. For contact details, see [Section 2.1](#).

3.2 MSc Programmes in the Department of Computer Science

The Department currently offers the following full-time on-campus MSc programmes:

- MSc Computer Science (CSMS)
- MSc Advanced Computer Science (CSAD)
- MSc Advanced Computer Science with Internet Economics (CSCI)
- MSc Big Data and High Performance Computing (CMBD)

The Department currently offers the following on-campus MSc programmes with a Year in Industry

- MSc Big Data and High Performance Computing with a Year in Industry (CMBI)
- MSc Advanced Computer Science with a Year in Industry (CSAI)
- MSc Advanced Computer Science with Internet Economics with a Year in Industry (CSCN)

The Department currently offers the following part-time on-campus MSc programmes:

- MSc Computer Science (CSMS)
- MSc Advanced Computer Science (CSMS)
- MSc Advanced Computer Science with Internet Economics (CSCI)

More detailed information can be found at

<http://intranet.csc.liv.ac.uk/teaching/programmes/index.php?level=pg>. A list of modules in each programme is given in [Section 3.5](#).

The Department is also involved in teaching on the following programme which is run at Faculty level:

- MSc Advanced Science (ADSC). Further information is available at: <http://www.liv.ac.uk/science/mscadvscience.html>.

Below is a brief description of the programmes offered by the Department.

[MSc Computer Science \(CSMS\)](#): The MSc in Computer Science is intended for graduates who do not hold an undergraduate degree in Computer Science but who wish to augment their existing knowledge with a good foundation in Computer Science as well as knowledge of research issues at the "cutting edge" of the discipline. The programme comprises a sequence of modules designed to both bring students "up to speed" and give a good understanding of a number of significant research areas. It is directed at careers in the IT industry that require some degree of research and development as well as more mainstream IT careers.

MSc Advanced Computer Science (CSAD): The MSc in Advanced Computer Science is intended for graduates who already have a first degree in Computer Science or a closely related subject, and who wish to extend the knowledge gained in their undergraduate study with more advanced specialised material reflecting current research at the "cutting edge" of the discipline. The programme comprises a sequence of modules focusing on the research strengths of the Department and is directed at careers in the IT industry that require a degree of research and development. It is also intended as a stepping stone for students who wish to continue their study to a higher level and undertake a PhD.

MSc Advanced Computer Science with Internet Economics (CSCI): The MSc Advanced Computer Science with Internet Economics is intended for graduates who already have a first degree in Computer Science, in Economics, or a closely related subject, and who wish to extend their knowledge with more advanced specialised material reflecting current research at the "cutting-edge" of the discipline of Algorithmic Game Theory, which lies at the intersection of economics and computer science.

MSc Big Data and High Performance Computing (CMBD):

The MSc in Big Data and High Performance Computing aims to provide students with an in depth understanding of big data analytics and processing using High Performance Computing technology. More specifically the programme is designed to allow students to gain a specialist qualification in an area of computing that has seen recent growth and in which there is expected to be a significant skills shortage.

Programmes with a Year in Industry

- MSc Big Data and High Performance Computing with a Year in Industry (CMBI)
- MSc Advanced Computer Science with a Year in Industry (CSAI)
- MSc Advanced Computer Science with Internet Economics with a Year in Industry (CSCN)

The above MSc with a Year in Industry programmes are divided into two equally weighted years (years 1 and 2). The first year runs concurrently with the normal first and second undergraduate semesters, and comprises taught modules to a total of 60 credits per semester (120 credits in total). The placement takes place in the second year typically running concurrently with the normal first and second undergraduate semesters. This counts for a further 120 credits, making a total of 240 credits over the two year period. These programmes address both the requirement to provide a core technical skill base and to equip students with an appreciation of how such skills will be used in practical commercial settings. They all follow the same structure as their equivalent programme without the year in industry but include a one-year placement with a commercial organisation in the second year.

3.3 Professional Accreditation

The British Computer Society (BCS) has accredited the MSc Computer Science (CSMS), MSc Advanced Computer Science (CSAD) and MSc Advanced Computer Science with Internet Economics (CSCI) programmes as fully meeting the educational requirement for Chartered IT Professional (CITP) Further Learning, and partially meeting the educational requirement for Chartered Scientist (CSCI) registration.

Full exemption means that students who successfully complete the programme qualify for full exemption from BCS Professional Examinations. Advanced Computer Science graduates can therefore attain Professional BCS Membership after a shortened period of relevant experience and training. For further information see <http://www.bcs.org/>.

3.4 Programme Structures

The tables below list the required and optional modules for each of the MSc programmes in the Department of Computer Science. Information about the individual modules can be seen in [Section 3.5](#).

Note: in exceptional circumstances, and with the approval of the programme Director of Studies, alternative modules available within the Computer Science provision may be substituted for optional and required modules, except COMP516, COMP598, COMP599 and COMP702.

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3.4.1 CSMS – MSc Computer Science

The programme is divided into three, equally weighted semesters. The first two, which are run concurrently with the normal undergraduate semesters, comprise taught modules, weighted at 15 credit points each, to a total of 60 credits per semester. An extended research based project, culminating in a dissertation, is undertaken full time over the summer period. This counts for a further 60 credits, making a total of 180.

At least 90 credits of the 120 taught credits available in the first two semesters must comprise level 'M' modules. The remaining 30 may include selected level 3 modules, taken from the Department's 3rd year module list, with the proviso that a graduates of the University of Liverpool cannot elect to take a level three module if they have already taken that module as part of their undergraduate study. The modules available in the MSc in Computer Science programme are as follows ('•' indicates a required module):

Module Code	Module Title	Credit Value	Level	Co-requisite	Pre-requisites	Pre-requisite for
Semester 1						
COMP516	Research Methods in Computer Science (•)	15	7	-	First degree in Computer Science or closely related subject	COMP524 COMP525 COMP702
COMP517	Object-Oriented Software Development (•)	15	7	-	-	COMP524 COMP525 COMP526 COMP527
COMP518	Database and Information Systems (•)	15	7	-	-	-
COMP519	Web Programming (•)	15	7	-	-	-
Semester 2						
<i>Plus options totalling 60 credits from the following ten modules provided pre-requisites are satisfied. No more than two level 6 modules may be selected.</i>						
COMP310	Multi-Agent Systems	15	6	-	-	-
COMP315	Technologies for E-Commerce	15	6	-	-	-
COMP318	Advanced Web technologies	15	6	-	-	-
COMP524	Safety and Dependability	15	7	-	COMP516	-
COMP525	Reasoning about Action and Change	15	7	-	COMP517 COMP518 COMP519	-
COMP526	Applied Algorithmics	15	7	-	COMP516	-
COMP527	Data Mining and Visualisation	15	7	-	COMP516	-
COMP532	Machine Learning and BioInspired Optimisation	15	7	-	-	-
COMP575	Computational Intelligence	15	7	-	-	-
ENVS456	Web Mapping and Analysis	15	7	-	-	-
Summer						
COMP702	MSc Project (•)	60	7	-	Taught part of MSc	-

3.4.2 CSAD – MSc Advanced Computer Science

The programme is divided into three, equally weighted semesters. The first two, which are run concurrently with the normal undergraduate semesters, comprise taught modules to a total of 60 credits per semester. An extended research based project, culminating in a dissertation, is undertaken full time over the summer period. This counts for a further 60 credits, making a total of 180.

At least 90 credits of the 120 taught credits available in the first two semesters must comprise level 'M' modules. The remaining 30 may include selected level 3 modules, taken from the Department's 3rd year module list, with the proviso that a graduates of the University of Liverpool cannot elect to take a level three module if they have already taken that module as part of their undergraduate study. The modules available in the MSc in Advanced Computer Science programme are as follows ('•' indicates a required module)

Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
Semester 1						
COMP516	Research Methods in Computer Science (•)	15	7	-	First degree in Computer Science or closely related subject	COMP524 COMP525 COMP702
<i>Options totalling 45 credits from the following seven modules provided pre-requisites are satisfied (Note that ELEC415 and ELEC319 must be taken as a pair). No more than two FHEQ level 6 modules may be selected in both semesters.</i>						
COMP521	Knowledge Representation	15	7	-	First degree in Computer Science or closely related subject	-
COMP522	Privacy and Security	15	7	-		-
COMP523	Advanced Algorithmic Techniques	15	7	-		-
COMP528	Multicore and Multi-Processor Programming	15	7	-		-
COMP557	Optimisation	15	7			
COMP305	Biocomputation	15	6	-	-	-
ELEC319	Image Processing	7.5	7	ELEC415	Mathematics: complex numbers and algebra, Laplace transforms, matrix algebra, Fourier series, partial differentiation, probability, Engineering: time and	-

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					frequency domain response, concept of filtering.	
ENVS563	Geographical Information Systems	15	7	1	-	-
Semester 2						
<p><i>Plus options totalling 60 credits from the following eleven modules provided pre-requisites are satisfied. Note that ELEC415 and ELEC319 must be taken as a pair. No more than two FHEQ level 6 modules may be selected in both semesters.</i></p>						
COMP310	Multi-Agent Systems	15	6	-	-	-
COMP315	Technologies for E-Commerce	15	6	-	-	-
COMP318	Advanced Web Technologies	15	6	-	-	-
COMP524	Safety and Dependability	15	7	-	COMP516	COMP516
COMP525	Reasoning about Action and Change	15	7	-	COMP516	-
COMP526	Applied Algorithmics	15	7	-	COMP516	COMP516
COMP527	Data Mining and Visualisation	15	7	-	COMP516	COMP516
COMP532	Machine Learning and BioInspired Optimisation	15	7	-	-	-
COMP559	Algorithmic Game Theory	15	7	-	COMP523 COMP557	
COMP575	Computational Intelligence	15	7	-	Basic knowledge of UG mathematics	-
ELEC415	Information Theory and Coding	7.5	7	-		-
ENVS456	Web Mapping and Analysis	15	7	-	-	-
Summer						
COMP702	MSc Project (●)	60	7	-	Taught part of MSc	-

3.4.3 CSAI – MSc Advanced Computer Science with a Year in Industry

The programme MSc in Advanced Computer Science with a Year in Industry is divided into two equally weighted years (years 1 and 2). The first year runs concurrently with the normal first and second undergraduate semesters, and comprises taught modules to a total of 60 credits per semester (120 credits in total). The placement takes place in the second year typically running concurrently with the normal first and second undergraduate semesters. This counts for a further 120 credits, making a total of 240 credits over the two year period.

