The Department of Statistical Science Undergraduate Student Handbook has been written for undergraduate students admitted by the Department of Statistical Science to study for one of the following degrees:

- **BSc Statistics** (UCAS code G300)
- **BSc Statistics, Economics and Finance** (known as SEF, UCAS code GLN0)
- **BSc Statistics, Economics and a Language** (known as SEL, UCAS code GLR0)
- **BSc Statistics and Management for Business** (known as SAMB, UCAS code GN32)
- **BSc (Econ) Economics and Statistics** (known as Econ/Stats, UCAS code LG13)
- **MSci Statistical Science (International Programme)** (UCAS code G305)

The contents also provide information for undergraduate students studying Statistical Science as part of the following degrees:

- **BSc Mathematics and Statistical Science** (known as MASS, UCAS code GG13)
- **MSci Mathematics and Statistical Science** (known as MASS, UCAS code GGC3)

Students on the Econ/Stats, MASS and SAMB degree programmes will also need to refer to the corresponding information published respectively by the Departments of Economics and Mathematics, and the School of Management.

Some of the contents are also relevant to students admitted by the Department of Statistical Science to study for academic credit as part of an undergraduate affiliate programme, either for the whole year, or for the second and third terms only.

The Department of Statistical Science Undergraduate Student Handbook is intended to provide particular information for students registered for the degrees listed above. General information about studying at UCL is given in the Academic Manual (available from the web address) and Current Students sections of the UCL website. It is important that you are aware of the contents of these sections of the UCL website.

The Department of Statistical Science Undergraduate Student Handbook contains numerous hyperlinks to sources of further information. The corresponding URL for each hyperlink is not always written out in full, so if you are reading a printed copy of the handbook, you may need to refer to the electronic version available at: https://www.ucl.ac.uk/statistics/current/ughb.pdf in order to access all of the information that you require.

The information given in this handbook is as far as possible accurate at the date of publication, but the Department reserves the right to make amendments before the commencement of, or during, the courses to which it refers. Information concerning College regulations and procedures is given for guidance only and is not intended as a substitute for that contained in the UCL Academic Manual and on the main UCL website (available from the web addresses above).

Department of Statistical Science, University College London, September 2016.
The Department of Statistical Science Undergraduate Student Handbook includes information on the following:

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CALENDAR OF EVENTS

UCL term dates
Terms for the 2016/17 session are based on the pattern of 12 weeks, 11 weeks and 7 weeks.

First Term 26 September 2016 – 16 December 2016
Second Term 09 January 2017 – 24 March 2017
Third Term 24 April 2017 – 09 June 2017

For those departments that operate them, Reading Weeks are the weeks beginning Monday 7 November 2016 (Week 7), and Monday 13 February 2017 (Week 6).

Christmas College Closure Close 17:30 Friday 23 December 2016
Open 09:00 Tuesday 3 January 2017

Easter College Closure Close 17:30 Wednesday 12 April 2017
Open 09.00 Thursday 20 April 2017

Bank Holidays Closed - Monday 01 May 2017
Closed - Monday 29 May 2017
Closed - Monday 28 August 2017

Further information:
- Term dates 2016-17

Key dates

Term 1
- Week 1: All students have to carry out College enrolment and module registration. Further details concerning induction arrangements for new students are provided upon arrival at the Department.

  College enrolment is organised by Student and Registry Services, who send you information about the procedure before the start of the term. New students must complete enrolment in person when they arrive at UCL. Continuing students can re-enrol online.

  Module registration is done using the online Portico system (see “Portico” section on page 10). The procedure will be explained to you upon arrival (see also “Selecting Courses” section on page 31). Tutorial groups are allocated automatically and your groups will appear in your online timetable (see “Timetable” section on page 11).

- Week 2: Beginning of lectures for all courses in the Department of Statistical Science. Friday is the deadline for making term 1 module amendments.

- Week 7: This is Reading Week. Classes in the Department of Statistical Science are replaced by self-study activities, including some set by the course lecturers. Not all departments observe reading week and you MUST attend classes given in other departments if they continue during this time.

- Week 12: End of all term 1 teaching in the Department of Statistical Science.

Term 2
- Week 1: Beginning of lectures in the Department of Statistical Science. Students should check their online timetable for the term 2 tutorial arrangements, and also check for any other timetable changes that may have occurred.
• **Week 2:** *Student module verification.* Wednesday is the deadline for all students to review and verify their module selection details on Portico. Student and Registry Services will email you with instructions on how to do this. Friday is the deadline for making *module amendments.*

• **Week 6:** This is *Reading Week.* Refer to the corresponding item in term 1 for details.

• **Week 11:** End of all *teaching* in the Department of Statistical Science.

**Term 3**

• **Week 1:** Some *revision classes* will be offered. Thursday is the start of the *examination period.*

• **Week 5:** Friday is the end of the undergraduate *examination period.*

*Courses not organised by the Department of Statistical Science may not follow the above schedule. For further information you should check with the relevant teaching department.*

**DEPARTMENT OF STATISTICAL SCIENCE**

The Department of Statistical Science is a constituent department of the Faculty of Mathematical and Physical Sciences (abbreviated to MAPS). Some information about the history of the Department is provided on the [Departmental website](#).

The Department of Statistical Science is located on the first and second floors of 1-19 Torrington Place. The offices of the academic staff are all in this location. The Departmental Office can be found in room 120 on the first floor.

**Staff**

**Academic staff**

Prof RE Chandler (Head of Department)

Dr G Ambler  
Dr A Beskos  
Prof P Dellaportas  
Dr CM Hennig  
Dr IN Kosmidis  
Dr PJ Northrop  
Prof RZ Omar  
Dr GJ Ross  
Dr ADL van den Hout  
Dr J Xue  

Dr G Baio  
Dr C Cotar  
Prof T Fearn  
Prof VS Isham  
Dr I Manolopoulou  
Dr AG O'Keeffe  
Dr GW Peters  
Dr AS Siddiqui  
Dr HM Wilkinson-Herbots  

Dr JA Barber  
Pro M De Iorio  
Prof SE Guillas  
Dr FJ Király  
Dr G Marra  
Prof SC Olhede  
Dr Y Pokern  
Dr RBA Silva  

**Teaching staff**

Dr SJ Harden  
Dr R Khatoon  
Dr M Shahin*  

Dr J Herbert*  
Mrs K Krajniewska*  

Dr EM Jones  
Dr MJ Rassias  

*members of staff indicated with an asterisk are based outside UCL

**Support staff**

Mrs D Jayawardena Wilkinson  
Ms KA Leport  

Dr RG Evans  
Mr C Visavakul  

Ms C Ghosh
Staff with particular responsibility for undergraduate students

**Departmental Tutor**
The Departmental Tutor is responsible for the day-to-day running of the five Statistical Science BSc degree programmes (i.e. Statistics, SAMB, SEF, SEL and Econ/Stats), as well as the MSci International Programme.

The equivalent responsibility for the MASS degree programmes is held by the Departmental Tutor in the Mathematics Department. However, the Departmental Tutor in the Statistical Science Department acts as the Statistics Tutor to MASS students, whom they may consult about the Statistics courses in their degree programme.

The Departmental Tutor is Dr MJ Rassias (room 134, m.rassias@ucl.ac.uk).

**Teaching Administrator**
The Teaching Administrator works closely with the Departmental Tutor and is the first point of contact for many aspects of your studies. For example, you should contact the Teaching Administrator to notify absence from college, to submit medical documentation or to change a module registration.

The Teaching Administrator is Ms KA Leport (room 120, k.leport@ucl.ac.uk).

**Personal Tutor**
UCL is committed to providing all students with the academic guidance and personal support that they need to flourish as members of our active learning and research community. As part of the wider support infrastructure provided by a programme, every undergraduate student will be assigned a member of staff who can provide constructive academic and personal development guidance and support. At the start of the year, students will be provided with the name and identity of their Personal Tutor, the date of their first meeting, and where and when the Personal Tutor can be found in term time. Students are encouraged to be proactive in engaging with their Personal Tutor, as it is the responsibility of the student to keep in touch.

Your Personal Tutor’s name is shown on your Portico record (see “Portico” section on page 10) and it is expected that it will be the same person throughout the whole of your degree programme.

Further information:
- **Personal Tutors**

  If you become unhappy with your degree programme, or a particular course, or with your progress, or if you cannot cope, or if you have other problems, you should immediately discuss the matter with the Departmental Tutor, Teaching Administrator or your Personal Tutor. Such problems are often much simpler to deal with if they are addressed immediately. You will then be directed to an appropriate person for more specialist advice if that is necessary.

**Other relevant staff roles**

<table>
<thead>
<tr>
<th>Role</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Careers Tutor</td>
<td>Dr MJ Rassias (room 134)</td>
</tr>
<tr>
<td>Study Abroad Tutor:</td>
<td>Dr MJ Rassias (room 134)</td>
</tr>
<tr>
<td>Tutor to Affiliate students:</td>
<td>Prof SE Guillas (room 133)</td>
</tr>
<tr>
<td>Chair of Staff-Student Committee:</td>
<td>Dr SJ Harden (room 140)</td>
</tr>
<tr>
<td>Chair of Departmental Teaching Committee:</td>
<td>Dr J Xue (room 141)</td>
</tr>
</tbody>
</table>
Students’ common room and departmental student society

Room 117 is the common room for students registered for any of the degree programmes listed on page 1. Students registered for these programmes are eligible for membership of the student-run Statistics Society, which organises social and other activities. Any mail arriving in the Department addressed to undergraduate students will be placed in the pigeonholes in the Students’ Common Room.

Study facilities

Students may use the lecture room 102 for study when it is not being used for lectures or other classes and meetings. The College’s safety regulations only permit undergraduate students to be in the Department between 08:00 and 19:00 Monday to Friday.

There is substantial space for reading and studying in the College Library (see page 12).

How UCL and the Department will communicate with students

UCL will communicate with students via:

- UCL student email – Students should check their UCL email regularly.
- UCL Moodle – UCL’s online learning space, used by module organisers, programme leaders, departments and faculties to provide essential information in addition to learning resources.
- myUCL – A weekly term-time e-newsletter to all students (undergraduate and postgraduate) at UCL, which covers key internal announcements, events and opportunities.
- UCL Instagram – UCL’s official Instagram channel, featuring news, events, competitions and images from across the UCL community.
- @ucl Twitter channel – Sharing highlights of life at UCL from across UCL’s diverse community.

Email

Email is used for communication throughout the College and you will be allocated an email address by UCL (see http://www.ucl.ac.uk/isd/services/email-calendar). Please check your UCL email account regularly. There may be urgent messages left for you, e.g. from Student and Registry Services, the Departmental Office, your personal tutor, or from staff teaching courses that you attend.

Your tutors, lecturers and College administrative staff will use your College email address and expect you to read and act promptly upon all messages sent to you at this address. If you wish to use only your own email address from a provider external to the College, then it is your responsibility to arrange for emails to be forwarded from your College email address. However, UCL cannot be held responsible for mail that is delayed or lost as a result of being forwarded to an external provider. Any consequences arising from not acting upon emails to your College address rest with YOU.

DOSSSH

The Department maintains a Moodle space called the “Department of Statistical Science Student Home” (DOSSSH) to which all Statistical Science students have access. Please check the DOSSSH page regularly. The DOSSSH page contains notices about courses, examinations and other useful information about the Department, as well as downloadable forms and links to resources that are described elsewhere in this handbook.
Processing of personal information

Whilst you are a student at UCL, the College will need to store and communicate information about you. This section summarises UCL and Departmental procedures with respect to such information.

How UCL uses student data

UCL uses student information for a range of purposes connected with their studies, health and safety. UCL takes the protection of student information very seriously and complies with the Data Protection Act (DPA) 1988. Information about students will only be shared within UCL when necessary. UCL may also be required by law to share information with some external agencies for a variety of purposes, such as UCLU, the Higher Education Statistics Agency and UK Visas and Immigration. After students leave UCL their data is retained in the permanent archives.

Further information:

- UCL General Student Privacy Notice
- UCL Confidential Information Statement
- UCL Information Security Policies
- data-protection@ucl.ac.uk

Portico

Portico is the main UCL student information system which is used by all students for:

- Updating personal data such as addresses or contact numbers
- Completing online module registration
- Viewing information about programmes/modules
- Viewing examination timetables and results
- Pre-enrolment and re-enrolment
- Applying for graduation ceremonies

Further information:

- Portico login
- Portico Helpdesk

If you need a document that can be used to confirm your registration status at UCL, you can print out a Statement of Student Status letter or an opening a bank account letter via Portico. Just log into Portico and click on the Statement of Student Status link on your Portico home page. Alternatively you can send an email request to studentstatus@ucl.ac.uk with your name, student number, date of birth and desired delivery address. Please note that the Department will NOT issue certificates of student status or attendance.

It is your responsibility to ensure that your personal details held on the UCL central record are correct and up-to-date. This information can be viewed via Portico. Instructions on how to update your personal information can be found at: https://www.ucl.ac.uk/current-students/services_2/personal_information. Any consequences arising from the failure to correct or update your personal information rest with YOU.

Return of coursework

Marked coursework, bearing a grade, may be returned to you via your pigeonhole, in classes, or through the Departmental Office. These routes are not completely secure and may result in other students seeing your grade. If you are unhappy about this, you should discuss your concerns with the course tutor.
References
We need your explicit permission to give any reference for you. This applies to ALL references, (e.g. for a landlord, a prospective employer or a Masters degree programme). Thus, when you give either the Department’s or a tutor's name as a referee, it is important that you complete and sign a “Reference Request” form confirming that you have done so. The form is available from the Departmental Office and the DOSSSH Moodle page (see page 9).

TEACHING AND STUDYING ARRANGEMENTS

Course units
Teaching is organised on a course unit system. A student normally takes courses equivalent to 4.0 units in each year of full-time study; most individual courses are worth either 0.5 or 1.0 units. Most courses consist of lectures supplemented by at least one of the following: tutorials, workshops, problem classes. The proportions of these activities vary over courses; details for courses offered by the Department of Statistical Science are provided in this handbook. A few courses are projects. Outline details of courses offered by other departments to students on the Statistics, SEF and SEL programmes are also provided in this handbook. Econ/Stats, MASS and SAMB students should refer to the course information provided by the Economics and Mathematics Department, and the School of Management, respectively, for details of the full range of Economics, Mathematics and Management courses that are potentially available.

Timetable
The timetable for lectures, workshops and problem classes can be found at http://www.ucl.ac.uk/timetable. After making your module selections on Portico, tutorial allocation will be arranged by the relevant Teaching Administrator before courses start and your tutorial group will automatically appear in your online timetable. However, it may take one or two days after registration has been approved before all of the classes appear on your personal timetable, particularly for tutorials. Check your timetable frequently, in case alterations have been made. Note also that, once allocated, your tutorial group will NOT be changed unless you can demonstrate a timetable clash.

Although the timetable states that lectures (and other classes) begin and end on the hour, there is a College-wide agreement that this refers to a starting time of 5 minutes past the stated hour and a finishing time of 5 minutes to the hour. This should give you time to get to your next lecture before it is due to start.

Scheduled teaching and learning activities

Lectures
These are formal and can involve large groups. Some lecture courses include students from other departments and those of you on joint degrees will be taking courses in other departments alongside their own and other students. Where possible, Statistical Science lectures take place in lecture rooms 102 and 115 in 1-19 Torrington Place. These rooms are too small for the larger courses, however, and therefore many Statistical Science lectures take place in other rooms around the College, as do lectures for other UCL courses.

Tutorials
Weekly academic tutorials are provided for first and second year students. These are less formal than lectures and enable you to raise your own questions about course material, as
and when they arise from lectures or coursework. You normally have different academic tutors in terms 1 and 2.

For third year students, tutorials for courses STAT3001 and STAT3002 are provided. For all other third year Statistical Science courses, the staff involved should nominate office hours during which they will be available to discuss any queries about the course material.

**Problem classes**

These involve discussing coursework with the whole class.

**Workshops**

Workshops, also referred to as "practical classes" within the Department, involve doing set work under guidance from the course staff. Some workshops will take place in the Computer Cluster Rooms. You should take a pocket calculator to all workshops (see page 14 for guidelines regarding calculators).

**Projects**

These normally involve a small amount of class training. Most of the work is done under individual supervision from a staff member whom you meet once a week to discuss your progress.

**Office hours**

For courses offered in Department of Statistical Science, each member of the academic and teaching staff should nominate at least one weekly office hour during term time in which they will be available to answer general queries arising from lectures, problem sheets, etc. If you need to consult a course lecturer, please do so in an office hour. In particular, in the period leading up to any assessment (see "In-Course Assessment" section on page 40) the course lecturer will set aside a fixed time or times at which (s)he will be available to answer questions about the assessment. (S)he will NOT answer queries about the course outside these times until the assessment is over.