At least 90 credits of the 120 taught credits available in the first two semesters must comprise level 'M' modules. The remaining 30 may include selected level 3 modules, taken from the Department's 3rd year module list, with the proviso that a graduates of the University of Liverpool cannot elect to take a level three module if they have already taken that module as part of their undergraduate study. The modules available in the MSc in Advanced Computer Science with a Year in Industry programme are as follows ('•' indicates a required module)

Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
Year 1 – Semester 1						
COMP516	Research Methods in Computer Science (•)	15	7	-	First degree in Computer Science or closely related subject	COMP524 COMP525 COMP598 COMP599
<i>Options totalling 45 credits from the following seven modules provided pre-requisites are satisfied. Note that ELEC415 and ELEC319 must be taken as a pair. No more than two FHEQ level 6 modules may be selected in both semesters.</i>						
COMP521	Knowledge Representation	15	7	-	First degree in Computer Science or closely related subject	-
COMP522	Privacy and Security	15	7	-		-
COMP523	Advanced Algorithmic Techniques	15	7	-		-
COMP528	Multicore and Multi-Processor Programming	15	7	-		-
COMP557	Optimisation	15	7			
COMP305	Biocomputation	15	6	-	-	-
ELEC319	Image Processing	7.5	7	ELEC415	Mathematics: complex numbers and algebra, Laplace transforms, matrix algebra, Fourier series, partial differentiation, probability, Engineering:	-

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					time and frequency domain response, concept for filtering.	
ENVS563	Geographical Information Systems	15	7	1	-	-

Year 1 – Semester 2

Plus options totalling 60 credits from the following eleven modules provided pre-requisites are satisfied. Note that ELEC415 and ELEC319 must be taken as a pair. No more than two FHEQ level 6 modules may be selected in both semesters.

COMP310	Multi-Agent Systems	15	6	-	-	-
COMP315	Technologies for E-Commerce	15	6	-	-	-
COMP318	Advanced Web Technologies	15	6	-	-	-
COMP524	Safety and Dependability	15	7	-	COMP516	COMP516
COMP525	Reasoning about Action and Change	15	7	-	COMP516	-
COMP526	Applied Algorithmics	15	7	-	COMP516	COMP516
COMP527	Data Mining and Visualisation	15	7	-	COMP516	COMP516
COMP532	Machine Learning and BioInspired Optimisation	15	7	-	-	-
COMP559	Algorithmic Game Theory	15	7	-	COMP523 COMP557	-
COMP575	Computational Intelligence	15	7	-	Basic knowledge of UG mathematics	-
ELEC415	Information Theory and Coding	7.5	7	-	-	-
ENVS456	Web Mapping and Analysis	15	7	-	-	-

Year 2 – Semester 1 and 2

Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Prerequisite for
COMP598	MSc Placement Experience	60	7	-	Successful completion of first year taught modules	-
COMP599	MSc Industrial Project	60	7	-		-

Note: in exceptional circumstances, and with the approval of the programme Director of Studies, alternative modules available within the Computer Science provision may be substituted for optional and required modules, except COMP516, COMP598 and COMP599.

**3.4.4 CSCI – MSc Advanced Computer Science with Internet Economics
(with first degree in Computer Science or Economics)**

The programme MSc in Advanced Computer Science with Internet Economics is designed for two broad potential groups of entering students, i.e., for those with BSc Honours degree in Economics (or related subjects) and those holding BSc Honours degree in Computer Science.

Computer Science entrants

Students with a first degree in Computer Science (or a related subject) are expected to pursue the following programme of study (‘•’ indicates a required module):

Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Prerequisite for
Semester 1						
COMP516	Research Methods in Computer Science (□)	15	7	-	First degree in Computer Science or closely related subject	COMP702 COMP524 COMP525
COMP557	Optimisation (□)	15	7	-	-	-
ECON915	Microeconomic Theory (□)	15	7	-	First degree in Economics or equivalent field ²	-
<i>Students who have not previously taken COMP323 (or an equivalent) as part of their undergraduate programme take</i>						
COMP323	Introduction to Computational Game Theory (□)	15	7	-	COMP109 or equivalent mathematical module	-
<i>Students who have taken COMP323 (or an equivalent) as part of their undergraduate programme take</i>						
COMP523	Advanced Algorithmic Techniques (□)	15	7	-	-	-
Semester 2						
COMP526	Applied Algorithmics (□)	15	7	-	COMP516	-
COMP559	Computational Auctions and Mechanism Design (□)	15	7	-	COMP516 COMP323/523 COMP557 ECON915	-
<i>Plus options totalling 30 credits from the following modules provided pre-requisites are satisfied.</i>						
COMP310	Multi-Agent Systems	15	6	-	-	-
COMP315	Technologies for E-Commerce	15	6	-	-	-
COMP524	Safety and Dependability	15	7	-	-	-
COMP527	Data Mining and Visualisation	15	7	-	-	-
COMP575	Computational Intelligence	15	7	-	Basic knowledge of UG mathematics	-
Summer						

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COMP702	MSc Project (□)	60	7	-	Taught part of MSc	-
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Note 1: Students can choose at most one optional module at level 6. Students who took COMP323 as part of their undergraduate programme, replace COMP323 by COMP523.

Note 2: ECON915 normally has a prerequisite of an Economics undergraduate degree. It has been agreed with the Management School that a Computer Science degree will be considered to be equivalent for students on the MSc Advanced Computer Science with Internet Economics.

Economics entrants

Students with a first degree in Economics (or a related subject) are expected to pursue the following programme of study (‘□’ indicates a required module):

Module Code	Module Title	Credit Value	Level	Corequisites	Prerequisites	Prerequisite for
Semester 1						
COMP323	Introduction to Computational Game Theory (□)	15	6	-	-	-
COMP516	Research Methods in Computer Science (□)	15	7	-	First degree in suitable subject	COMP702 COMP524 COMP525
COMP517	Object-Oriented Software Development (□)	15	7	-	First degree in suitable subject other than Computer Science	COMP524 COMP525 COMP526 COMP527
COMP557	Optimisation (□)	15	7	-	-	-
Semester 2						
COMP526	Applied Algorithmics (□)	15	7	-	COMP516	-
COMP559	Computational Auctions and Mechanism Design (□)	15	7	-	COMP516 COMP323 COMP557	-
<i>Plus options totalling 30 credits from the following modules provided pre-requisites are satisfied (at most one module at level 6 can be taken)</i>						
COMP310	Multi-Agent Systems	15	6	-	-	-
COMP315	Technologies for E-Commerce	15	6	-	-	-
COMP524	Safety and Dependability	15	7	-	COMP516 COMP517	-
COMP527	Data Mining and Visualisation	15	7	-	COMP516	-
COMP575	Computational Intelligence	15	7	-	Basic knowledge of UG mathematics	-
Summer						
COMP702	MSc Project	60	7	-	Taught part of MSc	-

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Note: in exceptional circumstances, and with the approval of the programme Director of Studies, alternative modules available within the Computer Science provision may be substituted for optional and required modules, except COMP516 and COMP702.

**3.4.5 CSCN – MSc Advanced Computer Science with Internet Economics
(with first degree in Computer Science or Economics) with a Year in Industry**

The programme MSc in Advanced Computer Science with Internet Economics with a Year in Industry is divided into two equally weighted years (years 1 and 2). The first year runs concurrently with the normal first and second undergraduate semesters, and comprises taught modules to a total of 60 credits per semester (120 credits in total). The placement takes place in the second year typically running concurrently with the normal first and second undergraduate semesters. This counts for a further 120 credits, making a total of 240 credits over the two year period.

This programme is designed for two broad potential groups of entering students, i.e., for those with BSc Honours degree in Economics (or related subjects) and those holding BSc Honours degree in Computer Science.

Computer Science entrants

Students with a first degree in Computer Science (or a related subject) are expected to pursue the following programme of study (‘•’ indicates a required module):

Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
Year 1 – Semester 1						
COMP516	Research Methods in Computer Science (•)	15	7	-	First degree in Computer Science or closely related subject	COMP598 COMP599 COMP524 COMP525
COMP557	Optimisation (•)	15	7	-	-	-
ECON915	Microeconomic Theory (•)	15	7	-	First degree in Economics or equivalent field ²	-
<i>Students who have not previously taken COMP323 (or an equivalent) as part of their undergraduate programme take</i>						
COMP323	Introduction to Computational Game Theory (•)	15	7	-	COMP109 or equivalent mathematical module	COMP598 COMP599
<i>Students who have taken COMP323 (or an equivalent) as part of their undergraduate programme take</i>						
COMP523	Advanced Algorithmic Techniques (•)	15	7	-	-	-
Year 1 – Semester 2						
COMP526	Applied Algorithmics (•)	15	7	-	COMP516	-
COMP559	Algorithmic Game Theory (•)	15	7	-	COMP516 COMP323/523 COMP557 ECON915	-
<i>Plus options totalling 30 credits from the following modules provided pre-requisites are satisfied</i>						
COMP310	Multi-Agent Systems	15	6	-	-	-
COMP315	Technologies for E-Commerce	15	6	-	-	-
COMP524	Safety and Dependability	15	7	-	-	-
COMP527	Data Mining and Visualisation	15	7	-	-	-
COMP575	Computational Intelligence	15	7	-	Basic knowledge of UG mathematics	-
Year 2 – Semester 1 and 2						

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Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
COMP598	MSc Placement Experience	60	7	-	Successful completion of first year taught modules	-
COMP599	MSc Industrial Project	60	7	-		-

Note 1: Students can choose at most one optional module at level 6. Students who took COMP323 as part of their undergraduate programme, replace COMP323 by COMP523.

Note 2: ECON915 normally has a prerequisite of an Economics undergraduate degree. It has been agreed with the Management School that a Computer Science degree will be considered to be equivalent for students on the MSc Advanced Computer Science with Internet Economics.