For other courses, refer to the corresponding information published by the relevant teaching department.

**Learning resources and key facilities**

**UCL Library Services**

UCL has 19 libraries and a mixture of quiet study spaces, bookable study rooms and group work areas. Each library has staff that students can ask for help. The UCL Library Services page has information for students about using the library, services available, electronic resources and training and support.

- **Library information for students**

The Science Library (in the DMS Watson building, Malet Place) contains an exceptionally good collection of statistical science text and reference books. Copies of most books that are highly recommended for courses taught by the Department are included in the Short Loan Collection on the ground floor in the Science Library. The Collection consists of all subjects of the Science Library and is arranged on open access shelves in one alphabetical sequence under authors. The period of loan for statistical science books is 2 days. Books cannot be taken out of the room without being issued. Other recommended books, for which there is less demand, are kept on the third floor of the Science Library. The loan period assigned to these is one week. There are longer loan periods for other books.
UCL Library Services has developed a set of online training materials, to help users find and use information effectively. Topics covered include finding materials in reading lists; search tips and techniques; accessing electronic resources; referencing; and copyright and plagiarism issues. Students taking project courses may also benefit from the more advanced “WISE for Built Environment, Engineering, Maths and Physical Sciences” course, accessible from https://www.ucl.ac.uk/library/training/guides.

**UCL Information Services Division (ISD)**

The UCL Information Services Division (ISD), the primary provider of IT services to UCL, offers IT learning opportunities for students and staff in the form of ‘How to’ guides which provide step-by-step guidance to all of ISD’s key services, including email and calendar services, user IDs and passwords, print, copy and scanning, wifi and networks. There are also opportunities for digital skills development through face-to-face training in areas such as data analysis, programming, desktop applications and more, along with individual support through drop-ins and via the ISD Service Desk. UCL also has a licence for Lynda.com which provides thousands of high quality video-based courses from programming to presentation skills.

**E-learning services** available to students include Moodle, Turnitin and Lecturecast and allow students to access online course materials or take part in online activities such as group work, discussions and assessment. Students can re-watch some lectures using the Lecturecast service and may also use interactive tools in the classroom.

ISD provides desktop computers and laptops for loan in a number of learning spaces. A map of computer workrooms is available on the ISD website. Computers at UCL run a Desktop@UCL service which provides access to hundreds of software applications to support students. It is also possible to access a large range of applications remotely, from any computer, using the Desktop@UCL Anywhere service.

All students are encouraged to download the UCL-Go app, available for iOS and Android devices. The app gives access to Moodle and timetabling and shows where desktop computers are available on campus.

**UCL Centre for Languages & International Education (CLIE)**

The UCL Centre for Languages & International Education (CLIE) offers courses in over 17 foreign languages (including English), along with teacher training courses, across a range of academic levels to support UCL students and staff and London’s wider academic and professional community. CLIE provides degree preparation courses for international students, courses satisfying UCL’s Modern Foreign Language requirements and a range of UCL summer school courses. Students can also access a database of language-learning resources online through the CLIE Self-Access Centre, including film and documentary recommendations and books for self-study.

Further information:
- CLIE website
- CLIE Self-Access Centre

**Moodle**

Moodle is UCL’s online learning space. It includes a wide range of tools which can be used to support learning and teaching. Moodle is used to supplement taught modules, in some cases just by providing essential information and materials, but it can also be integrated more fully, becoming an essential component of a module. Some modules may use Moodle to provide access to readings, videos, activities, collaboration tools and assessments.
All courses in the Department of Statistical Science have a presence on Moodle, and students registered for these courses can use the service to access online resources such as course information, lecture notes and assessment material. Students are given additional printing credits, to allow them to print copies of the lecture notes for each of their statistics courses.

Further information:
- Moodle
- Frequently Asked Questions
- Quick Start Guide

Calculators
There are eight calculator models that the College has approved for use in examinations. These are the Casio FX83ES, FX83GT+, FX83MS and FX83WA which are all battery powered, and Casio FX85ES, FX85GT+, FX85MS and FX85WA which are all solar powered. Students on the degree programmes covered by this handbook may NOT use any other type of calculator in Statistical Science examinations. Students are therefore strongly advised to purchase one of these calculators at the start of their degree programme. The use of a non-approved calculator constitutes an examination irregularity (i.e. cheating) and carries potentially severe penalties.

Statistical tables
Statistical tables are provided by the College for use in all examinations set by the Department. The currently provided tables are New Cambridge Statistical Tables by D.V.Lindley & W.F.Scott. New students are strongly advised to purchase a copy of these statistical tables at the start of their degree programme. These will be the statistical tables referenced in the Department’s courses.

Feedback on student work
Students receive feedback on all items of assessed coursework (see “Components of Compulsory Assessment” section on page 40) and on selected items of non-assessed work. Feedback may be given in tutorials, problems classes or electronically. It may take the form of verbal or written comments, either personalised or in the form of general points that emerged from the class as a whole. These comments are intended to help you see what was done well and where there is room for improvement. For assessed work, the comments are also provided to help justify the grade awarded.

For assessed work, feedback will include a provisional letter grade. The correspondence between letter grades and percentage marks, along with guidance regarding the interpretation of each grade, is as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Mark ( \geq 80 )</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td></td>
<td>The criteria for an A grade are all met. Additionally, exceptional quality has been demonstrated with respect to at least two of the following: understanding, insight, depth of analysis or clarity of discussion, with evidence (where appropriate) of relevant knowledge or reading.</td>
</tr>
</tbody>
</table>

Pass
<table>
<thead>
<tr>
<th>Grade</th>
<th>Mark</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>70 to 79</td>
<td>The criteria for a B grade are all met, along with one or more of the following: high quality answers in a wide range of questions, evidence of a very sound understanding, thoroughness of discussion and clarity of expression, evidence of insight, wide knowledge or reading. There may be a small number of relatively minor errors or inconsistencies, but there should not be serious errors in knowledge or understanding.</td>
</tr>
<tr>
<td>B</td>
<td>60 to 69</td>
<td>Good understanding of the questions asked, good knowledge of the main aspects of the subject and good levels of appropriate skills (such as the ability to carry out calculations and manipulations, and to develop a logical argument). At the higher end of the range, one would expect to see clear expression and presentation. A few mistakes are allowable, providing they are not serious.</td>
</tr>
<tr>
<td>C</td>
<td>50 to 59</td>
<td>Reasonable understanding of the subject, and a reasonable level of ability in the appropriate skills. Work in this category may fail to reach Grade B either because it does not demonstrate a wide enough range of knowledge (e.g. some good answers, but too many questions or part questions either omitted or answered inappropriately), or because skill deficiencies lead to too many mistakes or badly presented answers.</td>
</tr>
<tr>
<td>D</td>
<td>40 to 49</td>
<td>Basic but limited understanding of the subject, together with some basic ability in the appropriate skills. There may be many mistakes, but there will be clear evidence of some relevant knowledge.</td>
</tr>
<tr>
<td>F</td>
<td>≤ 39</td>
<td>Not of pass standard. At the higher end of the scale a very limited understanding may be present, but answers will present little evidence of relevant knowledge and contain many mistakes, irrelevancies or misunderstandings. At the lower end, answers will show little or no understanding of either the questions or the subject.</td>
</tr>
</tbody>
</table>

**Model answers**

Many Statistical Science courses have regular sets of exercises. These are designed to help students learn and, in most courses, it is essential that students do the exercises in order to understand the subject. Course lecturers are often asked to provide model answers to the exercise sheets. There is a similar demand for model answers to past exam papers. Lecturers do provide model or outline answers to some exercises and to some exam questions, but it is Departmental policy not to do so in general, for a number of reasons:

- We do not want to encourage students to “learn answers” but rather to create a culture in which they know that they must work out the answer for themselves. Often it is not the answer, but the process of working it out that is the main learning experience.
- We are trying to encourage independent thought and understanding, so that students can answer (more or less well) different questions, similar questions in different forms, and to solve related problems. Understanding in statistical science, and in mathematics, comes much more from doing than from reading.

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1 Marks for assessed coursework in the range 30-39, whilst still not being of pass standard, are indicative of a level of performance which may have slightly better implications if repeated in the final exam (see “Referred Assessment” section on page 24). Such marks are sometimes informally denoted using the letter grade “E”. 
• It is important for students to learn how to persevere with a problem when they are “stuck”. In the past, we have found that model answers handed out in one year are often passed on to students in a subsequent year, to the detriment of the learning process.

A common argument put forward by students is “Yes, we want to do the exercises, but we would like model answers in order to check that we have the right method and answer”. Of course it can sometimes be helpful to look at answers, but it is also important to learn how to verify answers when they are not otherwise available, and to gain the confidence to know when you are right. One function of tutorials is to discuss problems or work through them with the teacher, and this is one way in which answers may be obtained. Part of the skill of the teacher is to help the student to progress without “spoon feeding” the answer.

Having said all of this, the Department recognises that while preparing for examinations in particular, it can be useful for students to have the final answers (rather than complete solutions) to past exam questions: this provides some confidence that the answers obtained while attempting past papers are correct. All teaching staff should provide such “final” answers routinely, for selected exam papers from 2014 onwards, via their course Moodle pages (see page 13).

WHAT IS EXPECTED OF STUDENTS

Student code of conduct

UCL enjoys a reputation as a world-class university. It was founded on the basis of equal opportunity, being the first English university to admit students irrespective of their faith and cultural background and the first to admit women. UCL expects its members to conduct themselves at all times in a manner that does not bring UCL into disrepute. Students should ensure they read and familiarise themselves with UCL’s Student Code of Conduct and be aware that any inappropriate behaviour may lead to actions under UCL’s Student Disciplinary Procedures.

Further information:
• UCL Student Code of Conduct
• Student Disciplinary Code and Procedure

Attendance requirements

UCL expects students to aim for 100% attendance, and has a minimum attendance requirement of 70% of scheduled learning, teaching and assessment activities. If a student does not meet this requirement they may be barred from summative assessment.

You are expected to be in attendance during the UCL terms throughout your programme of study. This includes reading week (see page 6). If you wish to be absent from College for some special reason, you should obtain permission beforehand from the Departmental Tutor (see page 8).

If you have a good reason for needing to miss a compulsory class, you must inform the Teaching Administrator and lecturer or tutor concerned in order to be excused. The Department keeps records of coursework submission and attendance at tutorials and workshops. At the end of each term, you will be required to explain an unsatisfactory attendance record to the Faculty Tutor. An inadequate explanation may lead to your studies being suspended or, in the case of International Programme students, you might not be allowed to go abroad.
You will also be taking some courses provided by other departments, where arrangements are likely to be different from those in the Department of Statistical Science. It is important that you know what is expected of you in each of these courses. You may be barred from taking examinations if you have not attended enough tutorials or submitted enough coursework, **EVEN** if it does not count towards the final examination mark.

The importance of attendance at lectures and other classes has been stressed above. Requests for special attention (e.g. for missed notes, handouts, problem sheets etc.) due to non-attendance without good reason (e.g. medical), do not create a good impression. The same applies to non-submission of coursework. Remember that when writing a job reference for you, we are usually asked to provide information about your attendance and punctuality, as well as your ability, etc. If you are absent from any lecture or other class, you should endeavour to copy up notes promptly.

Further information:
- [Attendance Requirements](#)
- [Barring Students from Assessment](#)

**Tier 4 students: absence from teaching and learning activities**

In line with UCL's obligations under UK immigration laws, students who hold a Tier 4 visa must obtain authorisation for any absence from teaching or assessment activities.

Further information:
- [Authorised Absence](#)
- [UCL Visa and Immigration pages](#)

**Absence from assessment**

Any student who is absent from an assessment must obtain authorisation for the absence by submitting a request for Extenuating Circumstances.

Further information:
- [Extenuating Circumstances](#)

**Studying**

**Tutorials**

Tutorials in the Department of Statistical Science are **compulsory** and provide the opportunity to get personal attention. It is important to prepare yourself by reading through the latest lecture material and trying the relevant exercises sheets **before the tutorial**. Think of questions relating to the course material to ask; make a note of points that you don't understand so that you can have them clarified in tutorials. Take your recent lecture notes and exercise sheets to each tutorial, in particular those relating to material that you know will be discussed.

**Lectures, workshops and problem classes**

Most new material is presented in lectures; some might be introduced by your trying ideas in workshops. The workshops give the opportunity to solve problems with guidance, a helpful alternative method of learning. In most courses learning is sequential; you need to have met and understood past material in order to follow the current material. You are therefore strongly advised to attend all classes. Teaching staff and demonstrators are able to give some personal attention in workshops; absences are likely to be noted.
Staff sometimes receive complaints from students about disruption and noise (caused by other students) in large classes. All students are respectfully asked to consider others when in the classroom: excessive noise and disruption can have a negative impact on the learning experience for everybody. Any student who is persistently disruptive will be asked to leave the classroom, and will receive an official warning from the Departmental Tutor with an appropriate note placed on the student’s record.

**Coursework**

In the Department of Statistical Science regular, often weekly, coursework is set. Some of this is for in-course assessment, but much of it is to help you to learn the material being taught. You will normally receive feedback from coursework during problem classes, tutorials or workshops, as appropriate for the course. You will generally be expected to hand in your work so that we can monitor your progress. The detailed arrangements for coursework will vary between courses and you will be told about them at the start of each course. You should ensure that you know what is required for each course that you take.

Our teaching assumes that you have attempted the coursework, and we may refer to it in subsequent classes and coursework. **In-course assessment is compulsory: it contributes to your final examination mark for that course and non-submission may mean that you cannot pass the course** (see “Examinations” section on page 40). Furthermore, for courses with tutorial classes your tutor will record whether you have submitted each piece of non-assessed coursework by the specified deadline and whether it is a reasonable attempt (i.e. an attempt of pass standard). The Department of Statistical Science expects a reasonable attempt for at least 70% of non-assessed coursework in each course. If you fail to satisfy this requirement you may be barred from taking the examination for the course and this may mean that you cannot progress to your next year of study.

Ensure that you leave yourself enough time to complete each exercise sheet. Weekly sets of exercises may well need about 5 hours work on them, including reading time. In some courses, more substantial sets of exercises are given out on a fortnightly basis: it is recommended that you start them in the first of the two weeks allowed. A prompt start to exercises set for in-course assessment is well advised.

It is good practice to aim for legibility, accuracy and clarity in your coursework, whether or not it is for in-course assessment (the same applies to examinations, of course!).

**Self study**

After a lecture, study your notes carefully. Work through the details slowly and annotate your notes in a different colour to that used in taking them; this can help with revision. It is important to keep on top of each course by reviewing the appropriate notes before the next class (lecture, tutorial, problem class or workshop). Read supporting material from textbooks as necessary. Start coursework well in advance of the submission date (see the above comments on coursework).

The following will help you understand and communicate your understanding of course material:

- continual practice at solving problems;
- thorough preparation for all classes;
- regular revision of course material as the course progresses;
- seeking help when you have difficulties.

The Department has prepared a self assessment questionnaire to help you to evaluate what you are getting out of your studies and to take responsibility for your own progress. This questionnaire is available on the DOSSSH Moodle page (under the Student Feedback topic). Try completing it for each course during reading week.
**Total workload**

For a typical 0.5 unit course, you should expect a workload of about 9 or 10 hours per week – this includes lectures, workshop, problems class, tutorial, reading and coursework, as appropriate for each course. For example, if you are studying the equivalent of four half-unit courses per term, your total weekly workload is expected to be around 40 hours.

As part of monitoring your own progress, you may find it helpful, in some weeks, to keep a diary of the time you spend actively working.

**AIMS AND OBJECTIVES OF THE DEGREE PROGRAMMES**

**BSc Statistics**

*Aims*

To provide an intellectually challenging undergraduate degree programme in the theory and practice of Statistical Science. This training should enable students to proceed directly to posts as Statisticians in industry, commerce or the civil service, or by profiting from the general numeracy and reasoning skills acquired during the programme, to take up trainee positions in accountancy, insurance or management. The programme should also provide a preparation for a Master’s programme in Statistics, which in turn is a normal requirement for postgraduate research in Statistics.

*Objectives*

On completion of the programme, a student is expected to be able to do the following:

- Explain the concepts and properties of discrete and continuous random variables, common probability distributions (both univariate and multivariate), and carry out basic calculations associated with these.
- Summarise the main features of a set of data, and explain and use basic methods of statistical estimation and significance testing in a variety of standard situations; explain and use basic concepts in the theory of statistical inference.
- Explain, and apply to simple situations, basic ideas in applied probability such as Markov Chains and Markov processes (discrete states only).
- Undertake a research project involving data analysis under supervision and present the findings by oral presentation and written report.
- Use a modern computer operating system, use at least one major statistical package, use a word processor, spreadsheet, database and graphics software.