Economics entrants

Students with a first degree in Economics (or a related subject) are expected to pursue the following programme of study (‘•’ indicates a required module):

Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
Year 1 – Semester 1						
COMP323	Introduction to Computational Game Theory (•)	15	6	-	-	-
COMP516	Research Methods in Computer Science (•)	15	7	-	First degree in suitable subject	COMP702 COMP524 COMP525
COMP517	Object-Oriented Software Development (•)	15	7	-	First degree in suitable subject other than Computer Science	COMP524 COMP525 COMP526 COMP527
COMP557	Optimisation (•)	15	7	-	-	-
Year 2 – Semester 2						
COMP526	Applied Algorithmics (•)	15	7	-	COMP516	-
COMP559	Algorithmic Game Theory (•)	15	7	-	COMP516 COMP323 COMP557	-
<i>Plus options totalling 30 credits from the following modules provided pre-requisites are satisfied (at most one module at level 6 can be taken)</i>						
COMP310	Multi-Agent Systems	15	6	-	-	-
COMP315	Technologies for E-Commerce	15	6	-	-	-
COMP524	Safety and Dependability	15	7	-	COMP516 COMP517	-
COMP527	Data Mining and Visualisation	15	7	-	COMP516	-
COMP575	Computational Intelligence	15	7	-	Basic knowledge of UG mathematics	-
Year 2 – Semester 1 and 2						

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Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
COMP598	MSc Placement Experience	60	7	-	Successful completion of first year taught modules	-
COMP599	MSc Industrial Project	60	7	-		-

Note: In exceptional circumstances, and with the approval of the programme Director of Studies, alternative modules available within the Computer Science provision may be substituted for optional and required modules, except COMP516, COMP598 and COMP599.

3.4.8 CMBD - MSc Big Data and High Performance Computing

The programme is divided into three, equally weighted semesters. The first two, which are run concurrently with the normal undergraduate semesters, comprise taught modules to a total of 60 credits per semester. An extended research based project, culminating in a dissertation, is undertaken full time over the summer period. This counts for a further 60 credits, making a total of 180.

The modules available in the MSc in Big Data and HPC programme are as follows (●) indicates a required module.

Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
Semester 1						
COMP516	Research Methods in Computer Science (●)	15	7	-	First degree in Computer Science or closely related subject	COMP702 COMP524 COMP525
COMP528	Multi-core and Multi-processor Programming (●)	15	7	-		-
COMP529	Big Data Analysis (●)	15	7	-		COMP702
COMP557	Optimisation	15	7	-		-
Semester 2						
COMP526	Applied Algorithmics (●)	15	7	-	-	-
COMP527	Data Mining and Visualisation (●)	15	7	-	-	-
COMP530	Big Data Group Project (●)	15	7	-	COMP528 COMP529	-
<i>Plus options totalling 15 credits from the following modules</i>						
COMP524	Safety and Dependability	15	7	-	-	-
COMP525	Reasoning about Action and Change	15	7	-	-	-
COMP532	Machine Learning and Bioinspired Optimisation	15	7	-	-	-
COMP559	Algorithmic Game Theory	15	7	-	-	-
COMP575	Computational Intelligence	15	7	-	-	-
Summer						
COMP702	MSc Project (●)	60	7	-	Taught part of MSc	-

Note: in exceptional circumstances, and with the approval of the programme Director of Studies, alternative modules available within the Computer Science provision may be substituted for optional and required modules, except COMP516 and COMP702.

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3.4.9 CMBI - MSc Big Data and High Performance Computing with a Year in Industry

The programme is divided into two equally weighted years (years 1 and 2). The first year runs concurrently with the normal first and second undergraduate semesters, and comprises taught modules to a total of 60 credits per semester (120 credits in total). The placement takes place in the second year typically running concurrently with the normal first and second undergraduate semesters. This counts for a further 120 credits, making a total of 240 credits over the two year period.

The programme structure is as follows, (•) indicates a required module.

Year 1						
Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
Semester 1						
COMP516	Research Methods in Computer Science (•)	15	7	-	First degree in Computer Science or closely related subject	COMP524 COMP525 COMP598 COMP599
COMP528	Multi-core and Multi-processor Programming (•)	15	7	-		-
COMP529	Big Data Analysis (•)	15	7	-		COMP598 COMP599
COMP557	Optimisation	15	7	-		-
Semester 2						
COMP526	Applied Algorithmics (•)	15	7	-	-	-
COMP527	Data Mining and Visualisation (•)	15	7	-	-	-
COMP530	Big Data Group Project (•)	15	7	-	COMP528 COMP529	-
<i>Plus options totalling 15 credits from the following modules provided pre-requisites are satisfied</i>						
COMP524	Safety and Dependability	15	7	-	-	-
COMP525	Reasoning about Action and Change	15	7	-	-	-
COMP532	Machine Learning and BioInspired Optimisation	15	7	-	-	-
COMP559	Algorithmic Game Theory	15	7	-	-	-
COMP575	Computational Intelligence	15	7	-	-	-
Year 2 – Semester 1 and 2						
Module Code	Module Title	Credit Value	Level	Co-requisites	Pre-requisites	Pre-requisite for
COMP598	MSc Placement Experience	60	7	-	Successful completion of first year taught modules	-
COMP599	MSc Industrial Project	60	7	-		-

3.5 Summary Information on Modules

This section gives a list of all the modules available to MSc students in the Department of Computer Science. A brief description of each of the modules is given below in Sections 3.6.2 (first semester), 3.6.3 (second semester), 3.6.4 (summer project) and 3.6.5 (year in industry modules).

3.5.1 List of Modules

Department of Computer Science

Module Code	Module Title	Semester	FHEQ Level	Credits	% CA	% Exam	Lecturer
COMP305	Biocomputation	1	6	15	20	80	Dr Irina Biktasheva
COMP310	Multi-Agent Systems	2	6	15	0	100	Dr Terry Payne
COMP315	Technologies for e-Commerce	2	6	15	0	100	Dr Vitaliy Kurlin
COMP318	Advanced Web Technologies	2	6	15	20	80	Dr Valentina Tamma
COMP323	Introduction to Computational Game Theory	1	6	15	20	80	Prof Paul Spirakis
COMP516	Research Methods in Computer Science	1	7	15	100	0	Dr Dominik Wojtczak/Dr Othon Michail
COMP517	Object Oriented Software Development	1	7	15	75	25	Dr David Jackson
COMP518	Database and Information Systems	1	7	15	75	25	Dr Giorgos Christodoulou
COMP519	Web Programming	1	7	15	75	25	Dr Ullrich Hustadt
COMP521 (taught with COMP304)	Knowledge Representation	1	7	15	25	75	Dr Louwe Kuijer
COMP522	Privacy and Security	1	7	15	25	75	Dr Alexei Lisitsa
COMP523	Advanced Algorithmic Techniques	1	7	15	25	75	Prof Darek Kowalski
COMP524	Safety and Dependability	2	7	15	25	75	Prof Sven Schewe
COMP525	Reasoning about Action & Change	2	7	15	25	75	Dr Clare Dixon
COMP526	Applied Algorithmics	2	7	15	25	75	Prof Leszek Gasieniec
COMP527	Data Mining and Visualisation	2	7	15	25	75	Dr Danushka Bollegala
COMP528	Multi-Core and Multi-Processor Programming	1	7	15	60	40	Dr Alexei Lisitsa
COMP529	Big Data Analysis	1	7	15	40	60	Prof Simon Maskell

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Module Code	Module Title	Semester	FHEQ Level	Credits	% CA	% Exam	Lecturer
COMP530	Big Data Group Project	2	7	15	100	0	Dr Andre Hernich
COMP532	Machine Learning and BioInspired Optimisation	2	7	15	25	75	Dr Shan Luo
COMP557 (taught with COMP331)	Optimisation	1	7	15	25	75	Dr Martin Gairing
COMP575	Computational Intelligence	2	7	15	0	100	Dr John Goulermas
COMP559	Algorithmic Game Theory	2	7	15	25	75	Dr Giorgios Christodoulou
COMP598	MSc Placement Experience	1&2	7	60	100	0	Dr John Goulermas
COMP599	MSc Industrial Project	1&2	7	60	100	0	Dr John Goulermas
COMP702	MSc Project	Summer	7	60	100	0	Dr Russell Martin

Management School

Module Code	Module Title	Semester	Level	Credits	% CA	% Exam	Lecturer
ECON915	Microeconomic Theory	1	7	15	20	80	Dr Christian Bach

Department of Electrical Engineering and Electronics

Module Code	Module Title	Semester	Level	Credits	% CA	% Exam	Lecturer
ELEC319	Image Processing	1	6	7.5	0	100	Dr T Jeyarajan
ELEC415	Information Theory and Coding	2	7	7.5	0	100	Dr X Yi

School of Environmental Sciences

Module Code	Module Title	Semester	Level	Credits	% CA	% Exam	Lecturer
ENVS456	Web Mapping and Analysis	2	7	15	100	0	Prof A Singleton
ENVS563	Geographical Information Systems	1	7	15	100	0	Dr D Arribas-Bel

3.5.2 Module Descriptions – Semester 1

COMP516 Research Methods in Computer Science

This module includes various "high order transferable skills" such as: searching for information on the WWW and libraries, reading and understanding research papers, writing papers (including referencing), a review of professional ethics and legal issues, problem solving, and the development and conduct of research programmes. There are 30 lectures and 10 hours of practical work.

COMP517 Object Oriented Software Development

This module provides a comprehensive review of object oriented software development using the Java programming language. The module is designed to equip students without a computer science (or related) first degree with the appropriate software development capabilities required for the second semester research based modules and when they go on to seek employment within the IT industry. There are 22 lectures and 22 tutorials.

COMP518 Database and Information Systems

This module provides a comprehensive review of database and information system techniques. The module is intended for MSc students who do not have a computer science (or related) first degree to provide those students with the appropriate information systems capabilities required for the second semester research based modules, their final individual project and when they go on to seek employment within the IT industry. There are 22 lectures and 22 tutorials.

COMP519 Web Programming

This module covers topics such as: distributed systems, WWW and HTML, Applets and the WWW, introduction to Java script, programming in Perl, CGI scripting and protocols. The module is intended for MSc students who do not have a computer Science (or related first degree) to provide those students with the appropriate WWW programming capabilities that they may require to complete their individual project and when they go on to seek employment. There are 26 lectures and 18 tutorials.

COMP521 Knowledge Representation

This module covers topics such as introduction to knowledge representation (KR) and logic for KR, introduction to modal and description logics, applications of modal logic, and handling uncertain information through probability and decision theory. There are 30 lectures and 10 tutorials.

COMP522 Privacy and Security

This module covers topics such as: identification and authentication, monitoring, protocols, attacks and defences, legal and ethical issues and future directions. There are 30 lectures and 10 tutorials.

COMP523 Advanced Algorithmic Techniques

This module covers topics such as: the study of algorithmic problems and techniques on the boundary of current research, dealing with non-standard computational models, graph algorithms, randomised algorithms, on-line algorithms, string algorithms and elements of probabilistic and number theory. There are 30 lectures and 10 tutorials.

COMP528 Multi-Core and Multi-Processing Programming

This module covers theoretical and practical aspects of parallel programming for multi-core architectures with the main focus on hands-on programming experience with latest multi-core and multi-processor platforms. The module was developed in collaboration with STFC Hartree Centre for High-Performance Computing and High-Performance Computing Services of University of Liverpool, whose facilities will be used in the practical sessions of the module. There are 24 lectures and 12 practicals.

COMP529 Big Data Analysis

This module provides an initial overview of the middleware used to provide solutions to Big Data and how to use this middleware to analyse data. There are 36 lectures and 12 tutorials.

COMP557 Optimisation

This module provides a foundation for modelling various continuous and discrete optimisation problems, related to real-world production and economics motivated applications which also involve big data. The tools and paradigms for the design and analysis of algorithms for such optimisation problems are introduced. Topics include linear programming, local search, algorithms and their complexity, algorithms for hard optimisation problems. Additionally, existing commercial optimisation software is introduced that allows to treat such problems. There are 30 lectures and 10 tutorials.

**COMP305 Biocomputation
(FHEQ Level 6 module)**

This module aims to introduce students to some of the established work in the field of neural computation; to highlight some contemporary issues within the domain of neural computation with regard to biologically-motivated computing particularly in relation to multidisciplinary research; to equip students with a broad overview of the field of evolutionary computation, placing it in a historical and scientific context; to emphasise the need to keep up-to-date in developing areas of science and technology and provide some skills necessary to achieve this; and to enable students to make reasoned decisions about the engineering of evolutionary ("selectionist") systems. There are 30 lectures and 10 seminars.

**COMP323 Introduction to Computational Game Theory
(FHEQ Level 6 module)**

This module aims to introduce students to the main subareas of algorithmic game theory, which is a novel academic field in the intersection of economics and computer science. This provides mathematical tools and models used for the analysis and implementation of existing Internet systems, mostly related to electronic commerce applications where emphasis is put on their algorithmic side. The module covers an introduction to basic economic game theory and applications like Google's sponsored search auctions, combinatorial auctions, Internet recommendation systems, mechanism design, price of anarchy. There are 30 lectures and 5 tutorials.

ECON915 Microeconomic Theory

This module, offered by the Management School, introduces students to the fundamental aspects of decision making under uncertainty, allowing for the presence of risk. It covers mostly microeconomic models related to non-cooperative game theory, which will serve as the economics related background for the students. Specific topics include the theory of production, choice under uncertainty, credit markets. There are 24 lectures and a series of seminars.

ELEC319 Image Processing

(7.5 credit module (level 3) offered as a pair with ELEC415 and taught by the Department of Electrical Engineering and Electronics)

This module covers the fundamentals of how images are generated, represented, compressed and processed to extract features of interest.

ENVS456 Web Mapping and Analysis

This module is taught by the School of Environmental Sciences. It has two main aims. First, it seeks to provide hands-on experience and training in the design and generation of web-based mapping and geographical information tools. Second, it seeks to provide hands-on experience and training in the use of software to access, analyse and visualise web-based geographical information. There are 10 lectures and 10 two hour practicals.

3.5.3 Module Descriptions – Semester 2

COMP524 Safety and Dependability

This module covers topics such as: safety critical systems, security, trusted systems, dependability and reliability, formal requirements engineering, design and development techniques and verification techniques. There are 22 lectures and 20 hours of practical work.

COMP525 Reasoning about Action and Change

This module covers topics such as: temporal logic, dynamic logic, alternating-time temporal logic, dynamic epistemic logics and belief revision. There are 30 lectures and 10 hours of practical work.

COMP526 Applied Algorithmics

This module covers topics such as: the study of problems with strong algorithmic components, specialised data structures, engineering of algorithms data structures with applications to large data sets, data compression and network algorithms. There are 30 lectures and 10 hours of practical work.

COMP527 Data Mining and Visualisation

This module provides an in-depth, systematic and critical understanding of some of the current research issues at the forefront of the academic research domain of data mining. There are 30 lectures and 10 tutorials.

COMP530 Big Data Group Project

This module aims at providing experience in working and collaborating in a software development team in the context of HPC and Big Data. Students will work largely autonomously in small teams to produce a HPC solution to a Big Data problem. The project and expected outcomes will be prescribed. Introductory lectures will outline details of the project framework, the available projects, and the key high-level skills required for group working. There are 6 lectures and 8 tutorials.

COMP575 Computational Intelligence

This module is divided into two parts: (i) Neural Networks and (ii) Evolutionary Computation and Fuzzy Systems. The Neural Network material covered includes the structure of such networks, the learning process (supervised and unsupervised) and applications. Part 2 covers evolutionary methods and optimisation, evolutionary optimisation and genetic algorithms, evolutionary programming, particle swarm intelligence, applications and fuzzy logic systems. This module consists of 24 lectures and 12 tutorials.

COMP559 Algorithmic Game Theory

This module presents an in-depth understanding of the research area of mechanism design which is widely present in the form of dedicated auction protocols used in existing electronic commerce

systems. Such systems are implemented and used over the Internet, for instance various banking systems, or many kinds of Internet auctions. The emphasis is put on the algorithmic aspects of these systems where part of the input data (such as customers' preferences) are private data of selfish agents (customers) and the goal of the protocol, called a mechanism, is to efficiently elicit this information from the agents. There are 30 lectures and 10 tutorials.

COMP310 Multi-Agent Systems
(FHEQ Level 6 module)

A multi-agent system is one composed of multiple interacting software components known as agents, which are typically capable of co-operating to solve problems that are beyond the abilities of any individual member. Multi-agent systems are important primarily because they have been found to have very wide applicability, in areas as diverse as industrial process control and electronic commerce. This module will begin by introducing the student to the notion of an agent, and will lead them to an understanding of what an agent is, how they can be constructed, and how agents can be made to co-operate effectively with one another to solve problems. The practical component of the module will be based on some of the many Java agent frameworks currently available (e.g. the Java-based based "Jack" programming language). There are 30 lectures.

COMP315 Technologies for E-Commerce
(FHEQ Level 6 module)

With the explosion in the use of the internet, there is an increasing interest in e-commerce: the use of the Internet as a means of exchanging goods and services for money. This has, in turn, led to a whole host of new problems for which software solutions are required. This module introduces students to some of these, in particular those which relate to security, privacy and cryptography. There are 30 lectures.

COMP318 Advanced Web Technologies
(FHEQ Level 6 module)

This module aims to provide students with guidelines, concepts and models for designing and evaluating applications utilising advanced web technologies. The module will also introduce students to Artificial Intelligence and Semantic Web techniques that can be applied to the application of advanced web technologies and the notion of semantic web applications intended to be used by software. There are 30 lectures and 10 hours of practical work.

ELEC415 Information Theory and Coding
(7.5 credit module offered as a pair with ELEC319 and taught by the Department of Electrical Engineering and Electronics)

This module aims to introduce students to the techniques used in source coding and error correcting codes, including the use of information as a measure. Topics covered include: Source coding (measuring information entropy of a zero memory source, variable-length codes, buffer management, vector coding and Shannon's noiseless coding theorem); channels (binary symmetric channels, equivocation, channel capacity, continuous channels, and the Shannon-Hartley law); and block codes (ideas of n-tuples, Hamming distance, least distance decoding, possibility of error-free messages, the Hamming bound, linear codes, generator and parity-check matrices, algebraic codes, cyclic codes, output error rates and coding gain). There are 12 lectures and 6 problem classes.

ENVS563 Geographical Information Systems

(taught by the School of Environmental Sciences)

This module introduces students to the fundamentals of Geographical Information Systems (GIS). It will enable students to develop both (i) theoretical knowledge of GIS and (ii) a practical ability to apply GIS in the handling and analysis of spatial data. The module aims to develop an understanding of how and why GIS may be useful in geography, planning and other disciplines. There are 11 lectures and 24 practicals.

NOTE: No more than two FHEQ Level 6 modules may be included in any individual student's programme over the two semesters. Also graduates of the University of Liverpool cannot elect to take a level three module if they have already passed that module as part of their undergraduate study.

3.5.4 Summer Project

COMP702 MSc Project (60 credits)

The MSc project is undertaken over the summer period, starting immediately after the announcement of the examination results, and leads to the submission of a written dissertation in September, when the programme finishes. This will investigate some real application of computing with the object of producing an agreed deliverable, in addition to the dissertation. The project work is usually associated with material covered in the taught research modules making up the programme. Alternatively, students can propose their own projects, or undertake projects based on the needs of local industries, provided that the proposal meets with the academic criteria for an MSc (level M) project.

Members of staff within the Department will manage the project, and students will be required to give regular progress reports and presentations on their work. This is extremely valuable experience, as such presentations are likely to be required in a future career.

Further details of project management, together with details of the projects on offer, will be provided closer to the project start date. There will also be information available on-line nearer the time.