In addition, a student should be introduced to most of the following:

- The problems associated with planning a survey, and the use of simple methods of analysing survey data.
- The problems associated with planning a clinical trial, and the use of simple methods for analysis of data from clinical trials and epidemiological studies.
- Forecasting procedures.
- Criteria for decision making, utility theory, decision trees.
BSc Statistics, Economics and Finance (SEF)

Aims
To provide an intellectually challenging undergraduate degree programme in quantitative methods together with a basic knowledge of Economics and Finance. This training should enable students to profit from the general numeracy and reasoning skills acquired during the programme in order to take up trainee positions in accountancy, finance, insurance or management, or to proceed to positions as statisticians in industry, commerce or public organisations. The programme should also provide a preparation for a Master’s programme in Statistics, Economics or Finance, which in turn is a normal requirement for postgraduate research in any of these areas. Via appropriate choice of options, the programme may also provide a foundation for a career, or for further study, in Operational Research.

Objectives
On completion of the programme, a student is expected to be able to do the following:

- Explain the concepts and properties of discrete and continuous random variables, common probability distributions (both univariate and multivariate), and carry out basic calculations associated with these;
- Summarise the main features of a set of data, and explain and use basic methods of statistical estimation and significance testing in a variety of standard situations; explain and use basic concepts in the theory of statistical inference;
- Carry out a critical evaluation of an analytical method, recognising both its strengths and its limitations;
- Explain the ideas of Markov Chains, Markov processes (discrete states only) and renewal processes, and use them in simple applications, including queues and reliability;
- Use a major statistical computer package, and interpret the output;
- Have a basic knowledge of central principles of microeconomics including supply and demand, consumer choice, firm behaviour, product markets, labour markets and international trade;
- Have a basic knowledge of central principles of macroeconomics including national accounts, relations between private sector and government, consider the problems of inflation, unemployment, balance-of-payments and growth, aggregate demand and supply;
- Formulate economic arguments and understand the role of argument and evidence in the policy-making process;
- Interpret company financial reports and appreciate the use of basic financial products;
- Use the basic mathematical and probabilistic tools of modern finance, and apply the relevant techniques for the pricing of derivatives;

In addition, a student should be introduced to most of the following:

- The problems associated with planning a survey, and the use of simple methods of analysing survey data.
- Forecasting procedures.
- Concepts and principles of risk, assessment and management of risk; criteria for decision making, utility theory, decision trees.
- Practical experience of techniques in Statistics through project work or case studies.
• Methods of linear and dynamic programming, and simple problems in game theory and Markov sequential processes.

BSc Statistics, Economics and a Language (SEL)

Aims
To provide an intellectually challenging undergraduate degree programme in quantitative methods, together with a basic knowledge of Economics and a reasonable ability to communicate in a second language in addition to English. This training should enable students to profit from the general numeracy, reasoning and linguistic skills acquired during the programme in order to take up trainee positions in accountancy, finance, insurance or management, or to proceed to positions as Statisticians in industry, commerce or public organisations. The study of a second language recognises that increasingly these careers have an international dimension. Students should be able to converse reasonably fluently (according to the level) with native speakers and discuss personal, social, current and professional issues using appropriate structures. The programme should also provide a preparation for a Master's programme in Statistics or Economics, which in turn is a normal requirement for postgraduate research in either of these areas. Via appropriate choice of options, the programme may also provide a foundation for a career, or for further study, in Operational Research.

Objectives
On completion of the programme, a student is expected to be able to do the following:

• Explain the concepts and properties of discrete and continuous random variables, common probability distributions (both univariate and multivariate), and carry out basic calculations associated with these.

• Summarise the main features of a set of data, and explain and use basic methods of statistical estimation and significance testing in a variety of standard situations; explain and use basic concepts in the theory of statistical inference.

• Explain the ideas of Markov Chains, Markov processes (discrete states only) and renewal processes, and use them in simple applications, including queues and reliability.

• Have a basic knowledge of central principles of microeconomics including supply and demand, consumer choice, firm behaviour, product markets, labour markets and international trade.

• Have a basic knowledge of central principles of macroeconomics including national accounts, relations between private sector and government, consider the problems of inflation, unemployment, balance-of-payments and growth, aggregate demand and supply.

• Formulate economic arguments and understand the role of argument and evidence in the policy-making process;

• Speak, write and comprehend a language other than English, to a level of fluency which is sufficient for future professional activities.

In addition, a student should be introduced to most of the following:

• The problems associated with planning a survey, and the use of simple methods of analysing survey data.

• Forecasting procedures.
• Concepts and principles of risk, assessment and management of risk; criteria for decision making, utility theory, decision trees.
• Practical experience of techniques in Statistics through project work or case studies.
• Use of a major statistical computer package, and interpretation of the output.
• Methods of linear and dynamic programming, and simple problems in game theory and Markov sequential processes.

BSc Statistics and Management for Business (SAMB)

Aims
To provide an intellectually challenging undergraduate degree programme in the theory and practice of Statistical Science, and equip those students who wish to enter industry or commerce with sufficient management skills for the first few years at work. This training should enable students to proceed directly to posts as Statisticians in industry, commerce or public organisations, or by profiting from the general numeracy and reasoning skills acquired during the programme, to take up trainee positions in accountancy, insurance or management. The programme should also provide a preparation for a Master's programme in Statistics, which in turn is a normal requirement for postgraduate research in this area.

Objectives
On completion of the programme, a student is expected to be able to do the following:
• Explain the concepts and properties of discrete and continuous random variables, common probability distributions (both univariate and multivariate), and carry out basic calculations associated with these.
• Summarise the main features of a set of data, and explain and use basic methods of statistical estimation and significance testing in a variety of standard situations; explain and use basic concepts in the theory of statistical inference.
• Carry out a critical evaluation of an analytical method, recognising both its strengths and its limitations.
• Explain the ideas of Markov Chains, Markov processes (discrete states only) and renewal processes, and use them in simple applications, including queues and reliability.
• Understand the practical aspects of applying theories of management and present arguments and views that demonstrate understanding of the realities of organisation life.
• Identify and discuss the impact of cultural, political, social, economic and technological issues on organisations.
• Define, analyse and present recommendations for the solution of given management problems.

In addition, a student should be introduced to most of the following:
• One or more specialised areas of management science as applied to business, including e-Business, ethics, international business, business law, managing organisational change and marketing.
• The problems associated with planning a survey, and the use of simple methods of analysing survey data.
• Forecasting procedures.
• Concepts and principles of risk, assessment and management of risk; criteria for decision making, utility theory, decision trees.
• Practical experience of techniques in Statistics through project work or case studies.
• Apply the methods of linear and dynamic programming, and solve simple problems in game theory and Markov sequential processes.
• Use of a modern computer operating system including spreadsheet, database and graphics software and the use of a computer package for data analysis.

BSc (Econ) Economics and Statistics (Econ/Stats)

Aims
To provide an intellectually challenging undergraduate degree programme that provides training in all major aspects of Economics, and in the theory and practice of Statistical Science. This training should prepare students for a career as an economist or statistician or, by profiting from the general numeracy and transferable skills acquired during the programme, to take up trainee positions in accountancy, insurance or management. The programme also aims to provide a foundation for graduate study in Economics, Statistics and related fields.

Objectives
On completion of the programme, a student is expected to be able to do the following:
• Understand the central ideas, concepts and methods of modern economics, including core elements of macroeconomics, microeconomics and quantitative empirical economics.
• Apply these core concepts to one or more specialised areas of economics.
• Explain the concepts and properties of discrete and continuous random variables and common probability distributions (both univariate and multivariate), and carry out basic calculations associated with these.
• Summarise the main features of a set of data, and explain and use basic methods of statistical estimation and significance testing in a variety of standard situations.
• Approach economic and more general quantitative problems in a methodical and structured manner, bringing to bear skills of conceptualisation, problem solving, analysis and communication.

In addition, a student should be introduced to most of the following:
• One or more specialised areas of economics, including financial economics, industrial relations, international trade and economic applications of game theory.
• Use of a modern computer operating system, and use of a computer package for data analysis.
• Methods of linear and dynamic programming and their application to simple problems.
• The problems associated with planning a survey, and the use of simple methods of analysing survey data.
• Forecasting procedures.
• Criteria for decision making, utility theory, decision trees.
MSci Statistical Science (International Programme)

Aims
As for the corresponding BSc degree (see previous pages). In addition, the International Programme aims at continuing advanced education in Statistics, as well as providing experience of education in a different cultural and/or linguistic setting which will broaden the horizon of students and increase chances to find positions with special emphasis on international expertise.

Objectives
As for corresponding BSc degree plus:
- Deepened / advanced understanding of statistical theory and its applications in a variety of areas.
- Mastering a foreign language (for those not already following a with language degree programme).

STRUCTURES OF THE DEGREE PROGRAMMES

The tables on the following pages show the degree programme structures by subject material for each year and term.

You will see that each degree programme has compulsory courses to fulfil the aims and objectives of the degree. In these tables, some course titles have been abbreviated; full course titles are given in the list of courses in the section following these tables. You will normally have the required prerequisites for each compulsory course. You should check on the prerequisites for an optional course by reference to the course descriptions later in the handbook.

General Information for the following tables:
- Students study 4.0 units per year.
- All courses are 0.5 units except where otherwise stated.
- Courses marked • are compulsory.
- Courses in capital letters have full weight in the scheme for the award of honours.
- Courses in square brackets are third year options if not taken in the second year.

A limited number of options may be chosen from other courses offered in the College, subject to approval by the Departmental Tutor and the department offering the option and the constraints of the timetable.
<table>
<thead>
<tr>
<th>Year Term</th>
<th>1</th>
<th>2</th>
<th>1</th>
<th>2</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>Calculus &amp; Linear Algebra •</td>
<td>Calculus in Several Dimensions •</td>
<td>Advanced Linear Algebra •</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Probability &amp; Statistics</td>
<td>INTRO PROB &amp; STATS •</td>
<td>FURTHER PROB &amp; STATS •</td>
<td>PROB &amp; INERENCE •</td>
<td>Linear Models &amp; ANOVA •</td>
<td>INTRO APPLIED PROB •</td>
<td>STAT INERENCE •</td>
</tr>
<tr>
<td>Other Statistics</td>
<td></td>
<td></td>
<td>Intro to Practical Statistics (T1 &amp; T2) •</td>
<td></td>
<td>At least one from</td>
<td>and at least three from</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Opt Algorithms in OR</td>
<td>Social Statistics</td>
</tr>
<tr>
<td>Computing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Computing for Prac Stats •</td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td>Remaining units from e.g. Computer Science, Economics, Languages, Management, Mathematics, Science &amp; Technology Studies</td>
<td>Remaining units from, e.g. Computer Science, Economics, Languages, Management, Mathematics, Science &amp; Technology Studies</td>
<td>Remaining units from, e.g. Computer Science, Economics, Languages, Management, Mathematics, Science &amp; Technology Studies</td>
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</tbody>
</table>
## Structure of the Statistics, Economics and Finance degree programme

<table>
<thead>
<tr>
<th>Year</th>
<th>Term</th>
<th>1</th>
<th>2</th>
<th>1</th>
<th>2</th>
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<td></td>
<td></td>
<td>Mathematics</td>
<td></td>
<td>Core Probability &amp; Statistics</td>
<td></td>
<td>Other Statistics</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculus &amp; Linear Algebra •</td>
<td></td>
<td>INTRO PROB &amp; STATS •</td>
<td></td>
<td>Opt Algorithms in OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculus in Several Dimensions •</td>
<td></td>
<td>FURTHER PROB &amp; STATS •</td>
<td></td>
<td>Social Statistics Computing for Prac Stats •</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Advanced Linear Algebra •</td>
<td></td>
<td>PROB &amp; INFERENCE •</td>
<td></td>
<td>At least two from Project (T1 &amp; T2)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Linear Models &amp; ANOVA •</td>
<td>INTRO APPLIED PROB. •</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>STAT INERENCE •</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intro to Practical Statistics (T1 &amp; T2) •</td>
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<td>Economics</td>
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<td></td>
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<td>Corporate Financial Strategy (T1 or T2)</td>
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<td>[Mang Acct for Dec Making (T1 or T2)]</td>
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<td>Quant Mod Op Risk &amp; Ins Anal²</td>
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² At least one of these courses must be selected during the degree programme.
³ Only available to students who take Economics II in the second year.
## Structure of the Statistics, Economics and a Language degree programme

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<tr>
<th>Year</th>
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</tr>
<tr>
<td></td>
<td>Calculus &amp; Linear Algebra •</td>
<td>Calculus in Several Dimensions •</td>
<td>Advanced Linear Algebra •</td>
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<tr>
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<td>INTRO PROB &amp; STATS •</td>
<td>FURTHER PROB &amp; STATS •</td>
<td>PROB &amp; INCLUSION • Linear Models &amp; ANOVA •</td>
<td>INTRO APPLIED PROB. •</td>
<td>STAT INCLUSION •</td>
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<td>Intro to Practical Statistics (T1 &amp; T2) •</td>
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<td>Opt Algorithms in OR</td>
<td>Social Statistics Computing for Prac Stats</td>
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<tr>
<td><strong>Economics</strong></td>
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<td>At least one from Economics II (T1 &amp; T2), 1 unit</td>
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<td>At least one from Quant Econ &amp; Econometrics4 (T1 &amp; T2), 1 unit</td>
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<td>Course in selected language • Option in selected language</td>
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<td>Course in selected language • Option in selected language</td>
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4 Only available to students who take Economics II in the second year.
### Structure of the Statistics and Management for Business degree programme

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<td>Calculus &amp; Linear Algebra • Calculus in Several Dimensions •</td>
<td>INTRO PROB &amp; STATS • FURTHER PROB &amp; STATS • Intro to Practical Statistics (T1 &amp; T2) •</td>
<td>Accounting for Business • BUS IN COMP ENVIRON •</td>
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<td>Advanced Linear Algebra •</td>
<td>PROB &amp; INFERENCE • Linear Models &amp; ANOVA •</td>
<td>Strategic Project Management (T1 or T2) • Strat Human Res Mang •</td>
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<tr>
<td></td>
<td>Statistical Inference Stochastic Systems Stochastic Methods in Fin I Medical Statistics I Opt Algorithm in OR</td>
<td>Forecasting Decision &amp; Risk Factorial Experimentation Medical Statistics II Selected Topics in Statistics Stochastic Methods in Fin II Bayesian Meth in Health Econ Quant Mod Op Risk &amp; Ins Anal [Intro Applied Prob] [Computing for Prac Stats] [Social Statistics]</td>
<td>At least one from Mast Entrepreneurship (T1 or T2) Mang Acct for Dec Making (T1 or T2)</td>
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<tr>
<td></td>
<td>At least two from Project (T1 &amp; T2)</td>
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5 Only one of these two options may be taken during the degree programme.

6 A total of at least 1.5 units must be taken during the second and third years.
## Structure of the Economics and Statistics degree programme

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<td>Calculus in Several Dimensions •</td>
<td>Advanced Linear Algebra •</td>
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<td>ECONOMICS II (T1 &amp; T2), 1 unit •</td>
<td>Quant Econ &amp; Econometrics (T1 &amp; T2), 1 unit •</td>
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<td>International Trade Economics of Labour</td>
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<td>Economics of Finance Economics of Information</td>
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<td>Environmental Economics</td>
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<td>FURTHER PROB &amp; STATS •</td>
<td>PROB &amp; INERENCE •</td>
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<td></td>
<td>At least two from8</td>
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<td>Stochastic Methods in Fin I</td>
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<td>Medical Statistics I</td>
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<td>Statistics Options</td>
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<td>Opt Algorithms in OR</td>
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<td>Statistics Options</td>
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<td></td>
<td>Social Statistics</td>
</tr>
</tbody>
</table>

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7 At least one ECON3### module must be selected.
8 A limited number of options may be chosen from other course units offered by the Departments of Economics and Statistical Science, or up to 1.5 units may be chosen from other course units offered in the College, subject to approval by the Departmental Tutor and the department offering the option and the constraints of the timetable.
Structure of the MSci International Programme

Students may be accepted onto the International Programme from year 1 with the intention of following the first two years of either the Stats, SEF or SEL BSc programmes (but not Econ/Stats or SAMB). Alternatively, students starting on one of these programmes may be allowed to transfer to the International Programme after their first year. The Department will only support a limited number of students on the International Programme. Where more students seek to follow the programme than there are opportunities available, the candidates will be selected by the Study Abroad Tutor in conjunction with the Departmental Tutor, based on overall profile of academic performance, enthusiasm and contribution to the Department. Students who wish to study in a language other than English must be able to demonstrate linguistic competence through qualifications and/or following UCL language courses. The Department may ask the UCL Centre for Languages & International Education to assess students seeking to study abroad.

Years 1 and 2 are the same as for the corresponding BSc programme selected at the start of year 1 except that, if required, a student should take up to 1.0 unit of additional language courses in the first two years. These language courses should be taken instead of options named in the programme structure of the selected programme; students will be required to take all of the compulsory first and second year courses of the selected programme.

Year 3 will be the year abroad. Students studying abroad must follow a programme that is to the fullest extent possible agreed in advance with the Study Abroad Tutor. The programme must

- be of equivalent depth and quality to the third year of one of our BSc programmes;
- be substantially composed of courses in Statistics or closely related allied disciplines such as Mathematics, Econometrics, Operations Research, Computer Science;
- be of equal workload to that of the UCL third year of one of our BSc courses, that is, using accepted equivalence measures, be of 4.0 units;
- be formally assessed by the host institution and the results of the assessment independently reported to the Study Abroad Tutor;
- include taught courses / units, i.e. not consist solely of project work;
- be formally documented by the student in an up to date written study plan, signed by the Study Abroad Tutor and kept by the Departmental Tutor.

Due to the variety of international marking systems, year 3 examination and assessment results will be converted into UCL marks on a case-by-case basis based on the grade definitions given in the “Feedback on Student's Work” section on page 14.

In year 4, the choice of courses should complement the ones taken in the year abroad. All 4.0 units must be selected at Masters level, at least 3.0 units of which should be chosen from amongst the courses offered by the Department of Statistical Science. The course STATM012: Statistical Inference is compulsory unless the student has already covered this material in equivalent depth during the year abroad. Similarly, a student must also undertake statistical project work amounting to the equivalent of at least 1.0 unit, either as a compulsory 1.0 unit Masters level statistical project in the final year, or by registering for at least a 0.5 unit project course in each of years 3 and 4 and undertaking the work over two years. Options courses must be agreed by the Study Abroad and Departmental Tutors, in order to avoid overlap caused by attending an overseas institution.

Structure of the MASS degree programmes

The structures of these degrees are available from the Department of Mathematics at http://www.ucl.ac.uk/maths/courses/undergraduates/mathstats.
COURSES AVAILABLE IN THE DEGREE PROGRAMMES

Course codes
Each course has a code: this consists of a four character prefix which indicates the examination board that is responsible for that course, followed by another four characters indicating a course code within that board. Courses in statistical science have the prefix STAT. However, you will often find that staff refer to course codes as simply 1005 for STAT1005, and 1604 for ECON1604 (for example).

Levels of courses
All UCL courses have a level associated with them. These levels are as follows:
- Level 0 (Basic/introductory – a level below that of a normal first year course)
- Level 1 (First – the level of most first year courses)
- Level 2 (Intermediate – the level of most second year courses)
- Level 3 (Advanced – the level of most third year courses)
- Level M (Masters – the level of all fourth year MSci courses)

The levels of all courses offered by the Department of Statistical Science are given in the “Course Information” section from page 67 onwards. Students must take courses at an appropriate level for the degree programme for which they are registered (see “Schemes for the Award of Honours” section on page 49). In particular, the Department expects all students to select a minimum of 3.5 course units at Advanced level throughout their degree programme. This is to reduce the risk of passing less than 3.0 course units at Advanced level, which is one of the requirements for the award of an honours degree. This rule will only be waived for good reason e.g. that taking a certain group of courses is important to a student’s career plans. Final year students seeking permission to select an overall total of only 3.0 course units at Advanced level must submit a form (available from the DOSSSH Moodle page) for consideration by the Departmental Tutor.

Selecting courses
Each degree programme has some compulsory courses that cover core material from each of the subjects in the degree title. These are then supplemented through the choice of appropriate options to make up a total of 4.0 course units in any particular year.

To take an optional course, you must register for it on Portico. Instructions on how to do this can be found on the Portico website (log on to Portico and select the “Module registration documentation” option from within the “Module Selection” container). In choosing options, you are advised to try and balance the amount of work evenly between the two terms. There is normally a specified list of options but, subject to approval, you may choose a limited number (normally no more than 0.5 course units per year) of options from other courses offered by the College, provided that there is no timetable clash. These courses are sometimes referred to as electives. The timetable will not be amended so that you may choose an elective option. However, third and fourth year students may usually take electives that are scheduled for Friday afternoons even though these clash with occasional workshops for statistics courses. In this case, it is the student’s responsibility to catch up on any work missed as a result of the clash.

During term 3 the Department holds meetings for current first and second year students to discuss the options available for the next year. You will be reminded of the options available
to you and the rules of your degree programme. Although you will not select your modules (using Portico) until later in the summer, it is helpful for you to think seriously about your options at this point.

Second year students taking a project in their third year will also be asked to choose a topic from a list suggested by staff. You must discuss a proposed topic with the supervisor named on the list before registering for it. These topics are allocated on a first taker basis so you must not delay making your choice and getting a supervisor’s agreement. You may suggest a topic of your own but you must see the Departmental Tutor to discuss whether it will make a suitable project and to find out who might supervise it.

Please remember that your registration for any optional course is subject to approval both by the Departmental Tutor and by the Department offering the option. Moreover, any final year student who has failed more than half a unit of courses MUST discuss their options with the Departmental Tutor, since failed courses may affect your eligibility for the award of a particular degree. Attempts to register for unsuitable options will be rejected. If you are in any doubt as to whether you will be allowed to take a particular option, you should discuss it with both the Departmental Tutor and with the Department offering the option, BEFORE attempting to register for it on Portico.

Courses on offer

In the lists below, the courses are organised by subject area. All courses listed are 0.5 units unless stated otherwise. Please refer to the programme structures shown on the previous pages for the appropriate courses for your degree.

Further details of the Statistical Science courses, ECON1604 and ECON2601 are provided in the final section of this handbook (see the “Course Information” section from page 66 onwards). For all other courses listed, the module code features a direct link to any further details available from the corresponding teaching department’s website. 

Statistics, SEF and SEL degree programmes

- Statistical Science

<table>
<thead>
<tr>
<th>Year</th>
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<th>Course Title</th>
<th>Level</th>
<th>Term</th>
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</thead>
<tbody>
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</table>

9 If you are reading a printed version of this handbook, the links to the index pages of the online module directories for other teaching departments are given in full on page 52.

10 Most Statistical Science courses have additional entries in the Portico module directory to those given here, representing versions of the courses offered to other groups of students at UCL e.g. postgraduate students (STATG###), fourth year MSci students (STATM###) and autumn term only affiliate students (STAT####A). Input your choices carefully, therefore, as the selection of any Statistical Science course codes not listed here will most likely result in the module registration being rejected.
<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Level</th>
<th>Term</th>
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<td></td>
<td>STAT3020</td>
<td>Stochastic Methods in Finance II</td>
<td>Advanced</td>
<td>2</td>
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<tr>
<td></td>
<td>STAT3021</td>
<td>Bayesian Methods in Health Economics</td>
<td>Advanced</td>
<td>2</td>
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<tr>
<td></td>
<td>STAT3022</td>
<td>Quantitative Modelling of Operational Risk &amp; Insurance Analytics</td>
<td>Advanced</td>
<td>2</td>
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<tr>
<td></td>
<td>STAT3901</td>
<td>Project (1 unit)</td>
<td>Advanced</td>
<td>1 &amp; 2</td>
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<tr>
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<td>STAT3902</td>
<td>Project</td>
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- **Mathematics**

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Level</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MATH6401</td>
<td>Calculus and Linear Algebra</td>
<td>First</td>
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<tr>
<td></td>
<td>MATH6402</td>
<td>Calculus in Several Dimensions</td>
<td>First</td>
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<td>2</td>
<td>MATH6403</td>
<td>Advanced Linear Algebra</td>
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</table>

- **Economics and Finance**

<table>
<thead>
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<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Level</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ECON1604</td>
<td>Economics I (Combined Studies) (1 unit)</td>
<td>First</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td></td>
<td>MSIN1004</td>
<td>Accounting for Business</td>
<td>First</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>ECON1002</td>
<td>Applied Economics</td>
<td>First</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ECON2601</td>
<td>Economics II (Combined Studies) (1 unit)</td>
<td>Intermediate</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>2/3</td>
<td>ECON6003</td>
<td>Money &amp; Banking</td>
<td>Intermediate</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MSIN7016A</td>
<td>Managerial Accounting for Decision Making</td>
<td>Intermediate</td>
<td>1</td>
</tr>
</tbody>
</table>

- **Languages** - see page 36.

Students may also choose options from outside the above lists, subject to the constraints and approval procedure described on page 31. The following are examples of courses that previous students have taken:

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Level</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COMP102P</td>
<td>Theory I</td>
<td>First</td>
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<tr>
<td></td>
<td>ECON1602</td>
<td>Basic Microeconomic Concepts</td>
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<td>2</td>
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<tr>
<td></td>
<td>ECON6002</td>
<td>An Introduction to Applied Economic Analysis</td>
<td>First</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>HPSC1001</td>
<td>History of Science: Antiquity to Enlightenment</td>
<td>First</td>
<td>1</td>
</tr>
<tr>
<td>Year</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Level</td>
<td>Term</td>
</tr>
<tr>
<td>------</td>
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<tr>
<td></td>
<td>HPSC1004</td>
<td>Science Policy</td>
<td>First</td>
<td>2</td>
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<tr>
<td></td>
<td>HPSC1011</td>
<td>History of Modern Science</td>
<td>First</td>
<td>2</td>
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<tr>
<td></td>
<td>MATH1101(^{11})</td>
<td>Analysis I</td>
<td>First</td>
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<tr>
<td></td>
<td>MSIN1002(^{12})</td>
<td>Communication and Behaviour in Organisations</td>
<td>First</td>
<td>2</td>
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<tr>
<td></td>
<td>MSIN6004</td>
<td>Accounting for Business</td>
<td>First</td>
<td>1</td>
</tr>
<tr>
<td>1/2/3</td>
<td>MSIN6001</td>
<td>Understanding Management</td>
<td>First</td>
<td>1 or 2</td>
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<tr>
<td></td>
<td>PSYC6001(^{12})</td>
<td>Introduction to Social and Business Psychology</td>
<td>First</td>
<td>2</td>
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<tr>
<td></td>
<td>ECON1006</td>
<td>History of Economic Thought</td>
<td>First</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MSIN7007</td>
<td>Mastering Entrepreneurship</td>
<td>Advanced</td>
<td>1 or 2</td>
</tr>
<tr>
<td>2/3</td>
<td>MATH6404(^{11})</td>
<td>Mathematical Analysis</td>
<td>Intermediate</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MSIN7008</td>
<td>Entrepreneurship: Theory and Practice</td>
<td>Advanced</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>ECON7001</td>
<td>Economics of Labour</td>
<td>Advanced</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ECON7004</td>
<td>Economics of Industrial Relations</td>
<td>Advanced</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ECON7005</td>
<td>Economics of the Public Sector</td>
<td>Advanced</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ECON7008</td>
<td>Economics of Tax Policy</td>
<td>Advanced</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ECON7010</td>
<td>Economics of Development</td>
<td>Advanced</td>
<td>1</td>
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<tr>
<td></td>
<td>MATH3802</td>
<td>History of Mathematics</td>
<td>Advanced</td>
<td>2</td>
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<tr>
<td></td>
<td>MATH6801</td>
<td>Logic</td>
<td>Advanced</td>
<td>2</td>
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<tr>
<td></td>
<td>MSIN7004</td>
<td>Business in the Digital Age</td>
<td>Intermediate</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MSIN7014</td>
<td>Strategic Human Resource Management</td>
<td>Intermediate</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MSIN3G07</td>
<td>Entrepreneurial Finance</td>
<td>Masters</td>
<td>2</td>
</tr>
</tbody>
</table>

Students may not take courses in years other than those indicated above. Third year students may not take a First level Mathematics course or MATH6502 (Mathematics for Engineers II). Students may not take both MATH3508 (Financial Mathematics) and STAT3006.

**SAMB degree programme**

- **Mathematics** - the courses are those listed on page 66.
- **Statistical Science** - the courses are included in the list on page 66.
- **Management and Business Studies**

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Level</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MSIN6001A</td>
<td>Understanding Management</td>
<td>First</td>
<td>1</td>
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<tr>
<td></td>
<td>MSIN1002</td>
<td>Communication &amp; Behaviour in Organisations</td>
<td>First</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MSIN1007</td>
<td>Information Management for Business Intelligence</td>
<td>First</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>MSIN1004</td>
<td>Accounting for Business</td>
<td>First</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MSIN7002B</td>
<td>Business in a Competitive Environment</td>
<td>Intermediate</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MSIN7008</td>
<td>Entrepreneurship: Theory and Practice</td>
<td>Advanced</td>
<td>2</td>
</tr>
<tr>
<td>2/3</td>
<td>MSIN7003</td>
<td>Organisational Change</td>
<td>Intermediate</td>
<td>1</td>
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<tr>
<td></td>
<td>MSIN7004</td>
<td>Business in the Digital Age</td>
<td>Intermediate</td>
<td>2</td>
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<tr>
<td></td>
<td>MSIN7005</td>
<td>Law for Managers</td>
<td>Intermediate</td>
<td>2</td>
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<tr>
<td></td>
<td>MSIN7007</td>
<td>Mastering Entrepreneurship</td>
<td>Advanced</td>
<td>1 or 2</td>
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<tr>
<td></td>
<td>MSIN7009</td>
<td>Introduction to Marketing</td>
<td>Intermediate</td>
<td>2</td>
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<tr>
<td></td>
<td>MSIN7011</td>
<td>International Business</td>
<td>Advanced</td>
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</tbody>
</table>

\(^{11}\) Students may not take both MATH1101 and MATH6404

\(^{12}\) Students may not take both PSYC6001 and MSIN1002
<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Level</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MSIN7013</td>
<td>Innovation Management</td>
<td>Advanced</td>
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<tr>
<td></td>
<td>MSIN7016</td>
<td>Managerial Accounting for Decision Making</td>
<td>Intermediate</td>
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<tr>
<td></td>
<td>MSIN7019</td>
<td>Technology-Driven Business Innovation</td>
<td>Advanced</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>ECON3014</td>
<td>Game Theory</td>
<td>Advanced</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MSIN7014</td>
<td>Strategic Human Resource Management</td>
<td>Intermediate</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MSIN7018</td>
<td>Global Marketing Strategy</td>
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<tr>
<td></td>
<td>MSIN3002</td>
<td>Marketing Communications</td>
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<td>MSIN3006</td>
<td>Digital Marketing</td>
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<tr>
<td></td>
<td>MSIN3013</td>
<td>Consumer Value Creation in the Sharing Economy</td>
<td>Advanced</td>
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<tr>
<td></td>
<td>MSIN3014</td>
<td>Patents and Intellectual Property (IP) for Innovators, Entrepreneurs &amp; Managers</td>
<td>Advanced</td>
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<tr>
<td></td>
<td>MSIN3017</td>
<td>Corporate Financial Strategy</td>
<td>Advanced</td>
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<td>MSIN3101</td>
<td>Strategic Project Management</td>
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<td></td>
<td>MSIN9001A</td>
<td>Dissertation (1 unit)</td>
<td>Advanced</td>
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</table>

Second year students may choose a 0.5 unit elective course and third year students may substitute other courses from the School of Management or choose up to 1.5 units of courses from other departments, subject to the degree programme structure (see page 28) and the constraints and approval procedure described on page 31. Third year students who wish to opt for either the 0.5 or 1.0 unit statistical project are still required to choose at least two other courses from the list of statistical science options.

Students may not take courses in years other than those indicated above. Students may not take PSYC6001 (Introduction to Social and Business Psychology) or both MATH3508 (Financial Mathematics) and STAT3006. Third year students may not take a First level Mathematics course or MATH6502 (Mathematics for Engineers II).