3.5.5 Year in Industry Modules

COMP598 MSc Placement Experience **(FHEQ Level 6 module)**

The placement experience module will be assessed in terms of a portfolio containing a number of documents as articulated in the COMP598 module specification. For the project module the assessment comprises: (i) an interim report (35% in January), (ii) an oral presentation (15% in May), and (iii) a final report (50% in May).

COMP599 MSc Industrial Project **(FHEQ Level 6 module)**

This module is focused on doing an industrial research project and it will be chosen by the student by the end of semester 2 in Year One. In situations where a student is not able to find a placement

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by the end of semester 2, or fails to complete the industrial placement, the student will be able to transfer to the standard version of the programme and commence a new project at the University.

Section 4 – Study

The broad aim of the Department in its postgraduate teaching is to focus on depth of study, and critical awareness and evaluation, in selected areas of current research and advanced scholarship within the academic discipline of Computer Science; at the same time it ensures a more general all round ability. In addressing these aims, the postgraduate MSc programmes in Computer Science include a significant amount of material on the theory, design and implementation of computer systems while at the same time focusing on particular specialist areas of research.

The Department's MSc programmes are all full time and delivered over one year of study commencing in September. The MSc year is divided into three stages: semesters 1 and 2 and the summer project. The programmes each comprise a total of 120 credits of taught material, and 60 credits of project work. During a normal teaching week the total study time will be about forty hours, i.e. ten hours per week for each 15 credit module. The 120 credits (typically 8 modules) of taught material are provided over the first two semesters in the form of lectures, tutorials and/or practicals. A typical module (although there are many exceptions) has three lecture hours per week plus a one hour supervised practical class and six hours of private study. The remaining 60 credits consist of an individual project undertaken, with supervision, over the summer months of the MSc year. Please note, therefore, that you are expected to attend full time from the beginning of the programme until the end of September. It is essential that you ensure you have made suitable arrangements for your accommodation to cover the full year.

At least 90 of the 120 taught credits available in the first two semesters must be level 'M' modules (i.e. meeting the national standards for a postgraduate taught programme). The remaining 30 may include selected level 3 modules (i.e. meeting the national standards for the final year of an undergraduate programme); with the proviso that a graduate of the University of Liverpool cannot elect to take a level three module if they have already passed that module as part of their undergraduate study.

Modules taken in each of the programmes can be found in [Section 3.4](#).

4.1 Computer Science Departmental Learning, Teaching and Assessment Strategy

The general aims of our teaching provision are:

- to provide a range of degree programmes which reflect the diversity of Computer Science and its applications in such a manner as to be able to recruit and retain appropriately qualified students able to benefit from the opportunities available at the University and to maximise flexibility of student choice between programmes;
- to develop and deliver curricula for degree programmes at both undergraduate and postgraduate levels which are informed by the research and scholarship of the staff as well as input by students, employers and professional bodies, and reflect current and potential future developments in the subject;
- to facilitate student achievement of the intended learning outcomes of their chosen programme of study as delineated in the programme specification by providing administrative, learning, pastoral, teaching and technical support and facilities for the effective delivery of the curriculum;
- to prepare students for further study in a related field and for careers where the skills and techniques acquired through computing based degree are important.

General information on assessment is provided in [Section 5](#) while details of the assessment method for each module can be found in [Section 3.5.1](#).

Full details of the Departmental Learning, Teaching and Assessment Strategy may be found at <http://intranet.csc.liv.ac.uk/department/ltas/>

4.2 Teaching and Learning

Modules will use an appropriate mix of teaching methods as indicated below. For a typical 'taught' module the total notional hours of teaching and learning, as indicated by the credit value of the module, will consist of 20-25% lectures, 10% scheduled practicals or tutorials, and 65-70% private study and assessment.

- **Lectures**

The majority of modules are taught using 50-minute lectures which typically involve the whole cohort of a module. Lectures are intended to disseminate knowledge, concepts, ideas, background information, methods and skills and can also include elements of demonstration of processes, methods, and tools. They aim to promote reflection on your part and to stimulate wider learning beyond the specific content delivered by lectures and can also be developed further by private study, practicals, tutorials and projects.

The style of presentation of lectures varies from module to module. Some lecturers will distribute handouts, which might be summaries, diagrams, rough notes or condensed manuals on a language or other computer facility. **These handouts, however, will be supplementary to any material contained in the module textbook or presented during lectures and it will still be necessary to take notes during the lectures.**

It is essential that you keep up with the material given in lectures and do not allow a backlog of work to build up. You should make sure that you have a complete and fully understandable set of lecture notes by making clear notes during all the lectures. If notes are distributed in printed or electronic form, you will need to go over them and rewrite parts in your own words in order to fully understand them.

Obviously you must understand your notes, and the process of sorting them out should clarify the information and ideas they are intended to convey; those for some of the lectures will need rather a lot of work while others will need very little. The notes may need to be expanded to a greater or lesser degree, using material from the module textbook and other sources (e.g. the library).

There will be two important consequences of this approach. Firstly, when the time comes round to revise, the notes will already be sorted out and it will not be necessary to spend valuable time doing this. Secondly, this is a task with a defined end point, in that you will know when you have finished dealing with a topic and can then go on to do other things.

If you have difficulty understanding any aspect of work and the textbooks do not help, you should not hesitate to ask either the module co-ordinator or a demonstrator for help. You should not be afraid to ask questions during or after lectures, tutorials, practicals or at other times. Many students experience difficulty with their work at some stage, so you need not be afraid that you will be alone in needing extra help to understand parts of the programme.

It is **very important** not to be left behind in any module, as the time available for catching up is very short.

- **Practicals/Labs**

Practical and/or lab-based elements are central to ensuring that you acquire the key skills fundamental to your chosen programme of study. All practicals are linked to specific modules and are intended to enable you to acquire the practical abilities and skills that the module aims to imbue.

The topic of each practical is determined by the module co-ordinator responsible. All scheduled practicals take place during timetabled sessions indicated in your individual timetable or by alternative arrangements as advised by the module co-ordinator. These are typically held in one of the specialised labs provided by the Department and will last 50 or 100 minutes.

Scheduled practicals are supervised by demonstrators or by the module co-ordinator. Just as in lectures, you should not hesitate to ask questions or ask for help during a practical.

- **Tutorials and On-line Discussion Groups**

Tutorials, usually delivered in smaller groups than lectures, provide an opportunity for you to get more individual help and attention from academic staff or appropriately trained postgraduate demonstrators. All tutorials are centred around exercises that relate to material taught in lectures or to a continuous assessment task of a specific module, and the topic of each tutorial is determined by the module co-ordinator responsible for the tutorial. Tutorials take place during timetabled sessions indicated in the individual timetables of students or by alternative arrangements as advised by the module co-ordinator. Each tutorial typically lasts 50 minutes.

If the exercises for a tutorial are made available in advance, then you will either be instructed to familiarise yourself with them or, in some cases, attempt to solve them before the tutorial. You should use part of your private study time to do this. Only by doing so will you take full advantage of the tutorials.

On-line discussion groups are a variation of tutorials where interchanges between students and staff or demonstrators take place on-line in a Virtual Learning Environment. Like tutorials they can be centred around specific exercises or may provide another means by which students can have open-ended discussions related to the content of a specific module.

- **Project**

Over the summer all students will undertake a 60 credit project. The main aim of the project is for you to develop and demonstrate autonomy in the management and development of a realistic project in computer science, either research or application oriented. Although new technical skills may be acquired, this is not the main aim. At the end of the project you should have demonstrated the ability to initiate, plan, manage and deliver a complete IT project for a customer or research supervisor. The delivery of the project will include giving interim presentations describing important stages of the project, and a final dissertation describing the project as a whole.

Students on the Big Data and High Performance Computing programme will take an additional 15 credit project during the second semester.

- **Private Study**

Private study includes:

- the preparation for a formal teaching session (lecture, practical, tutorial, project meeting);
- reflection and consideration of the content of such a formal teaching session and related teaching material;
- wider background reading and learning;
- the practice of particular skills, methods, and processes (using the Department's laboratory equipment outside scheduled practicals or equipment equivalent to that provided);
- completion of assessment tasks and the revision for examinations.

For study facilities within the Department see [Section 6.2](#).

4.3 Professional Skills – Computer Science

As well as technical skills relating to the subject, all programmes will provide the opportunity to develop study and transferable skills. These include giving presentations, report writing, working in teams, time management and other things that will be useful in later life whatever career a student adopts.

While many of these skills are needed in all modules, some modules offer particular opportunities to practise them. The first semester module, COMP516 Research Methods in Computer Science, includes various "high order transferable skills" such as searching for information on the WWW and libraries, reading and understanding research papers, writing papers (including referencing), a review of professional ethics and legal issues and problem solving. The COMP702 project, undertaken over the summer period, includes an element of assessment by oral presentation and demonstration of project work as well as report writing.

4.4 Commitment to Studies

The elements of learning and teaching within the Department have been detailed above, but however good the teaching, a major effort is required from you in order for you to be successful on your degree programme.

You yourself are responsible for keeping abreast of your programme of study. If you have any problems understanding sections of work, either in connection with lectures or with practical work, then you should seek help immediately from your module co-ordinator or your Academic Advisor. If you do not seek such help we will naturally assume, in the absence of evidence to the contrary, that you are not having any problems. When you do seek help we will do our best, with your co-operation, to help.

4.5 Monitoring Students' Commitment to Study

You are expected to attend all lectures and practicals. The expectation is that students will not take holidays during either the taught semesters or the summer project period. Missing several weeks out of the project period may be detrimental to study and will not be considered to be an acceptable extenuating circumstance warranting an extension on the hand-in date.

4.5.1 Departmental Procedure for Monitoring Attendance

Attendance at classes is crucial to the successful completion of coursework and examinations, and those are in turn central to your progress from one year to the next. The great majority of our students play a full part in their degree study and gain enormously from it. Unfortunately, we need to have procedures in place for the small minority who choose not to engage with their work here. Attendance at classes and the punctual submission of coursework are key factors in determining whether your progress is satisfactory. Absences are monitored by the School. Academic staff will inform the Academic Lead for Student Progress if you are negligent in attendance or submission of work and you may receive a written warning. A student who ignores such a warning and continues to be negligent may be referred to a Departmental Progress Panel which acts on behalf of the Board of Examiners and can recommend that your studies be terminated.