**Econ/Stats degree programme**

- **Mathematics** - the courses are those listed on page 66.
- **Statistical Science** - the courses are included in the list on page 66.
- **Economics**

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Level</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ECON1002</td>
<td>Applied Economics</td>
<td>First</td>
<td>2</td>
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<tr>
<td></td>
<td>ECON1005</td>
<td>The World Economy</td>
<td>First</td>
<td>2</td>
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<tr>
<td></td>
<td>ECON1604</td>
<td>Economics I (Combined Studies) (1 unit)</td>
<td>First</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>2</td>
<td>ECON2601</td>
<td>Economics II (Combined Studies) (1 unit)</td>
<td>Intermediate</td>
<td>1 &amp; 2</td>
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<td></td>
<td>ECON2007</td>
<td>Quantitative Economics &amp; Econometrics (1 unit)</td>
<td>Intermediate</td>
<td>1 &amp; 2</td>
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<tr>
<td>3</td>
<td>ECON6003</td>
<td>Money &amp; Banking</td>
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<td>ECON7001</td>
<td>Economics of Labour</td>
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</tr>
<tr>
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<td>ECON7002</td>
<td>Economics of Finance</td>
<td>Advanced</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ECON7007</td>
<td>Environmental Economics</td>
<td>Advanced</td>
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</tr>
<tr>
<td></td>
<td>ECON7008</td>
<td>Economics of Tax Policy</td>
<td>Advanced</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ECON3002</td>
<td>Microeconometrics</td>
<td>Advanced</td>
<td>1</td>
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<td></td>
<td>ECON3003</td>
<td>Econometrics for Macroeconomics &amp; Finance</td>
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<td>2</td>
</tr>
<tr>
<td></td>
<td>ECON3004</td>
<td>International Trade</td>
<td>Advanced</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ECON3014</td>
<td>Game Theory</td>
<td>Advanced</td>
<td>1</td>
</tr>
<tr>
<td>Year</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Level</td>
<td>Term</td>
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<tr>
<td></td>
<td>ECON3016</td>
<td>Economics of Information</td>
<td>Advanced</td>
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<tr>
<td></td>
<td>ECON3019</td>
<td>Issues in Economic Development</td>
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<td>ECON3020</td>
<td>Experimental Economics</td>
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<td></td>
<td>ECON3023</td>
<td>Economics of Financial Markets</td>
<td>Advanced</td>
<td>2</td>
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</table>

Third year students must take at least 0.5 units of courses with ECON3### codes, but may substitute other courses from the Department of Economics or choose up to 1.5 units of courses from other departments, subject to the degree programme structure (see page 29) and the constraints and approval procedure described on page 31. Third year students who wish to opt for either the 0.5 or 1.0 unit statistical project are still required to choose at least two other courses from the list of statistical science options.

Students may not take courses in years other than those indicated above. Students may not take both PSYC6001 (Introduction to Social and Business Psychology) and MSIN1002 (Communication & Behaviour in Organisations) or both MATH3508 (Financial Mathematics) and STAT3006. Third year students may not take a First level Mathematics course, MATH6502 (Mathematics for Engineers II), MSIN1002 (Communication & Behaviour in Organisations), MSIN1004 (Accounting for Business), MSIN6001 (Understanding Management) or MSIN7002 (Business in a Competitive Environment) or more than 0.5 units of MSIN courses below Advanced level.

**MASS degree programmes**

The courses available in these degrees can be found on the Department of Mathematics website at [http://www.ucl.ac.uk/maths/courses/undergraduates/maths-stats](http://www.ucl.ac.uk/maths/courses/undergraduates/maths-stats).

**Language courses**

Language courses for Statistical Science students are available at the UCL Centre for Languages & International Education (CLIE). The following languages are available:

- **Arabic, Dutch, French, German, Italian, Japanese, Mandarin, Portuguese, Spanish**

All languages are offered as 0.5 unit courses at 7 levels. Two levels may be combined in the same year to form a 1.0 unit course. The correspondence between language levels and those described on page 31 is indicated below. A full course listing is available on the CLIE website at [https://www.ucl.ac.uk/clie/CourseUnits](https://www.ucl.ac.uk/clie/CourseUnits).

**Selecting a level**

The CLIE tutors will assist students in selecting the right level when they come for interview as part of the course enrolment procedure in September. You can only register for language courses following an interview; if you try and register on Portico for a language course without the prior agreement of the Centre, your registration will not be permitted.

The Language Centre levels are as follows:

- **Level A** (corresponding level for degree classification: First) This is for complete beginners or for students who have had only very little contact with the language.
- **Level B** (corresponding level for degree classification: Intermediate) This is for students who have passed level A, or have a low GCSE grade or equivalent.
- **Level C** (corresponding level for degree classification: Advanced) This is for students who have passed level B, or have a high GCSE grade or equivalent.
- **Level D** (corresponding level for degree classification: Advanced) This is for students who have passed level C, or are reasonably fluent in the language and are able to discuss a range of issues (low A-Level grade or equivalent).
- **Business and Current Affairs** (corresponding level for degree classification: *Advanced*) This is for students who have passed level D, or have a high A-level grade or equivalent. The course covers a variety of issues within the scope of Business and Current Affairs such as Europe, society and politics.

- **Current Affairs and Culture (Social, Historical and Political)** (corresponding level for degree classification: *Advanced*) This is for students who have taken the Business and Current Affairs course. The course provides knowledge and understanding both of the structure of the language and of the business, social, historical and political contexts in which it is currently used.

- **Professional Purposes II** (corresponding level for degree classification: *Advanced*)

**Statistics degree**

In each year, a 0.5 unit language course at *any level* is allowed as an option, subject to an overall maximum of 1.0 unit of language courses and to the requirements of the scheme for the award of honours. However, a 1.0 unit course in any one year is not normally allowed.

**SEF degree**

In each of years 2 and 3, a 0.5 unit language course at *any level* is allowed as an option, subject to the requirements of the scheme for the award of honours. A 1.0 unit course in any one year is not normally allowed.

**SEL degree**

You can study at most two languages throughout your degree programme. However, you can only enrol for one level A course throughout the three years. The rules are as follows:

- **Year 1:** A compulsory 0.5 unit language course. A 1.0 unit course is not allowed.
- **Year 2:** A compulsory 0.5 unit language course and an optional 0.5 unit language course. You may combine both to select a 1.0 unit course in one language.
- **Year 3:** A compulsory 0.5 unit language course and an optional 0.5 unit language course. You may combine both to select a 1.0 unit course in one language. If you enrol for a level A course, it must be 1.0 unit.

In addition to the restrictions outlined here, the number of language courses taken at levels A to D may be limited by the requirements of the scheme of award (see page 49).

**EXTENUATING CIRCUMSTANCES AND REASONABLE ADJUSTMENTS**

**Reasonable adjustments**

UCL will make Reasonable Adjustments to learning, teaching and assessment to ensure that students with a disability are not put at a disadvantage. UCL also provides Reasonable Adjustments for students who might not consider themselves to have a ‘disability’ but who nevertheless would benefit from additional support due to an ongoing medical or mental health condition. It is the responsibility of the student to request Reasonable Adjustments, and students are encouraged to make a request as early as possible.

Further information:
- **Reasonable Adjustments**
- **Student Disability Services**
Special examination arrangements

Special Examination Arrangements (SEAs) are adjustments to central or departmental written examinations which can be made as a Reasonable Adjustment for students with a disability or longer-term condition or as a form of mitigation for students with shorter-term medical Extenuating Circumstances. This may include, but is not limited to extra time, a separate room, rest breaks and specialist equipment. Students must make an application to use the special examination facilities.

Further information:

- Special Examination Arrangements – guidance and forms
- Special Examination Arrangements – regulations

Any special arrangements that are agreed for you will automatically be taken into account in all centrally-organised exams held during the main exam period in term 3. However, in order to have your requirements taken into account for any departmentally-organised assessments held outside the main exam period, you must provide the relevant department with a copy of your letter in advance of the test date.

Extenuating circumstances

Extenuating circumstances are defined by UCL as circumstances in a student’s life that are unexpected, significantly disruptive and beyond the student’s control and which may affect their performance at assessment. Wherever possible, UCL is responsible for ensuring that students are not unfairly disadvantaged by such circumstances.

The extenuating circumstances regulations provide short-term solutions for students experiencing sudden, unexpected difficulties. They are not designed to support students with longer-term or chronic conditions or disabilities. UCL seeks to ensure that such students are enabled to achieve their full potential at assessment by putting in place appropriate special examination arrangements (see the previous section).

Examples of extenuating circumstances that would commonly be regarded as having seriously affected a student’s performance are:

- death of, or serious injury to, a close relative;
- a serious personal injury or medical condition;
- being the victim of a serious crime (e.g. assault, mugging);
- theft of work required for assessment.

Examples of circumstances that would not normally be considered are:

- minor illnesses or injuries (e.g. colds, headaches, hay fever);
- assessment / examination stress (e.g. because of tight exam timetabling);
- failure of IT equipment / printers;
- minor private or public transport failure.

However, these lists are by no means exhaustive and additional guidance on the types of claims that might be considered is available from the UCL Academic Manual: http://www.ucl.ac.uk/srs/academic-manual/documents/annexes_2016-

13 It is, however, recognised that a student with a chronic or long-term condition may nonetheless experience an acute episode or sudden worsening of their condition, or that the condition might be newly-diagnosed. Such students are encouraged to seek support through Student Disability Services, but may also need to submit an extenuating circumstances claim if, for example, there is insufficient time to put special examination arrangements in place.
Furthermore, UCL recognises that each student’s circumstances are different and that claims must be considered on a case-by-case basis.

You are responsible for making known any circumstances which may affect your performance in good time for them to be considered by the appropriate UCL body. You must complete an Extenuating Circumstances Claim Form (available from the DOSSSH Moodle page) and submit this, together with appropriate supporting evidence, to the Teaching Administrator as soon as possible and **NO later than one week after the circumstance has taken place.** Claims must clearly state the modules / components for which you are seeking mitigation; claims will not be considered for any modules not identified on the claim form.

Claims must be supported by written evidence from an appropriate, verifiable and independent authority such as a registered medical practitioner, solicitor, undertaker, registrar of births, marriages and deaths, police officer, fire officer, court or tribunal officer. Evidence must cover the full period for which you are claiming mitigation and must be provided in English or accompanied by a translation formally notarised by a solicitor. If you are unable to obtain evidence in order to submit your claim within the one week deadline, you should submit the claim on time, indicating on the form that the evidence is to follow.

Depending on the type of mitigation being requested, your claim will be reviewed by relevant members of staff from the Department and / or MAPS Faculty, who will make a decision either to accept or reject the claim, or to request additional evidence. You will be notified in writing within one week of the decision being made. Where a claim is accepted, the notification will include details of the mitigation to be applied. Where further evidence is required, you will be expected to provide this within a further two weeks.

**Unless you follow the above procedure, it will NOT be possible for the examiners to take any extenuating circumstances into account.** Details of the precise circumstances affecting individual students are not made available to all examiners.

Further information:
- Extenuating Circumstances Regulations

**Support to study policy and fitness to study procedure**

Students with physical or mental health concerns are encouraged to make contact with the available support services as early as possible so that UCL can put in place reasonable adjustments to support them throughout their studies. However there may be occasions when a student’s physical or mental health, wellbeing or behaviour is having a detrimental effect on their ability to meet the requirements of their programme, or is impacting on the wellbeing, rights, safety and security of other students and staff. In such cases UCL may need to take action under the Fitness to Study Procedure.

Further Information:
- Support to Study Policy
- Fitness to Study Procedure
- Student Psychological Services
- Student Support and Wellbeing
- Learning Agreements, Barring, Suspensions and Terminations of Study
- Student Disciplinary Code and Procedures
- UCL Student Mental Health Policy
EXAMINATIONS

Complete and non-complete courses
In order to qualify for an award, you need to be complete in all your courses (4.0 units per year), **EVEN in those that you have failed.** Unless there are strong mitigating circumstances (e.g. medical), you will be non-complete for a particular course if:

- you are absent from the final examination, or make little or no attempt;
- you fail to submit a piece of coursework worth more than 20% of the overall mark.

You may also be declared non-complete in a course if your attendance is insufficient or you don't hand in enough non-assessed coursework (see page 16). To avoid being non-complete for a particular course through absence from an assessment, students must obtain authorisation for the absence by submitting a request for extenuating circumstances (see “Extenuating Circumstances” section on page 38).

Components of compulsory assessment
For most courses, you are examined by in-course assessment and written examinations (there are exceptions, however, notably if the course is a project).

*In-course assessment*
At the beginning of each course, the lecturer will provide details of the method and dates of in-course assessment and the amount of work involved. The assessment dates will also be posted on the course Moodle page. Students should ensure that they have no other commitments on these dates. *In-course assessment is a form of examination, and should be treated as such.* The proportion it normally contributes towards the final mark is given for each course in the “Course Information” section from page 67 onwards.

Each piece of in-course assessment set by the Department of Statistical Science has its own rubric and the instructions given must be followed. *In particular, do pay attention to the consequences of missing the deadline set, non-submission and plagiarism; any of these can result in your not passing the course.* Teaching staff will set aside extra office hours to discuss assessment-related matters (see page 12) students should respect the lecturers’ time by confining queries to these hours.

Some assessments will be in the form of a “take-home” assignment, to be handed in to the Departmental Office or the course lecturer by a set deadline. For such assessments, you will need to sign a cover sheet (provided by the course lecturer) containing a declaration that the submitted work is entirely your own (see “Plagiarism and collusion” section on page 42). You will also need to submit your work in a *single securely stapled bundle* including the cover sheet.

**Late Submission Penalties:** Planning, time-management and the meeting of deadlines are part of the personal and professional skills expected of all graduates. For this reason, UCL expects students to submit all coursework by the published deadline date and time, after which penalties will be applied. If a student experiences something which prevents them from meeting a deadline that is sudden, unexpected, significantly disruptive and beyond their control, they should submit an Extenuating Circumstances Form (see “Extenuating Circumstances” section on page 38). If the request is accepted, the student may be granted an extension. If the deadline has already passed, the late submission may be condoned i.e. there will be no penalty for submitting late.

Further information:

- [Late Submission Penalties](#)
Word counts: some assessments (usually involving the production of reports) carry a specified word count. The rubric will include clear instructions about word counts, the inclusion of footnotes, diagrams, images, tables, figures and bibliographies etc. Students are expected to adhere to the requirements for each assessment. Students exceeding these parameters may receive a reduction in marks.

Further information:
- **Word Counts**

  The rubric may indicate that the word count excludes appendices. However, this should not be regarded as an invitation to transfer large amounts of surplus text into an appendix and the mark awarded will reflect the standard of judgement shown in the selection of material for inclusion.

Written examinations

These normally take place during term 3. Student and Registry Services will contact you with details of your personal examination timetable, normally just before the end of term 2.

Students must ensure that they are aware of the regulations governing written examinations detailed in the UCL Examination Guide for Candidates on the Examinations and Awards website. Students should pay particular attention to the regulations around examination irregularities. Students who are suspected of any form of cheating or of breaching the Examination Regulations will be investigated under UCL’s Examination Irregularities and Plagiarism procedures (see “Examination Irregularities” section on page 44).

Further information:
- **Examination Regulations**

  In most examinations set by the Department of Statistical Science, there are two sections and candidates are required to answer all questions. The questions in section A are intended to be straightforward and to focus on core material, whereas those in section B are more challenging. The rubric will indicate the proportion of the total mark allocated to each section. Statistical tables will be provided by the College in all examinations set by the Department (the currently provided tables are New Cambridge Elementary Statistical Tables by D.V.Lindley & W.F.Scott). You should take a pocket calculator to all of these examinations (see page 14 for details of permitted calculators).


Final course mark

For courses in Statistical Science which are assessed by both in-course assessment and written examination, the final mark is obtained by combining the in-course assessment mark and the written examination mark. To pass a course at any level below Masters, a final mark of at least 40% is required. To pass a Masters-level course, a final mark of at least 50% is required. For each course described later in this handbook, a guideline is given to indicate the scheme used for combining marks. This guideline will normally be adhered to, but is subject to change at the discretion of the Board of Examiners.

Feedback on assessments

Regular feedback is an essential part of every student’s learning. It is UCL policy that all students receive feedback on summative assessments within one calendar month of the submission deadline. This feedback may take the form of written feedback, individual discussions, group discussions, marker’s answers, model answers or other solutions (although students should note that UCL is generally unable to return examination scripts or
comments on the same). Students writing dissertations or research projects should also expect to receive feedback on a draft on at least one occasion.

If, for whatever reason, a department/division cannot ensure that the one calendar month deadline is met then they will tell students when the feedback will be provided - it is expected that the extra time needed should not exceed one week. Where feedback is not provided within the timescale, students should bring the matter to the attention of their Departmental Tutor or Head of Department.

Further information:
- [UCL Feedback Turnaround Policy](#)

**Plagiarism and collusion**

Plagiarism means attempting to pass off someone else's work as your own, while collusion means passing off joint work as your own unaided effort. Both are unacceptable, particularly in material submitted for examination purposes including exercises done in your own time for in-course assessment. Plagiarism and collusion are regarded by the College as examination irregularities (i.e. cheating) and are taken extremely seriously. UCL uses a sophisticated detection system (Turnitin®) to scan work for evidence of plagiarism and collusion, and the Department reserves the right to use this for assessed coursework. This system gives access to billions of sources worldwide, including websites and journals, as well as other work submitted to the Department, UCL and other universities. It is therefore able to detect similarities between scripts that indicate unacceptable levels of collusion, as well as material taken from other sources without attribution.

If plagiarism or collusion are suspected, on the basis either of the Turnitin® software or other evidence, it can be dealt with informally only in the case of first offences committed by first year students. All other cases must be dealt with formally, which involves adjudication by a departmental panel and/or College Examinations Irregularities panel (see “Examination Irregularities” section on page 44).

**What isn’t acceptable?**

Students sometimes find it difficult to know what counts as plagiarism or collusion. The following list is not exhaustive, but gives some indication of what to avoid. It is based on guidelines developed by Nick Hayes of the UCL Pharmacology Department. You may NOT:

- Create a piece of work by cutting and pasting material from other sources (including websites, books, lecture notes and other students' work).
- Use someone else's work as your own. This includes, but is not limited to:
  - Making notes while discussing an assessment with a friend, and subsequently using these as the basis for all or part of your submission.
  - Telephoning another student to discuss how best to carry out a particular piece of analysis.
  - Employing a professional ghostwriting firm or anyone else to produce work for you.
- Use somebody else’s ideas in your work without citing them.
- Ask a lecturer in the department for help with assessed work, unless you make it clear to them that the work is assessed.
- Help another student with their assessed work. If you do this, you will be deemed to be guilty of an examination irregularity.
What is acceptable?

The following practices do not constitute plagiarism / collusion:

- Quoting from other people's work, with the source (e.g. book, lecture notes, website) clearly identified and the quotation enclosed in quotation marks.

- Summarising or paraphrasing other people's work, providing they are acknowledged as the source of the ideas (again, usually this will be via a reference to the book, journal or website from which the information was obtained).

- Asking the course lecturer for help with difficult material, providing it is clear that the question is in connection with the assessment. The lecturer will be able to judge for him or herself what is an appropriate level of assistance.

Some examples

Unfortunately, each year there are some students in the Department of Statistical Science who submit work that contravenes the regulations. The consequences can be severe.

Example 1: Final-year student A had a lot of coursework deadlines in the same week as an important job interview. One of the coursework deadlines was for an extended piece of data analysis, set two weeks previously. Because of his other commitments, student A did not start this piece of coursework until shortly before the deadline, at which point he discovered that he did not have enough time to do it. He asked student B for help. The result was that both students submitted essentially identical work using exactly the same computer output. A departmental panel was convened to investigate the matter. The panel suggested that student B had passed electronic material (computer output and graphics files) to student A, who had pasted this material straight into his own submission. Although student A admitted asking student B for help, both students denied exchanging electronic material. They were, however, unable to explain how the same electronic files came to appear in both submissions. As a result, the allegation was upheld and both students were penalised. Student A was recorded as "non-complete" for the course in question (this meant that he had no possibility of passing it that year), and student B was given a mark of zero for the coursework component.

Example 2: Students C and D both had to submit some computer code for an assessment, which was worth one third of the total mark for a course. There was considerable flexibility in how to go about the assessment. Although the students submitted code that looked very different, closer inspection revealed that they were carrying out the same procedures in more or less the same order, and that the methods they used to carry out these procedures were essentially the same. Further, these procedures and methods were not used by other students in the class. On investigation, it transpired that the students had discussed the assessment over the phone while sitting in front of their computers. This is unacceptable, and as a result the marks of both students for this piece of assessment were halved.

Example 3: The in-course assessment for a particular module was organised as a multiple choice exam taken via Moodle outside of lessons. Each student could attempt the one-hour exam at any time of their choosing within a ten day window, but were clearly advised that they must work alone. After the exams had been graded, it was noticed that students E and F had given identical answers to every question (including incorrect answers). Inspection of the Moodle logs revealed that the students had started and finished their attempts at exactly the same time, using IP addresses that were traced to adjacent PCs in the same computer cluster. Students E and F admitted colluding on the in-course assessment and were both given a mark of zero.
How to avoid plagiarism and collusion

If you are found to have committed an offence of plagiarism or collusion, it makes no difference whether or not you intended to do so. Ignorance is no excuse. To avoid committing an offence, a useful rule of thumb is: if in doubt, don't do it. Make sure that any work you submit is your own unaided effort. More specific guidance is as follows:

- Plan your work schedule carefully, to allow enough time to complete each piece of assessment.
- If you have genuine problems in meeting a deadline, don't take the easy way out and borrow a friend's work. Discuss your difficulty with the course lecturer in the first instance.
- If you are stuck with an assessment, don't ask another student for help. Discuss it with the course lecturer.
- If another student asks you for help with an assessment, or asks to see your work, suggest that they approach the course lecturer instead. Remember: if somebody else copies or uses your work, you will be penalised as well, even if you didn't expect them to use your work in this way.

More information can be found at [http://www.ucl.ac.uk/current-students/guidelines/plagiarism](http://www.ucl.ac.uk/current-students/guidelines/plagiarism), and in the UCL Library Services WISE courses (see page 12).

Examination irregularities

UCL students are expected to be aware of and adhere to UCL’s referencing and examination requirements as a condition of their enrolment:

- **For examinations**, the *UCL Examination Guide for Candidates* is published annually on the Examinations and Awards website. All candidates for written examinations must ensure they are familiar with the requirements for conduct in examinations set out in this guide.

- **For coursework submissions**, students must ensure that they are familiar with the UCL Library Guide to References, Citations and Avoiding Plagiarism which provides detailed guidance about UCL’s referencing and citation requirements. Students should also ensure that they are familiar with the specific referencing requirements of their discipline.

Any student suspected of examination misconduct, plagiarism, self-plagiarism, collusion, falsification or any other form of academic misconduct which is likely to give an unfair advantage to the candidate and/or affect the security of assessment and/or compromise the academic integrity of UCL will be investigated under the Examination Irregularities and Plagiarism procedures. If misconduct is found, students are likely to be failed for that assignment and/or module. Serious or repeated offences may lead to failure of the whole year, suspension or even expulsion. A breach of copyright or intellectual property laws may also lead to legal action.

Further information:

- [UCL Examination Guide for Candidates](http://www.ucl.ac.uk/current-students/guidelines/plagiarism)
- [Library Guide to References, Citations and Avoiding Plagiarism](http://www.ucl.ac.uk/current-students/guidelines/plagiarism)
- [Examination Irregularities and Plagiarism procedures](http://www.ucl.ac.uk/current-students/guidelines/plagiarism)
- Students can also seek advice from the [UCLU Rights & Advice Centre](http://www.ucl.ac.uk/current-students/guidelines/plagiarism)
Examination marks

Marking, second-marking and moderation

All work that is submitted for summative assessment is marked by a UCL Internal Examiner or Assistant Internal Examiner. All UCL programmes also include rigorous second-marking and internal moderation processes to ensure that marking is consistent and fair. Second-marking can take a number of different forms depending on the type of assessment, but the overall aim is to ensure that marking is as accurate as possible. Internal moderation also helps UCL to ensure that marking is equitable across different modules, pathways, options and electives.

External examining at UCL

External Examiners are senior academics or practitioners from other universities who help UCL to monitor the quality of the education we provide to our students. In particular, External Examiners scrutinise the assessment processes on each programme, helping UCL to ensure that all students have been treated fairly, that academic standards have been upheld and that the qualifications awarded are comparable with similar degrees at other UK universities.

Each External Examiner submits an annual report. Faculties and departments are required to reflect on any recommendations and address any issues raised in a formal response. The report and response are discussed with Student Reps at the Staff-Student Consultative Committee, and are scrutinised by faculty, department and institution-level committees. Students can access their External Examiner’s report and departmental response via their Portico account or by contacting their Departmental Administrator in the first instance or Student and Registry Services directly at examiners@ucl.ac.uk.

Boards of examiners

Module marks are finalised at meetings of examiners in the departments offering the courses. When finalising the marks, examiners in the Department of Statistical Science refer to the grade descriptors summarized in the “Feedback on student work” section on page 14. Recommended degree classifications for final year students registered on the Statistics, SEF, SEL and International programmes are made at the Departmental Examiners’ Meeting. Recommended degree classifications for the Econ/Stats, SAMB and MASS degrees are made by the examination boards for these joint programmes.

Provisional degree classifications for final year students and provisional marks for continuing students registered in the Department of Statistical Science are released after the appropriate examiners’ meetings, normally shortly after the end of term 3. These results are provisional until confirmed by the College Examination Board later in the summer and will be published online via the DOSSSH Moodle page. To access the provisional results online you will need your candidate ID number, along with your UCL userid and password. Students will be advised of the exact release date in advance via UCL email.

Appeals concerning examination results

Where informal resolution is not possible, candidates may appeal against their examination results under one or more of the following conditions:

- Either the examination and/ or classification process was not conducted in accordance with the relevant regulations/ procedures.
- The examiners could not reasonably be made formally aware of special circumstances (e.g. illness) notified by the candidate which significantly affected his/ her performance in the examination. For a candidate to appeal on these grounds, it is necessary to
demonstrate that they could not reasonably have submitted the appropriate claim for extenuating circumstances by the required deadline (see page 38).

- There has been an arithmetical or transcription error in the compilation of the marks and/or the result.
- There is substantive evidence that one or more of the examiners can be shown to have been biased or prejudiced against the candidate in one or more specific examinations.

Any such appeal should be pursued via the Student Complaints Procedure (see page 61). Note that appeals will NOT be considered except under one or more of the conditions above. The Department of Statistical Science would therefore like to reassure all students that all staff in the Department take the assessment process extremely seriously. The marking process described above is designed to ensure that papers are marked fairly and accurately, with all marks agreed by at least three examiners (two internal and one external) and any difficulties discussed by the entire Board of Examiners.

Progression to next year of study

As a guideline you are normally allowed to proceed automatically to the second year if you have passed in at least 3.5 units including STAT1005, and to the third year if you have passed in at least 7.0 units and are complete in 4.0 first year units (see page 40).

To progress automatically from year 2 to 3 of the MSci International Programme, a student must additionally achieve at least 60% weighted average from all year 2 courses and an overall weighted mark of at least 60% for years 1 and 2. To progress automatically from year 3 to 4, a student must normally pass at least 11.0 units altogether, achieve at least 60% weighted average from all year 3 courses and achieve an overall weighted mark of at least 60% for years 1, 2 and 3. The relative weightings used in the calculation of these yearly and overall averages are those specified in the scheme of award for the MSci International Programme (see page 53). A student who fails to meet the rules for progression from year 3 to 4 must transfer to the BSc programme followed in the first two years (there is no opportunity for reassessment of the year abroad). A student who fails to progress from year 2 to 3 cannot go abroad and must transfer to the BSc programme.

The following options are normally available to first and second year students who are not able to proceed to the next year of their degree programme, and to final year students who are not eligible for the award of a degree:

- Take a year out and re-sit any failed examinations at the next available opportunity.
- Register as a part-time student and re-attend some or all of the failed courses. A student choosing this option is responsible for paying the appropriate tuition fees.

Prizes and medals

Departmental

The following sessional prizes may be awarded to students on the Statistics, SEF, SEL, SAMB, Econ/Stats or MSci International programmes:

- Two **Egon Pearson Prizes**: for outstanding performance in the first year;
- Two **Karl Pearson Prizes**: for outstanding performance in the second year;
- **RA Fisher Prize**: for outstanding performance in the final year;
- **Project Prize**: for the best undergraduate project.\(^\text{14}\)

\(^\text{14}\) If the same recipient would otherwise be selected for both the RA Fisher and Project Prizes, there will instead be two RA Fisher Prizes for outstanding performance in the final year (and no Project Prize).
Faculty
The Department may nominate outstanding students for consideration by the MAPS Faculty for the following awards:

- **Kathleen Lonsdale Medal**: a final year student
- **Dean’s Commendation**: final year students
- **Jackson Lewis Scholarship**: a continuing student in any year
- **UCL Scholarships for Excellence**: one first year and one second year student.

Other
- **Royal Statistical Society Prize**: a final year student on an RSS accredited programme.

Referred assessment
If you fail a course by a narrow margin, the option of referred assessment is sometimes available. The referral range of marks differs between UCL teaching faculties:

- For courses taught by departments in the MAPS Faculty (e.g. Statistical Science, Mathematics), the referral range is 30-39%.
- For courses taught by departments in the Arts & Humanities and Social & Historical Sciences Faculties (e.g. Economics, CLIE), there is NO referral range.
- For courses taught by departments in other faculties (e.g. Computer Science, School of Management), the referral range is 35-39%.

If your final mark for any course is in the corresponding referral range, then the option of referred assessment in that course is available if the following conditions are also satisfied:

- You are not in the final year of your degree programme.
- If you are in the first year of your degree programme, you have passed at least 2.5 units altogether.
- If you are in the second year of your degree programme, you have passed at least 6.0 units altogether.
- If the course is taught by a department in the MAPS Faculty, besides the overall mark, you have additionally achieved a mark in the range 30-39% for any unseen examination component.
- If you complete the referral successfully, there is nothing to prevent you from progressing to the next year of your degree programme.

Referred assessment provides you with the opportunity to pass the course before the next normal re-sit opportunity (or a final opportunity to pass the course, if this was already your second attempt). In the Department of Statistical Science, the procedure used for referred assessment for a course is normally the following:

- You are given a choice of dates, normally at the end of August or beginning of September, on which to come into the Department and repeat the paper you took in May, under examination conditions. You should use the intervening period to study the course material in your own time so that you understand how to solve the questions.
- If you obtain a mark of at least 60% on your repeat attempt, you will be awarded a bare pass (40%) for the course. Otherwise, your original mark will remain unchanged.
- For certain courses that cover material of fundamental importance to the remainder of the programme, the referral may involve an additional, unseen assessment component.
If you are offered the opportunity of referred assessment, you do not have to accept it. Other options are:

- To re-sit the examination at the next available opportunity, in the hope of obtaining a mark higher than 40% (not applicable if this was already your second attempt).
- To retain the failed mark.

However, students are normally advised to take up the offer of a referral, even if they can progress without it. (Whilst it is true that a re-sit gives you the opportunity to obtain a mark higher than 40%, most students find it difficult to prepare for a re-sit at the same time as the following year’s examinations.) Note also that students on 3-year programmes must pass at least 11.0 course units to be eligible for the award of an honours degree, so can retain at most 1.0 unit of failed marks in this way. Students on the 4-year MSci International Programme must pass at least 14.5 units to be eligible for the award of an honours degree, so can retain at most 1.5 units of failed marks.

Arrangements for referred assessment in other departments may differ from those in Statistical Science. Further advice about the referral procedure and its consequences will be available to eligible students from the Departmental Tutor.

Further information:

- Undergraduate Referrals

Reassessment

A student who is non-complete for a course or fails a course, and either (i) is ineligible for referred assessment, (ii) has declined the offer of referred assessment, or (iii) fails the referred assessment in that course, may be reassessed on one more occasion only, unless they have been awarded a degree, are eligible for the award of a degree, or have been excluded from UCL on the grounds of academic insufficiency or as a result of misconduct. Students who have passed a module are not permitted to resit or repeat that module.

Further information:

- Reassessment

Timing of reassessment

Reassessment must be made at the next scheduled occasion, which is normally in the next academic session. Students who are on a year abroad at the time of the next scheduled occasion will be re-examined in the summer following their year abroad.

Resit marks

Students will receive the higher of the marks achieved at the first or second attempt, whether for the original module or a substitute module. Marks will be included in the classification calculation for the year in which the module was originally taken.

If the mark obtained at reassessment is in the referral range, students may be offered referred assessment provided they satisfy all other requirements.

Format of reassessment

Students will normally only be reassessed in those module components which they have failed.
**Substitution of failed module(s)**

Subject to faculty approval, modules up to the value of 1.0 course unit across the whole programme may be substituted for modules that have been failed. Students will be required to attend all teaching and undertake all assessment for the new module, but the assessment for the new module will be treated as a second attempt. All applications for the substitution of new modules must be made via the Departmental Tutor for your programme.

**SCHEMES FOR THE AWARD OF HONOURS**

A scheme for the award of honours provides the formula for determining your degree class at the end of your final year. The following pages describe the current schemes for the award of honours.

**Modern foreign language requirements**

UCL is committed to Modern Foreign Language education and requires all UK Honours Degree students to enter UCL with, or have developed by graduation, a basic level of language competence. Students who fail to satisfy the requirement by the end of their programme will not be eligible for the award of an Honours Degree. Students should speak to their personal tutor or programme leader in the first instance if they have any questions about the requirement.