When, after graduation, you apply for employment or further study, you will need a reference. Employers and educational bodies invariably request details of attendance and timekeeping. Consistent commitment to work and conscientious attendance throughout your degree studies will therefore have an impact on your future career.

The modules in the Department introduce many new skills and often quite detailed and subtle concepts. Since there is only one week set aside for revision, you need to keep up with your lecture material and coursework. It is therefore very important not to miss any lectures, tutorials or practicals.

Absence from lectures is often a sign that a student is having either academic or personal problems. We therefore monitor attendance closely to identify problem cases. Moreover, failure to attend may lead to serious visa problems for international students.

You may be asked to scan your student smart card at lectures to register your attendance. You should, therefore, ensure that you carry your card with you when attending a lecture or using the computer labs. If you forget your card, the lecturer will have a temporary register to sign **during the first four weeks over the semester**.

If you go to a lecture but for some reason do not register your attendance, you should advise the Student Office as soon as possible. If a lecture is missed for good reason (e.g. illness, family circumstances, medical appointment) you should complete an absence form and hand this in to the Student Office (see [Section 4.6](#)). Your attendance record will then be amended accordingly.

If your attendance fails to meet the required standard, you will receive communication as follows:

- An e-mail will be sent asking you to attend an interview with your Academic Advisor to discuss the reasons for your poor attendance;
- If you fail to attend this interview, or if your attendance does not improve, a letter will be sent to both your term time and permanent addresses, requesting you to attend an interview with the Director of Studies;
- Failure to attend the interview with the Director of the Studies will result in a departmental warning letter. This will be copied to Faculty, which has the power to require withdrawal from study.

Please note that smart cards should never be scanned on behalf of anyone else. The Department takes this matter very seriously and anyone who is suspected of falsifying attendance records will

be required to attend an interview with the Chair of the Board of Studies or an appointed panel, and may subsequently be reported to a University level disciplinary board.

4.6 Absence from Studies and Claims for Extenuating Circumstances

It is important that you notify the Department of any absence from your studies by completing the appropriate form/s. These are available either from the Student Office or the departmental website and should be completed as follows:

- Absence from lectures.
<http://intranet.csc.liv.ac.uk/department/ltas/AbsenceForm.pdf>
You should complete this form if you know that you will miss, or if you have missed, a lecture, practical or tutorial. If the absence is for a good reason, your attendance record will be modified to show an excused absence and this will not be taken into consideration when reviewing absences. The form will be copied to your Academic Advisor for information.
- Extenuating circumstances (late submission or affected/missed coursework)
http://intranet.csc.liv.ac.uk/student/forms/Extenuating_Circumstances_Coursework.pdf
You should complete this form, in addition to the absence form, if a coursework deadline or class test is affected. The form will be passed to the module coordinator who will decide on an appropriate action. You should also contact the module coordinator directly to see whether an extension is possible. See also [Section 5.1.4](#)
- Extenuating circumstances (including Examinations or on-going circumstances)
http://intranet.csc.liv.ac.uk/student/forms/Extenuating_Circumstances.pdf
You should complete this form if your overall performance or an exam has been affected. This form will be copied to your Academic Advisor and will be considered by the Extenuating Circumstances Committee which meets shortly before the meetings of the Board of Examiners in February, June and September. You will be advised in writing of the decision of the Committee shortly after the exam results are released.

All forms should be submitted to the Student Office as soon as possible. In the case of extenuating circumstances you will be notified by e-mail of the final date for submitting claims following the written examinations in January, May and August.

4.7 Departmental Progress Panel

Students who make insufficient progress in their studies may be asked to attend an interview with the Departmental Progress Committee. This comprises of the Chair of the Board of Studies, the Director of Studies and the Examinations Officer. This interview is intended to identify and recommend an appropriate course of action for the student to follow before it becomes necessary to rule that progress is unsatisfactory.

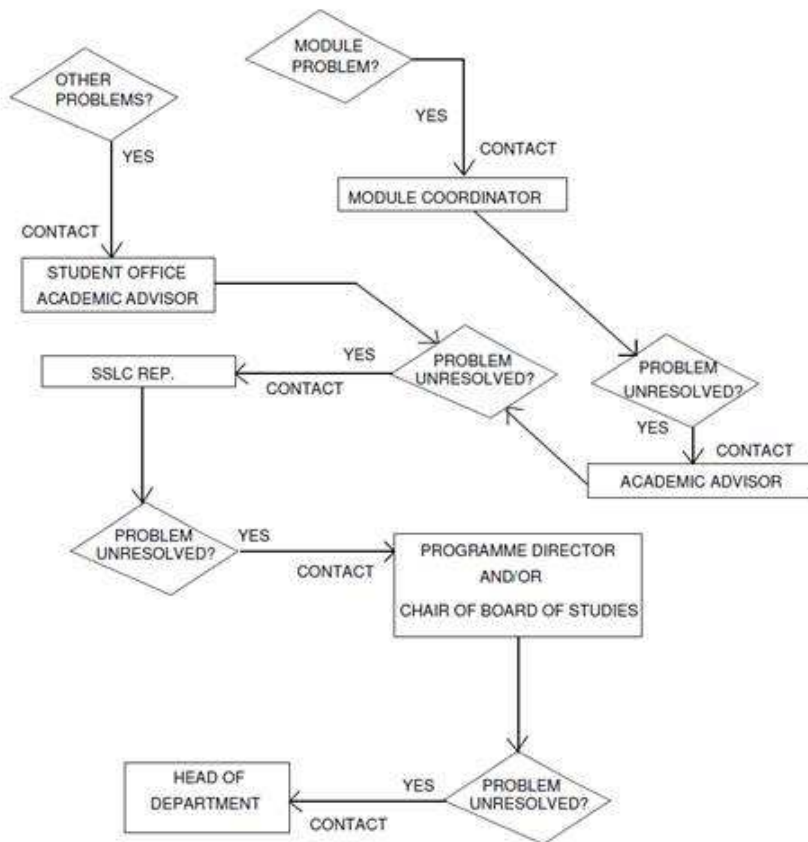
4.8 Whom to contact if something concerns you

It is recognised that, on occasion, situations may occur in the course of module delivery which you feel concerned about: this may be anything from disquiet about demonstrators, an assessment you have received, aspects of the module itself, to more serious issues such as the outcome of Board of Examiners meetings and their consequences on progression into the next year of study.

We would hope it is recognised that the Department takes such concern seriously and is perfectly happy to consider and advise on any issues that arise. Nevertheless, in addressing and dealing with

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specific issues it is far more likely that a successful resolution of problems will be achieved if the appropriate pathway of responsible individuals have been made aware of the problem. The flowchart below presents the route that ought to be followed.



Please note that there is no point in raising an issue (no matter how serious it may appear to you) directly with, for example the Chair of the Board of Studies in Computer Science (let alone with the Head of Department) unless the matter in question has already been considered by responsible parties at an earlier stage and you do not consider the matter to be resolved.

It is not that these individuals are reluctant to become involved, it is more the case that: firstly, you will only increase the length of time taken to deal with the issue of concern (if a problem is raised immediately with the Head of Department with no record of it having been discussed earlier, this will only result in it being referred through proper channels not with its solution being expedited); secondly, going directly to the most senior individual without consulting others creates an impression of at best frivolous time-wasting and, at worst, of malicious disregard for procedures. By following these procedures staff will be able to work with you in an efficient manner to address any such issues that arise and, it is hoped, reach a mutually acceptable conclusion.

Section 5 – Assessment

5.1 Assessment in the Department of Computer Science

Assessment is by a mixture of coursework and written examinations in January and May. The project, undertaken from mid-June to mid-September, has a number of units of assessment associated with it including oral presentations, demonstrations and the final dissertation. Below is a description of the main types of assessment

5.1.1 Types of assessment

There is a wide variety of ways that different modules are assessed, the particular method(s) being chosen to suit the material and aims of each particular module. For Computer Science modules, these are:

- **Written examinations**

An examination is an assessment task formally scheduled and supervised by the University which takes place over a specified period, in a specified location and at a specified time. For examinations on modules in the remit of the Board of Studies in Computer Science, students provide written answers to a set of questions. This includes written examinations that may in part or solely consist of multiple choice questions. Where the assessment of a module includes a written examination, this will take place at the end of the semester or semesters in which a module is taught. The duration of examinations varies between 1 and 2.5 hours.

- **Practical assessments**

Practical assessments include the assessment of tasks performed in laboratories as well as the assessment of written reports, oral presentations, or demonstrations of the outcome of work conducted in laboratories (or using equipment equivalent to that provided in laboratories) often in relation to an assignment set for a module.

- **Class tests**

A class test is an assessment task scheduled by the module co-ordinator with a typical duration of 50 minutes. The format of class tests is identical to that of examinations. On-line tests are an alternative form of class test. An on-line test might be time-limited, that is, students have only a certain amount of time to complete the test, and there will either be a specific date and time on which the test takes place or there will be a deadline by which students must complete the test.

- **Project reports and dissertations**

Projects typically involve an element of assessment by a final report or dissertation due at the end of the project. Such reports and dissertations on a module in the remit of the Board of Studies in Computer Science will typically be practical assessments, that is, be based on laboratory or laboratory-related work. However, dissertations based on purely theoretical work are possible at level M.

- **Other types of coursework**

This includes presentations, demonstrations of software, essays, or the completion of small assessed tasks during or in advance of a tutorial.

Modules will use an appropriate mix of these types of assessment, varying from 100% assessment by written examination to 100% assessment by continuous assessment (practical assessments, class tests, reports, essays, presentations are particular forms of 'continuous assessment'). An example of the latter is the module COMP516 on which students are required to write reports, give a presentation and complete other practical assessments.

The form of assessment (and relative percentages) for all modules is given in [Section 3.5.1](#).

It should be noted that assessments of a module are not restricted to the assessment of material and skills covered in lectures, tutorials, and practicals but can extend to material and skills that can be expected to have been acquired through private study.