Further information:

- [Modern Foreign Language Requirements](#)

**Award of honours for Statistics, SEF, SEL, SAMB and Econ/Stats**

Degree classification takes place after the examinations in term 3 of your final year. Provided you:

- are complete in 12.0 units (see page 40);
- have taken no more than 1.0 unit of courses at Introductory level (see page 31);
- have passed at least 11.0 units in total;
- have passed at least 3.0 units at Advanced level;

you will be considered for honours. An initial classification is obtained as follows:

- Marks are calculated for each year of your degree programme. The precise details of these calculations vary between programmes and are given below.
- Your final mark is calculated as a weighted average, rounded to the nearest whole number, of the marks for each year of your degree programme. The relative weights attached to the first, second and third year marks are 1, 3 and 5 respectively.
- The resulting final mark is referred to the following table:

<table>
<thead>
<tr>
<th>Final mark</th>
<th>Initial Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 or over</td>
<td>First</td>
</tr>
<tr>
<td>60 to 69</td>
<td>Upper Second</td>
</tr>
<tr>
<td>50 to 59</td>
<td>Lower Second</td>
</tr>
<tr>
<td>40 to 49</td>
<td>Third</td>
</tr>
</tbody>
</table>

In cases where a candidate re-sits a course, the highest available mark is used in the calculation. The resulting mark is credited to the year in which the course was first taken.
Candidates whose overall degree mark falls within 1% of a class boundary may be considered for promotion to the higher class. Examiners will consider the following criteria in such cases, before making the final recommendation of honours class:

- The overall distribution of marks: does the candidate have a majority of marks in any particular class, for example.
- The final-year performance compared with that in earlier years, and whether this is reflected adequately in the weight attached to the third year mark.
- The performance in modules of more advanced level or those with a significant research element.
- Marks that have a particular significance for the overall classification (for example, marks for modules with a high course unit value).

Candidates who do not meet the requirements for an honours classification, but who:

- are complete in at least 11.0 units;
- have passed at least 10.0 units in total;
- have passed at least 2.0 units at Advanced level,

will be offered an ordinary degree. If such a candidate has exhausted all re-sit attempts available to them, they must accept this offer. Otherwise, they may either (i) decline the offer and re-sit any failed examinations at the next available opportunity, with a view to improving their degree classification, or (ii) accept the offer (in which case they have no further right to re-sit any failed examinations).

**Calculation of yearly marks**

In the schemes of award for every degree programme covered by this handbook, the marks from all 4.0 course units are used in the calculation of each yearly mark. A 1.0 unit course is counted as two 0.5 unit courses.

**BSc Statistics**

- The first year mark is a weighted average of all first year course marks; full weight is attached to courses STAT1004 and STAT1005 and to the best unit from your remaining courses, and half weight to the other two units.
- The second year mark is a weighted average of all second year course marks; full weight is attached to STAT2001, STAT2003 and to the best two units of your remaining courses, and half weight to the other unit.
- The third year mark is a weighted average of all third year course marks; full weight is attached to STAT3001, half a unit of STAT3901 and the best two units of remaining courses, and half weight to the other unit.

**BSc Statistics, Economics and Finance**

- The first year mark is a weighted average of all first year course marks; full weight is attached to courses STAT1004 and STAT1005 and to the best unit from your remaining courses, and half weight to the other two units.
- The second year mark is a weighted average of all second year course marks; full weight is attached to STAT2001, STAT2003 and to the best two units of your remaining courses, and half weight to the other unit.
- The third year mark is a weighted average of all third year course marks; full weight is attached to STAT3001, STAT3006 and the best two units of remaining courses, and half weight to the other unit.
**BSc Statistics, Economics and a Language**

- The first year mark is a weighted average of all first year course marks; full weight is attached to courses STAT1004 and STAT1005 and to the best unit from your remaining courses, and half weight to the other two units.

- The second year mark is a weighted average of all second year course marks; full weight is attached to STAT2001, STAT2003 and to the best two units of your remaining courses, and half weight to the other unit.

- The third year mark is a weighted average of all third year course marks; full weight is attached to STAT3001 and the best 2.5 units of remaining courses, and half weight to the other unit.

**BSc Statistics and Management for Business**

- The first year mark is a weighted average of all first year course marks; full weight is attached to courses STAT1004, STAT1005 and to the best unit of remaining courses, and half weight to the other two units.

- The second year mark is a weighted average of all second year course marks; full weight is attached to STAT2001, MSIN7002 and to the best two units of your remaining courses, and half weight to the other unit.

- The third year mark is a weighted average of all third year course marks; full weight is attached to the best three units of courses, and half weight to the other unit.

**BSc (Econ) Economics and Statistics**

- The first year mark is a weighted average of all first year course marks; full weight is attached to courses STAT1004, STAT1005 and ECON1604 (which counts as two half-unit courses), and half weight to the other two units.

- The second year mark is a weighted average of all second year course marks; full weight is attached to STAT2001, half a unit of ECON2601 and to the best two units of your remaining courses, and half weight to the other unit.

- The third year mark is a weighted average of all third year course marks; full weight is attached to the best three units of courses, and half weight to the other unit.

**Illustrative calculations**

When attempting to determine your yearly average or final mark using the above rules, the calculation may be easier to perform if you begin by separating any 1.0 unit courses into two 0.5 unit courses (and attributing the same mark to both), such that you are then dealing with a set of eight marks for each year of your degree programme. Below are two examples to show how the preliminary assessment of honours is calculated.

**Example 1:** a student on the SEF programme obtains marks as follows:

*First year:* STAT1004 63%; STAT1005 53%; ECON1604 28%; marks for all other half-unit courses 72%, 64%, 58%, 46%. The student has only passed 3.0 course units, and the mark for ECON1604 is not high enough for a referral to be offered (see page 47). The student therefore takes a year out, resits ECON1604 at the next available opportunity and obtains a mark of 45%.

*Second year:* STAT2001 38%; STAT2003 64%; marks for all other half-unit courses 68%, 64%, 59%, 53%, 50%, 46%. A referral is offered in STAT2001. The student passes this referral, and is therefore credited with a mark of 40% for this course.

*Third year:* STAT3001 52%, STAT3006 64%, marks for all other half-unit courses 73%, 67%, 63%, 57%, 54%, 48%.
The student meets all the criteria for the award of an honours degree. The marks for each year of the degree programme are calculated as follows:

**First year.** Since ECON1604 is a 1.0 unit course, for the purpose of the calculation it is treated as two 0.5 unit courses, both with a mark of 45%. Full weight is attached to STAT1004, STAT1005 and to the best unit of remaining courses (i.e. to the marks of 72% and 64%); half weight to the remainder. The first year mark is therefore

\[
\frac{(1 \times 63) + (1 \times 53) + (1 \times 72) + (1 \times 64) + (0.5 \times 58) + (0.5 \times 46) + (0.5 \times 45) + (0.5 \times 45)}{1 + 1 + 1 + 1 + 0.5 + 0.5 + 0.5 + 0.5} = 58.17
\]

**Second year.** Full weight is attached to STAT2001, STAT2003 and to the best two units of remaining courses (i.e. to the marks of 73% and 67%); half weight to the remainder. The second year mark is therefore

\[
\frac{(1 \times 64) + (1 \times 40) + (1 \times 68) + (1 \times 64) + (1 \times 59) + (1 \times 53) + (0.5 \times 50) + (0.5 \times 46)}{1 + 1 + 1 + 1 + 1 + 0.5 + 0.5} = 56.57
\]

**Third year.** Full weight is attached to STAT3001, STAT3006 and to the best two units of remaining courses (i.e. to the marks of 73%, 67%, 63% and 57%); half weight to the remainder. The third year mark is therefore

\[
\frac{(1 \times 52) + (1 \times 64) + (1 \times 73) + (1 \times 67) + (1 \times 64) + (1 \times 57) + (0.5 \times 54) + (0.5 \times 48)}{1 + 1 + 1 + 1 + 1 + 0.5 + 0.5} = 61.00
\]

The final mark for this student is obtained by rounding the weighted average

\[
\frac{(1 \times 58.17) + (3 \times 56.57) + (5 \times 61.00)}{1 + 3 + 5} = 59.21
\]

to the nearest whole number. The resulting final mark is 59%. The preliminary classification for this student would therefore be a lower second class degree. However, since the final mark is within 1% of a class boundary, the Board of Examiners has the discretion to award an upper second degree if appropriate (on the basis on the criteria set out on page 50).

**Example 2:** a student on the Econ/Stats programme obtains marks as follows:

**First year:** STAT1004 61%; STAT1005 37%; ECON1604 55%; marks for all other half-unit courses 73%, 66%, 62%, 48%. The student has passed 3.5 course units, but cannot progress to year 2 automatically as these do not include STAT1005. The failed the mark is high enough for a referral to be offered. The student passes this referral, is credited with a mark of 40% for STAT1005 and is therefore able to progress.

**Second year.** STAT2001 27%; ECON2007 52%; ECON2601 58%; marks for all other half-unit courses 71%, 63%, 49%. The student re-sits STAT2001 at the next available opportunity (alongside the third year exams) and obtains a mark of 48%.

**Third year.** Marks for all half-unit courses 71%, 63%, 59%, 56%, 52%, 49%, 49%, 47%.

The student meets all the criteria for the award of an honours degree. The marks for each year of the degree programme are calculated as follows:

**First year.** Since ECON1604 is a 1.0 unit course, for the purpose of the calculation it is treated as two 0.5 unit courses (both with a mark of 55%). Full weight is attached to STAT1004, STAT1005 and ECON1604 (twice); half weight to the remainder. The first year mark is therefore

\[
\frac{(1 \times 61) + (1 \times 40) + (1 \times 55) + (1 \times 55) + (0.5 \times 73) + (0.5 \times 66) + (0.5 \times 62) + (0.5 \times 48)}{1 + 1 + 1 + 1 + 0.5 + 0.5 + 0.5 + 0.5} = 55.92
\]

**Second year.** Since ECON2007 and ECON2601 are both 1.0 unit courses, for the purpose of the calculation they are each treated as two 0.5 unit courses. Full weight is attached to STAT2001, half a unit of ECON2601 and to the best four half units of remaining courses
(i.e. to the marks of 71%, 63%, 58% and 52%); half weight to the remainder. The second year mark is therefore

\[
\frac{(1 \times 48) + (1 \times 58) + (1 \times 71) + (1 \times 63) + (1 \times 58) + (1 \times 52) + (0.5 \times 52) + (0.5 \times 49)}{1 + 1 + 1 + 1 + 1 + 1 + 0.5 + 0.5} = 57.21
\]

**Third year.** Full weight is attached to the best 3.0 units (i.e. to the marks of 71%, 63%, 59%, 56%, 52% and 49%); half weight to the remainder. The third year mark is therefore

\[
\frac{(1 \times 71) + (1 \times 63) + (1 \times 59) + (1 \times 56) + (1 \times 52) + (1 \times 49) + (0.5 \times 49) + (0.5 \times 47)}{1 + 1 + 1 + 1 + 1 + 1 + 0.5 + 0.5} = 56.86
\]

The final mark for this student is obtained by rounding the weighted average

\[
\frac{(1 \times 59.92) + (3 \times 57.21) + (5 \times 56.86)}{1 + 3 + 5} = 56.87
\]

to the nearest whole number. The resulting final mark is 57%. The preliminary classification for this student would therefore be a lower second class degree. As the final mark does not lie within 1% of a class boundary, the Board of Examiners would not be able to give any consideration to adjusting the classification.

**Award of honours for the MSci International Programme**

Degree classification takes place after the examinations in term 3 of your final year. Provided you:

- are complete in 16.0 units (see page 40);
- have taken no more than 1.0 unit of courses at Introductory level (see page 31);
- have passed at least 14.5 units in total;
- have passed at least 3.0 units at Masters level;
- have passed in statistical project work amounting to the equivalent of at least 1.0 unit undertaken in the third and/or fourth year,

you will be considered for honours. An initial classification is obtained as follows:

- Marks are calculated for each year of your degree programme. For the calculation of each yearly mark, a 1.0 unit course is counted as two 0.5-unit courses. The first and second year marks are calculated in the same way as for the corresponding BSc programme (see above). The third year mark is a weighted average of all third year courses, with full weight attached to the best three units and half weight attached to the remainder. The fourth year mark is an average of all fourth year courses, in which all units are given equal weight.

- Your final mark is calculated as a weighted average, rounded to the nearest whole number, of the marks for each year of your degree programme. The relative weights attached to the first, second, third and fourth year marks are 1, 3, 2.5 and 5 respectively.

- The resulting final mark is referred to the following table:

---

15 In general, the degree awarded according to the scheme of awards of honours is an MSci in Statistical Science (International Programme). The title might be modified to take the specific course choice into account, i.e. the examiners will determine the degree title with reference to the subjects taken and, where appropriate, the UCL rules for combined degrees.

16 The description given here is standard for MSci programmes within the UCL Faculty of Mathematical and Physical Sciences. In practice however, students on the International Programme spend their third year abroad and, since other universities do not operate the same course unit system as does UCL, it is necessary to translate their marks to a “UCL equivalent” for the purposes of degree classification. The translation is done on a case-by-case basis, taking into account the known correspondence between marking scales at different institutions as well as any relevant individual circumstances. No attempt is made to translate marks for individual courses: rather, a single mark for the year abroad is recorded and this is treated as a 4.0 unit course for the purpose of applying the formula described above.
<table>
<thead>
<tr>
<th>Final mark</th>
<th>Initial Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 or over</td>
<td>First</td>
</tr>
<tr>
<td>60 to 69</td>
<td>Upper Second</td>
</tr>
<tr>
<td>50 to 59</td>
<td>Lower Second</td>
</tr>
<tr>
<td>40 to 49</td>
<td>Third</td>
</tr>
</tbody>
</table>

In cases where a candidate re-sits a course, the highest available mark is used in the calculation. The resulting mark is credited to the year in which the course was first taken. Candidates whose overall degree mark falls within 1% of a class boundary may be considered for promotion to the higher class. Examiners will consider the following criteria in such cases, before making the final recommendation of honours class:

- The overall distribution of marks: does the candidate have a majority of marks in any particular class, for example.
- The final-year performance compared with that in earlier years, and whether this is reflected adequately in the weight attached to the third year mark.
- The performance in modules of more advanced level or those with a significant research element.
- Marks that have a particular significance for the overall classification (for example, marks for modules with a high course unit value).

Students registered on the MSci programme, who have failed to meet the criteria for a MSci Degree, will be offered a BSc Degree provided that they:

- are complete in at least 12.0 units;
- have passed at least 11.0 units in total;
- have passed at least 3.0 units at Advanced / Masters level.

If such a candidate has exhausted all re-sit attempts available to them, they must accept this offer. Otherwise, they may either (i) decline the offer and re-sit any failed examinations at the next available opportunity, with a view to improving their degree classification, or (ii) accept the offer (in which case they have no further right to re-sit any failed examinations).

**Award of honours for the MASS programmes**

Schemes of award are available from the Mathematics Department.

**CHANGES TO REGISTRATION STATUS**

Students wishing to make changes to their registration status should first discuss their plans with their Personal Tutor or the Departmental Tutor who can explain the options available and help students to make the right decision. Students should also ensure that they read the relevant sections of the UCL Academic Manual before making any requests to change their academic record.

**Statistics, SAMB, SEF, SEL and Econ/Stats students:** please consult the Departmental Tutor (this applies for courses in any subject). For Econ/Stats students, there is also a tutor available in the Department of Economics whom you may consult about the Economics courses in the degree programme.

**International Programme students:** please consult the Departmental Tutor (this applies for courses in any subject). For organisation of the year abroad, please consult the Study Abroad Tutor.
MASS students: please consult the Departmental Tutor in the Department of Mathematics (this applies for courses in any subject). You may also consult the Statistics Tutor to MASS Students about the Statistics courses in the degree programme.

Further information:
- Changes to Registration Status

Changing programme

If a student wishes to transfer from one UCL degree programme to another, they must make a formal application. The normal deadline for change of degree programme during the academic session is 31 October each year. Students should log in to their Portico account and complete the online application under the 'C2RS Home' menu. Students are strongly advised to discuss their plan with the departments involved before requesting a change of programme on Portico.

Further information:
- Programme Transfers

Tier 4 students and changing programmes

Only some Tier 4 students are permitted to change their programme at UCL without first completing their previous programme. There are some circumstances where a Tier 4 student is permitted to change programme, however please be aware that this could affect your current Tier 4 visa and you could be required to apply for a new visa from outside the UK. Changing to a programme at a lower level than your previous/current programme is not permitted under Tier 4 regulations.

If you are thinking of changing programmes at UCL and you hold a Tier 4 visa, please get in touch with the Visa Compliance Team for further information: visacompliance@ucl.ac.uk.

Interruption of studies

If a student requires a temporary break from their studies and plans to resume their programme at a future date, they must apply for a formal Interruption of Study.

Further information:
- Interruption of Study

Withdrawing from a programme

If a student wishes to leave their degree programme prior to completing their final examinations they must apply for a formal withdrawal from their studies. Once withdrawn, the student cannot return to the programme at a later date. Applications must be made in advance of the effective date of change. Students should log in to their Portico account and complete the online application under the 'C2RS Home' menu.