5.1.2 Practical assessments, projects and other types of coursework

Nearly all the practical work that is done for a practical assessment, project or other type of coursework involves the use of the Department's computer systems.

On some modules, the scheduled practicals in your timetable are intended to give you time in one of the laboratories to work on a practical assignment under the supervision of a demonstrator. In order to make the best use of this time, you should have given some thought to the solution of the assignment beforehand. This will probably involve familiarising yourself with any relevant handouts and lecture notes on the topic. You will also need to have planned out how to tackle the problem.

If the assignment is concerned with the design and implementation of a program, database, website, or other computer software, a draft solution should be prepared in advance of the practical class. This can be taken along, ready to be typed into or uploaded onto the computer, or be made available beforehand. If you have not been able to do that, then you should at least have a list of questions about the work to ask the demonstrator.

Without this preliminary preparation you will not be able to make use of help that the practical class demonstrator can provide, but will spend the time reading and understanding the assignment, being ready to ask questions only at the end of the session. This is obviously not an optimal use of the time.

Even if scheduled practicals are dedicated to exercises other than practical assignments, they still provide an opportunity to ask questions not only about those exercises but also about practical assignments.

You should try to make the maximum use of the help available during scheduled practicals. Do not hesitate to ask the demonstrators and module co-ordinator questions; that is what they are there for. However, there will be a limit to what they will be able to do for you as it is not the job of a demonstrator or module co-ordinator to solve assignments for you. .

In addition to supervised practical sessions, most assignments will involve additional unsupervised work using the computers in order to prepare or complete a solution and to write reports.

It is also possible to obtain assistance and advice on general programming problems from the departmental **Helpdesk**. However, the technical support staff are typically not familiar with the detailed contents of individual modules, so may not be able to assist with specialised queries. Such issues should be directed to the module co-ordinator and/or demonstrators.

For the programmes with a Year in Industry, the Group Project module (COMP598) and the MSc Industrial Project module (COMP599) both include an element of assessment by oral presentation and demonstration of project work. The mark produced for a module is subject to scrutiny by the

Computer Science Postgraduate Boards of Examiners including the External Examiner for the programme. Decisions on progress are also controlled by the university's published regulations.

5.1.3 Submission of Work

In any module where set work is part of the assessment, you will be notified in advance of:

- The deadlines for the assessed work.
- Where, when and how the work must be submitted.

An overview of coursework deadlines can also be found on the departmental database which can be accessed at <http://intranet.csc.liv.ac.uk/sam.html>. See also [Section 1.4](#).

If this information is not provided, then you should not hesitate to ask for it. Some modules have specific requirements with regard to the format and length of the submitted work. If this is the case, you will be notified in advance and you should ensure that you adhere to these requirements, as there may be penalties if you do not.

There is a standard University Policy imposing penalties for late submission, which is applied by the Department. See Section 6.2.1. of the Code of Practice on Assessment at http://www.liv.ac.uk/media/livacuk/tqsd/code-of-practice-on-assessment/code_of_practice_on_assessment.pdf

We may make and authorise third parties to make copies of any work submitted by you for assessment but only for the following purposes:

- Assessment of a student's work;
- Comparison with databases of earlier answers or works or other previously available works to confirm there is no plagiarism; and
- Addition to databases of works used to ensure that future works submitted at this institution and others are not plagiarised from a student's work.
- Review by accrediting bodies, external examiners, University QAA and other external bodies as appropriate.

Feedback on assessment tasks will be provided following the Policy on Feedback to Students (see [Section 5.4](#)). You can appeal against the results of an assessment task, examination, or decisions by the Board of Examiners following the University's Assessment Appeals Procedure. See Appendix F of the Code of Practice on Assessment at [http://www.liv.ac.uk/media/livacuk/tqsd/code-of-practice-on-assessment/appendix F cop assess.pdf](http://www.liv.ac.uk/media/livacuk/tqsd/code-of-practice-on-assessment/appendix_F_cop_assess.pdf)

5.1.4 Procedure for Requesting an Extension/Missed Class Test

If you have a valid reason for being unable to submit coursework on time or for missing a class test, you should complete the form 'Extenuating Circumstances Affecting Coursework'. The form can be collected from the Student Office or downloaded from

http://intranet.csc.liv.ac.uk/student/forms/Extenuating_Circumstances_Coursework.pdf

Once completed, the form should be submitted to the Student Office together with any supporting evidence. You should also contact the module co-ordinator responsible for the assessment, preferably before the deadline for the submission of such work or date of class test, otherwise as soon as possible afterwards.

The module co-ordinator is empowered, if appropriate, to offer an extension of the deadline for practical assignments/project work to allow the piece of work to be completed. Where coursework or class tests missed count for no more than 20% of the module mark and it is possible for you to demonstrate the achievement of the learning outcomes of the module through other assessments, it is also possible for the module co-ordinator to excuse you from the missed coursework or class tests and to compute the module mark on the basis of the remaining assessments. Note that the decision rests with the module co-ordinator.

If you are excused from a missed class test or coursework, the overall module mark is based on unaffected assignments, that is, the final mark will be calculated using the following formula:

$$\text{Total Mark} = \frac{\text{MC1} * \text{W1} + \text{MC2} * \text{W2} + \text{MC3} * \text{W3} + \dots}{\text{W1} + \text{W2} + \text{W3} + \dots}$$

Where MC1, MC2, ... are the marks of the assessments (i.e. class tests, exams, coursework) from which you have not been excused and W1, W2, ... are the weights of the assessments from which you have not been excused.

5.2 Marking Descriptors

Marking on level M modules offered by the Department of Computer Science is carried out using the following marking descriptors

Grade	Description	Key features
Outstanding: 80%+	Outstanding work. Factually almost faultless; clearly directed; logical; comprehensive coverage of topic; strong evidence of reading/research outside the material presented in the programme; substantial elements of originality and independent thought; very well written.	Distinction Grade: Originality; Well-directed independent thought
Excellent: 70-80%	Excellent work. Logical; enlightening; originality of thought or approach; good coverage of topic; clear, in-depth understanding of material; good evidence of outside reading/research; very well written and directed.	
Very Good: 60-70%	Very Good work. Logical; thorough; factually sound (no serious errors); good understanding of material; evidence of outside reading/research; exercise of critical judgement; some originality of thought or approach; well written and directed.	Merit/Pass Grade:

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Good: 50-60%	Good work. Worthy effort, but undistinguished outcome. Essentially correct, but possibly missing important points. Largely derived from material delivered in the programme, but with some evidence of outside reading/research; some evidence of critical judgement; some weaknesses in expression/presentation.	Essentially correct and complete: Competence; Critical judgement
Marginal Fail: 40-50%	Inadequate work. Incomplete coverage of topic; evidence of poor understanding of material; poor presentation; lack of coherent argument.	Compensatable Fail: Significant weaknesses, but serious effort
Fail: <40%	Unsatisfactory work: Serious omissions; significant errors/ misconceptions; poorly directed at targets; evidence of inadequate effort.	Fail: Little or no achievement of learning outcomes

5.3 Progression to the Dissertation Stage

All students complete the initial stages of the project. If students fail one or more modules in the first and second semester examinations, then the following rules apply:

- Students who fail 15 credits proceed as normal;
- Students who fail 30 credits can proceed as normal. However they have the option to defer the continuation of the project until after their resit exams (this applies to the Dissertation stage only). They need to make this decision within two weeks of the second semester exam results being published. No extensions to any project deadlines will be granted on the grounds of resit assessments if a student decides to proceed as normal;
- Students who fail more than 30 credits are strongly recommended to defer the submission of the project until December.

5.4 Feedback

The purpose of feedback is to facilitate improvement and promote learning. This covers both academic content and formal aspects of work submitted for assessment. Information regarding the aims, learning outcomes, teaching and learning strategy, syllabus and method of assessment for each module are available on the departmental website, and further information will be provided by the lecturer concerned.

Continuously assessed work: Feedback may take many forms - written feedback, (recorded), oral feedback, peer feedback or self-assessment, and may include numerical marks, grades, and/or qualitative points and comments. There will normally be publicised marking descriptors for numeric or grade-based marking.

The aim would always be to provide feedback as quickly as is practicable (normally within 15 working days of the submission deadline) and ideally before the next related assessment task (or final

examination). However this may not always be possible, depending on the size of the class, and the timescales involved.

Examinations. Examination scripts are not normally returned to students. If students require individual formative feedback on examination performance, they can request this by contacting the Student Office within two weeks of the release of the exam results. In addition, examiners will, wherever possible, provide generic group feedback to students on their performance in examinations. This generic group feedback can be found at <http://www2.csc.liv.ac.uk/examfeedback/> once the exam results have been made available.

Academic advisors can be consulted regarding feedback on your overall academic performance.

The Feedback Policy for modules in the remit of the Board of Studies in Computer Science can be seen at http://intranet.csc.liv.ac.uk/department/ltas/BSCS_Feedback_Policy.pdf

5.5 Departmental Prize

The following prizes are expected to be available in 2017/18:

- The Ann Maybrey prize for excellent performance, awarded to the best overall student on an MSc programme.
- The Ann Maybrey prize for the best project, awarded annually to the student on the MSc programmes, who has most distinguished him or herself in project work.

Ann Maybrey was one of the original members of the department when it was founded in the early 1980s. Several years ago she donated an amount to be used to endow a prize, however, she left the terms of the award to be decided by the department. It was felt appropriate to award to this to MSc Students as Ann was also involved in setting up and contributing to the first MSc run by the department in the mid 1980s.

Section 6 - Departmental Resources and Support for Students

6.1 Help and Advice

If you are having problems or need advice, there are a number of people who can help you:

- **Academic Advisor:** your Academic Advisor is the first port of call if you are having problems with your academic studies or if you are having any personal difficulties. If you have any problems contacting your Academic Advisor, the Student Office will be able to help you. Every student has an Academic Advisor who provides appropriate support to help students fulfil their academic potential during the course of their studies. You can find the name of your Academic Advisor via Liverpool Life. Your Academic Advisor will meet you when you begin your studies in the Department and you can make appointments to meet with him or her throughout the course of your programme to discuss your progress. Your Academic Advisor will write your reference for employment/further study in your final year, so it is essential that you enable him or her to get to know you over the course of your studies by arranging to meet regularly.
- **Student Experience Team:** You can contact the Student Office for general advice and assistance, reporting of absence and submission of medical notes. The Student Experience Team is primarily located in the Student Office in room G09 on the ground floor of the Ashton Building. The office is open daily from 9:15-16:45, except Wednesdays when it is open 9:15-14:00. You are welcome to call in at any time during opening hours. The office also remains open during vacations.
- **Student Experience Co-ordinator and Team Leader:** Mrs Judith Birtall (Student Experience Co-ordinator) and Mrs Jan Harding (Student Experience Team Leader) can help with advice on school level procedures and signposting to central and specialised support services. They also act as Secretary to the Board of Examiners. Mrs Birtall is located in the Computer Science Student Office, room G09 and Mrs Harding is located within the Department of Electronics and Electrical Engineering; for contact details, please see [Section 2.2](#). Both Mrs Judith Birtall and Mrs Jan Harding can help if you are experiencing serious difficulties with any aspect of University life. They will be able to provide advice and support with welfare and pastoral concerns, ensuring that you are guided to the most appropriate specialised support for your needs. Please contact the Student Office in the first instance, if you wish to make an appointment (csstudy@liv.ac.uk).
- **Technical Staff:** The technical staff can be contacted via the Helpdesk and can offer advice and support for any matters relating to the departmental computer system. See [Section 6.3.2](#) below.
- **Departmental Disability Officer:** Mr Phil Jimmieson can provide advice if you have a disability and need any support. See [Section 2.1](#) for contact details.

6.2 Study Facilities

6.2.1 Student Common Room and Private Study Area

Room H211/H212 of the George Holt Building has been designated the student common room and private study area. This room contains vending machines dispensing cold drinks and snacks, lockers for the storage of small items (e.g. laptops & books) and is open during normal working hours. Lockers are allocated on a first come, first served basis - students wishing to rent a locker should see the staff on Help Desk for further details.

This room also has Wi-Fi provision allowing you to gain access to the internet from your laptop.

You are permitted to eat and drink in this room and use it for social gatherings. You are responsible for keeping this area tidy by disposing of rubbish in the bins provided.

6.3 Computing Facilities

The Department has around 300 computer workstations and servers, all networked together and connected to the wider University network and the global Internet. The facilities provide a full range of Microsoft Windows, Linux, and Apple Macintosh computing environments, as well as a selection of departmental network services. All of these are available exclusively to staff and students attending Computer Science modules, and are in addition to the University-wide computing facilities provided by the Computing Services Department.

Most of the workstations provided for student use are PCs running the Windows 10 operating system. These also provide networked access to a set of workstations running Scientific Linux, which can be used either via a command-line-based terminal session, or a full graphical desktop environment. There is also a laboratory of 30 Apple iMacs running Mac OS X.

All systems, independent of the operating system used, share a common unified file system for individual users' documents, programs, etc. Each user has their own data, which only they can access. These user files are backed up daily, to provide protection against accidental loss.

You also have access to the use of the University printing facilities, allowing output to be retrieved from anywhere across the campus.

Other network services provided automatically to all members of the Department include remote access to the departmental Linux systems and common file system, departmental and personal web-based information (including dynamically generated pages), and electronic mail via the main University email service. Other services available on request include database facilities (MySQL & Oracle), and collaborative management of source code and other documents (CVS or Subversion). Students and staff also have access to the full range of University facilities provided by the Computing Services Department.

Use of Computer Science facilities is restricted to students attending programmes or modules provided by the Department of Computer Science. The access is controlled by means of a username and password, which will typically be assigned during the initial registration period. Note that most Computer Science facilities are administered separately from the CSD-maintained systems, and the Computer Science username and password will be different from those used to access University-

wide services. Similarly the departmental file store is distinct from the corresponding University facilities.

Laboratory One contains similar systems to PC lab elsewhere in the University, but, configured to meet Computer Science teaching requirements. This laboratory uses the same username and password as the other University wide services. This provision may be extended to the other labs in due course.

6.3.1 Student Laboratories

There are four teaching laboratories located on the first floor of the George Holt Building dedicated for student use. These contain 150 systems running Windows 10 and 30 Apple iMacs. In general, unless a given laboratory is booked for a scheduled class, the systems will be available for use by any student for working on practical assignments, private study or other activities relating to the degree programme. These laboratories will normally be open between 8:30 and 17:30, Monday to Friday during term time. Some of these labs may be closed for maintenance outside term time, but there would still be access to departmental computing facilities during normal working hours.

Faults with equipment or software should be reported to the technical support staff, so that they can be attended to promptly. You should not attempt to interfere with or move equipment. The laboratories are protected with motion sensors and CCTV cameras, and moving equipment may cause an alarm to be triggered.

You are asked to assist in keeping the computer labs tidy and pleasant to work in, by disposing of waste paper and other rubbish in the bins provided. **Food and drink may not be taken into the computer laboratories.**

6.3.2 Helpdesk

The first point of contact for issues relating to the departmental computing facilities should be the Helpdesk, which is situated on the second floor of the George Holt Building, in room H225. This is open during term time between 10:30-12:30 and 14:00-15:30, Monday to Friday (except Wednesday afternoon). Outside term time, you should contact a member of the technical staff directly.

The Helpdesk should be used to report problems with equipment or software packages. It may also be able to offer advice with general programming problems. However the technical support staff are typically not familiar with the detailed contents of individual modules, so may not be able to assist with more specialised queries. Such issues should be directed to the relevant module co-ordinator and/or demonstrators. Similarly, questions about the organisation or structure of the degree programme should be directed your academic advisor or the Student Office in the first instance.

Note that this Helpdesk is purely concerned with the Computer Science departmental equipment. Issues relating to University-wide facilities (such as electronic mail, printing, Liverpool Life or the PC teaching centres in the libraries or halls) should be directed to one of the Computing Services Help Desks, on Brownlow Hill, or in the Harold Cohen or Sydney Jones Libraries. However issues with laboratory 3 (the Computing Services Department laboratory) should continue to be reported via the Computer Science Helpdesk.

6.3.3 Responsible Use of Computers

All use of computing facilities within the University, both departmental and University-wide, are subject to the Regulations for the Use of IT Facilities and relevant Codes of Practice. These cover areas such as use of email and the web, teaching centres and laboratories, and the departmental, University and national academic computer networks. The full text of these Regulations and Codes of Conduct are available at <http://www.liv.ac.uk/csd/regulations/>.

The following summary is intended to highlight some of the most pertinent points, but should not be taken as a complete statement of what is/is not acceptable use of the facilities. Students are expected to familiarise themselves with the full Regulations and Codes of Practice via the URL given above.

General

- Computing and network facilities are provided for registered users only. By registering for use of these facilities, students will have agreed to be bound by the Regulations for the Use of IT facilities.
- Use of these facilities will typically be authenticated by a username and password. Students must keep their password secure and secret, and must not allow anyone else to access computer facilities by way of their username. Similarly, students must not attempt to use the facilities through someone else's username, or attempt to find out another person's username/password combination.
- The computing facilities are provided to support University work. Limited use of email and web for personal and social purposes is tolerated, but such use should not become excessive, or interfere with or cause difficulties for other users.

Electronic Publishing (including Email and Web Pages)

- Material must not be sent by email or published on the web, in such a way as to obscure or hide the source of such material, or to claim an authority that it does not possess.
- Publication of material (including sending by email) must abide by the copyright of that material. In particular, material should not be published without obtaining the permission of the copyright owner.
- Material must not be published that is insulting, abusive or offensive, or that advocates or condones illegal activities.
- The computing facilities are provided to support a student's programme of academic work. It is not permitted to use them for commercial purposes (including advertising).

Use of Laboratories

- Use of Labs and other shared facilities should show consideration for other users of the system. Loud or unruly behaviour, or the display of questionable material is not acceptable.
- Food and drink may not be taken into the Laboratories. Smoking is not permitted anywhere in the Department.
- Users must not attempt to open, move, disconnect or in any other way tamper with or attempt to destroy or damage any equipment. Headphones and USB devices may be connected to the front panel of a PC, but users must not otherwise connect any items of equipment to any part of the departmental computing facilities without first clearing this with the technical staff.
- Systems must not be left unattended. If students need to leave a terminal, they should either lock the screen (for a short absence) or log out of the system.

- The playing of computer games is not permitted at any time, unless specifically authorised for academic purposes.

Use of Networks

All use of the departmental network must abide by the Regulations for Use of IT Facilities, and (where relevant) the JANET Acceptable Use policy.

6.3.4 Laptops

All software required for Computer Science modules is available and configured on the computers in the Computer Science teaching labs, and much of this (though not all) is also available on the central University computing facilities. It is not necessary to have access to a personal computer in order to study CS programmes.

Some students find it convenient to work on their own systems, and many packages are available at little or no cost. The module lecturer can advise as to what software might be needed for that module. However it is important to check that assignments written on your own personal equipment also work as expected on CS facilities, **before** handing them in. This is particularly important for the project.

Certain modules may require specialist facilities, typically only available within the Computer Science department.

Wireless connectivity is available via wireless access points operated by Computing Services, hence uses your University username/password. This can be configured by connecting to the 'GuestNet' wireless service, start up a web browser, and click on "Connect Now".

This should automatically configure your computer to use the EduRoam secure wireless service. You will typically be prompted for your (university) username and password. You may also see a warning regarding the 802.1x server certificate - this is perfectly normal.

6.4 Nursing Mothers

The School of EECS has a room dedicated for nursing mothers, which also contains a small fridge for anyone wanting to store expressed milk. This room is located on the right hand corridor of the ground floor of EEE A Block. If you are unsure where this is the Student Office can direct you. The keycode for the room can be obtained from either Jane Gallagher (barneyb@liverpool.ac.uk, 0151 795 4297) or the EEE Building Manager whose contact details are at the reception desk in the EEE building.

Disclaimer

We make every effort to ensure the accuracy of this Handbook. However, it should be noted that the matters covered are subject to change from time to time. Where changes occur, we will endeavour to update this version as soon as possible.