STUDENT SUPPORT AND WELLBEING

Central wellbeing and support services

UCL is committed to the wellbeing and safety of its students and tries to give assistance wherever possible to ensure that studying at UCL is a fulfilling, healthy and enjoyable experience. There is a wide range of support services for students - the Current Students
Support website provides more information. Students should be aware that, while there are many services on offer, it is their responsibility to seek out support and they need to be proactive in engaging with the available services.

The Student Centre
The Student Centre provides front-line administrative services to UCL students and is an excellent source of information about the services provided by Student Support and Wellbeing. They can also provide advice about a range of Student Records enquiries and fulfil requests for proof of student status.

Further information:
- Student Centre website

Student Disability Services
Student Disability Services provide a comprehensive range of support services for students who have a disability which impacts upon their studies at UCL. They support students with physical and sensory impairments, specific learning difficulties, autistic spectrum disorders, mental health difficulties, and long-term health conditions. As well as arranging for adjustments to learning environments, the team loan out specialist equipment and provide one-to-one tutoring and support for students with specific learning difficulties.

Further information:
- Student Disability Services

Student Psychological Services
Student Psychological Services is dedicated to helping UCL students with personal, emotional and psychological concerns. The Student Psychological Services Team is diverse and consists of a variety of highly trained and experienced professionals, who offer short-term CBT and psychodynamic support. There are currently two psychiatrists and ten therapists on staff with varying kinds of psychological training and expertise.

Further information:
- Student Psychological Services

International student support and welfare
The International Student Support and Welfare Team provide specialist support and advice for all non-UK students at UCL. As well as immigration information, they help to support students through the transition to university in the UK by organising the International Student Orientation Programme (ISOP) at the start of each term, and arranging regular workshops for international students which tackle particular issues.

Further information:
- International Student Support and Welfare

Study abroad support
The Study Abroad Team provide administrative and welfare support to all undergraduate students undertaking a period abroad as part of their studies, working with colleagues across academic departments in order to advise and guide students from application through to their return to studies at UCL.

Further information:
- Study Abroad website
Accommodation

UCL Residences provides a range of accommodation options including three Halls of Residence, self-catered student houses and intercollegiate halls shared with other colleges of the University of London. Each Hall has a Warden and Vice-Warden to support students and foster a positive environment within the accommodation.

Further information:
- Wardens and Vice Wardens at UCL Residences

Financial support

At UCL we understand students can face a range of financial issues. We aim to help and advise students as much as possible, so that they have more control over their own financial situation. The Student Funding Team offer online information and one-to-one support through appointments as well as a drop-in service. Students with a more complex or sensitive circumstances can make an appointment with the Student Funding Welfare Adviser.

Further information:
- UCL Financial Support

Transition Mentors

The UCL Transition Programme supports new first-year students at UCL, helping them to settle in quickly and achieve their potential. Each first-year student is assigned a Transition Mentor for their first term. Transition mentors are later-year students within each department who work with small groups of students on a weekly basis to help them settle in to UCL and London as well as focussing on academic issues and topics specific to their degree programme. First-year students meet their Transition Mentor during the first week of term at their department’s ‘Meet your Mentor’ session.

Further information:
- UCL Transition website

Student of Concern

There are many sources of support for students who are having difficulties, but sometimes it is hard to know how to help a student who appears to be struggling, particularly if they seem unwilling or unable to seek the help they need. Anyone concerned about the behaviour of a student, who believes the problem may be related to health and wellbeing issues, is encouraged to complete the online UCL Student of Concern Form. Depending on the concerns raised, Student and Registry Service may respond by offering support or advice to the student or the person who submitted the form, liaise with support services or, if necessary, work with the relevant authorities to ensure the student is safe.

Further information:
- Student of Concern

Registering with a doctor and out-of-hours support services

Registering with a doctor

Students are strongly encouraged to register with a doctor as soon as possible after they arrive in London so that they can access healthcare as quickly as possible if they become ill or injured. When attending a university in the UK students are also advised to be vaccinated against Meningitis C.
The Ridgmount Practice is a National Health Service (NHS) practice providing healthcare and dental services for students living within its catchment area (i.e. near the main UCL campus). Students can also choose to register with a practice closer to where they live if they prefer. The Ridgmount Practice also runs a Walk-in Surgery which any UCL student can attend, even if they are not registered with the practice.

Further information:
- Register with a Doctor
- Ridgmount Practice website

*Out-of-hours support and information helpline*

UCL works in partnership with Care First to provide an out-of-hours support and information helpline. The helpline is free of charge and includes access to information specialists who are trained by Citizens Advice and to professionally-qualified and BACP-accredited counsellors who can help students with a range of emotional and psychological difficulties.

Further information:
- Care First

*Crisis support - immediate help*

If a student is in crisis there are a range of UCL and external sources of help such as Nightline, Ridgmount Medical Practice, Hall Wardens, Student Psychological Services and the Samaritans.

Further information:
- Crisis Support – immediate help

*Equality and diversity*

UCL fosters a positive cultural climate where all staff and students can flourish, where no-one will feel compelled to conceal or play down elements of their identity for fear of stigma. UCL is a place where people can be authentic and their unique perspective, experiences and skills seen as a valuable asset to the institution. The Equalities and Diversity website brings together a range of information on issues relating to race, gender, religion and belief, sexual orientation, and disability amongst other equalities initiatives at UCL.

*Departmental Equal Opportunity Liaison Officers*

Departmental Equal Opportunity Liaison Officers (DEOLOs) provide support and assistance for students and staff about issues relating to equalities and diversity. The DEOLO for the Department of Statistical Science is **Ms KA Leport** (room 120, k.leport@ucl.ac.uk).

Further information:
- Equalities and Diversity
- Support for Pregnant Students
- Support for Students who are Parents
- Religion and Belief Equality Policy for Students
- UCL LGBT Student Support Pages
- UCL Chaplain and Inter-Faith Adviser
- DEOLOs (Departmental Equal Opportunity Liaison Officers)
UCL’s zero tolerance policy on harassment and bullying

**Harassment and bullying**

Every student and member of staff has a right to work and study in a harmonious environment. UCL will not tolerate harassment or bullying of one member of its community by another or others and promotes an environment in which harassment and bullying are known to be unacceptable and where individuals have the confidence to raise concerns in the knowledge that they will be dealt with appropriately and fairly.

Further information:
- UCL Policy on Harassment and Bullying
- UCLU Rights & Advice Centre

**Sexual harassment**

It is unacceptable for any person at UCL, whether staff or student, to be subjected to any unwanted and persistent behaviour of a sexual nature. UCL is working with UCLU to implement a two-year action plan to tackle issues of sexual harassment and make sure that staff and students have access to relevant training. Any UCL student experiencing sexual harassment may access confidential support from a range of sources including their personal tutor or any other member of staff in their department or faculty who they trust, their Hall Warden, a UCLU student officer, the trained staff in the UCLU Rights & Advice Centre, or the UCL Student Mediator.

Further information:
- UCLU Zero Tolerance to Sexual Harassment

**Support for students who have been affected by sexual violence**

UCL will do its utmost to support anyone who has been, or is being, affected by sexual violence. If a student would like to talk to somebody at UCL, the Student Support and Wellbeing Team can offer advice on the support available both internally and externally.

Further information:
- Support for Students Who Have Been Affected by Sexual Violence

**STUDENT REPRESENTATION**

**University College London Union (UCLU)**

UCLU is the students’ union at UCL. As the student representative body, it is run by students for students. UCLU is independent of UCL and a registered charity, providing a range of services to support UCL students and help them develop skills and interests while at UCL. UCL students are automatically members of UCLU (but can opt out), and the Union is run by seven full-time student sabbatical officers who are elected by cross-campus ballot each year and take a year out of their studies in order to work for the Union. These officers represent students on various UCL committees and campaign on the issues that matter to students.

Further information:
- UCLU website
- Membership information (including how to opt out)
- Elections information (including how to run for office)
Student societies

UCL students currently run over 250 different clubs and societies through UCLU, providing a wide range of extra-curricular activities for students to get involved with during their time at UCL.

Further information:

- [UCLU Clubs & Societies](#)

Student Academic Representatives (StARs)

The principal function of UCLU is to represent the needs and interests of all UCL students at the university, regional and national level. Central to this mission are elected Student Academic Representatives (StARs).

StARs are elected to represent students’ views and interests. They sit on various departmental, faculty and University level committees and act as the voice of students, ensuring that UCL takes the needs of students into account in its decision-making. StARs also liaise with UCLU and UCL staff to resolve issues.

Being a StAR is an opportunity not to be missed. Participants can gain a StARs certificate and, if applicable, Higher Education Achievement Report (HEAR) accreditation in recognition of their contribution to students and UCL. StARs receive training for their role and additional skill building sessions such as public speaking, assertiveness and negotiation. They work on real issues and make changes to teaching, assessment and local facilities.

Further information:

- [StARs website](#)
- [Find your StAR](#)
- [Become a StAR](#)

Staff-Student Consultative Committee

Every department at UCL has a Staff-Student Consultative Committee (SSCC) that meets at least twice a year. The SSCC provides a forum for discussion between staff and student representatives (StARs). This is an important opportunity for students to give feedback on their learning experience and is central to maintaining and improving the quality of education at UCL.

It is possible in principle for every interested student to attend the committee meetings (subject to space restrictions). The minutes of previous meetings are available on the DOSSSH Moodle page for students to consult.

Departmental Teaching Committee

This committee oversees the organisation and structure of the degree programmes and courses offered by the Department. It also considers teaching matters arising from meetings of the Staff-Student Consultative Committee. Student representatives (including at least one from each undergraduate year group) are invited to Departmental Teaching Committee meetings.
UCLU Rights & Advice Centre

The UCLU Rights & Advice Centre is a service available to UCL students to help with any difficulties that might occur while at UCL. The Rights & Advice Centre’s trained and experienced caseworkers can give advice about:

- **Immigration** - including applying for a Tier 4 visa
- **Academic issues** - including examination irregularities and student complaints
- **Housing** - including contract checking and housemate disputes
- **Employment** - including unpaid wages and part time employment contracts
- **Many other legal and university matters**

Students can make an appointment or attend a drop-in session for free, confidential and independent advice and support.

Further information:

- [UCLU Rights & Advice Centre](#)

Student complaints

UCL aims to ensure that every student is satisfied with their experience of UCL. However we recognise that from time to time problems do arise and students may wish to express concern or dissatisfaction with aspects of UCL or the quality of services provided.

**Informal resolution**

Many complaints can be resolved at an informal or local level without needing to submit a formal complaint. Students can speak to their Personal Tutor, Programme Leader, Departmental or Faculty Tutor, or Student Academic Representative (STAR) if they have any concerns about their programme. They can also speak to the UCL Student Mediator or the UCLU Rights and Advice Service. UCL strongly encourages this kind of resolution and does expect students to have attempted some form of informal resolution before making a formal complaint.

**Formal complaints**

If an issue cannot be resolved at a local level, students may feel they need to submit a formal complaint using UCL’s Student Complaints Procedure. UCL aims to ensure that all complaints are treated fairly, impartially, effectively and in a timely manner, without fear of victimisation. The Complaints Procedure applies across all Schools, Faculties, Academic Departments and Professional Service Divisions.

Further information:

- [Student Complaints Procedure](#)
- [UCL Student Mediator](#)

STUDENT FEEDBACK

UCL’s goal is to put students’ feedback, insights and contributions at the heart of our decision-making. We value students’ feedback and work with students as partners in the process of shaping education at UCL. In recent years, as a direct result of student feedback, we extended library opening hours, opened new study spaces and scrapped graduation ticket fees for students.
The Department is very interested in how students feel about studying Statistics at UCL and how well we are doing according to the students’ point of view. There are a number of ways in which students can give feedback to the Department, some of which are detailed below. Students are also encouraged to give individual feedback to their Personal Tutor (regarding general issues) and to the course lecturers (regarding specific courses). The Department will try its best to take students’ opinions into account wherever possible.

**Student surveys**

One of the principal ways in which UCL gathers and responds to student feedback is via online student experience surveys such as the National Student Survey, The Postgraduate Taught Experience Survey and the Student Barometer. Whether it’s about teaching, accommodation, or facilities, surveys are a chance for students to have their say about what works and what needs improving, to help us make sure that UCL is as good as it can be for current and future students. Each survey usually takes just a few minutes to complete, all responses are anonymous and some include a generous prize draw. Every piece of feedback is read and the results of each survey are then shared with staff right across UCL – including President & Provost Michael Arthur.

Further information:
- UCL Student Surveys

**Student evaluation questionnaires**

Departments also run student evaluation questionnaires on individual modules throughout the year. This gives students the opportunity to feedback about the teaching on their specific modules, helping departments to continuously improve learning, teaching and assessment. Feedback from SEQs feeds into the Annual Student Experience Review process.

The Department relies on feedback from as many students as possible in order to get a clear picture of how well the courses are running and whether improvements can be made. You will be asked to complete a questionnaire for each course that you take. This is usually done during the last two weeks of a course. You are expected to take this exercise seriously. Anonymity is preserved and space is provided on the questionnaires for additional comments if you feel that is required (positive comments are also helpful; frivolous comments will be discounted).

**The Annual Student Experience Review (ASER)**

UCL’s Annual Student Experience Review (ASER) process requires all departments to undertake an annual self-evaluation and produce a development plan for how they plan to improve in the coming year. The self-evaluation involves looking at student feedback from surveys and student evaluation questionnaires as well as other data about student performance and academic standards, such as the feedback provided by the External Examiner, which helps departments to understand what is working well and what might need improving. Student Academic Representatives (StARs) are active participants in the evaluation process and creation of the development plan through discussions at departmental and faculty committees, giving students an important role in identifying and planning improvements within their department. Students can view the completed reports and action plans on the faculty/departmental intranet.

Further information:
- Annual Student Experience Review
UCL ChangeMakers

UCL ChangeMakers encourages students and staff to work in partnership with each other on educational enhancement projects to improve the experiences of students across UCL. UCL ChangeMakers Projects supports students and staff in running projects to improve the learning experience at UCL. Anyone with an idea, or who wants get involved, can submit a proposal for funding and support. UCL ChangeMakers ASER facilitators are students who work with Student Academic Representatives and staff in selected departments to formulate the departmental educational enhancement action plan.

Further information:
- [UCL ChangeMakers](#)

EMPLOYABILITY AND CAREERS

Careers information

Within the Department, there is a careers noticeboard in the Students’ Common Room. Job advertisements and information about careers talks, fairs and courses are posted there. There are special careers talks arranged by the Careers Tutor for students from each year, including first years.

You may approach members of the academic and teaching staff for a job reference. However, please note that staff cannot supply a reference without your written permission (see page 11). If you require a reference, therefore, you should fill in a form, available from the Departmental Office and the DOSSSH Moodle page (see page 9). This form also contains space for you to provide other relevant information (for example, a description of the position / course you are applying for, and a brief CV). This kind of information will enable staff to write constructive references for you.

UCL Careers

UCL Careers provides a wide variety of careers information, one-to-one guidance and events for UCL students and recent graduates, and assists them through the entire job hunting process, including exploring options, searching for vacancies, preparing CVs and applications, practicing for interviews, aptitude tests or assessment centres, and providing access to recruitment fairs and other employment-related events. They can also advise on exploring options for further study and funding. These specialised services and events are available to graduates, international students and Master’s students for up to two years following course completion.

UCL Careers also supports work-related learning, including internships and placements. UCL students who are required to complete a placement or internship as part of certain courses are supported in their search, application, and work by UCL Careers. Students can also sign up for UCL Talent Bank, a shortlisting service connecting students to small and medium sized organisations.

Further information:
- [UCL Careers](#)
Professional accreditation

Royal Statistical Society (RSS)

The Royal Statistical Society ([https://www.rss.org.uk/](https://www.rss.org.uk/)) accredits university degree programmes at undergraduate and MSc level for a particular year on the basis of information supplied by the university. For undergraduate degrees, accreditation means that graduates for that year will automatically be granted Graduate Statistician (GradStat) status on application to the RSS, provided that at least second class honours has been achieved. Applicants must already be Fellows of the RSS or become Fellows concurrently.

Five undergraduate programmes offered by the Department of Statistical Science (Statistics, SEF, SEL, SAMB and the MSci International programme) have been accredited for the year 2015/16, as have the MASS BSc and MSci programmes. In some of these cases, qualification for GradStat status requires that at least 50% of the courses selected in the second and third years are chosen from amongst those offered in the Department of Statistical Science. The Econ/Stats programme has not been accredited. Graduates with this degree may apply individually for GradStat status; they will need to provide a transcript of courses taken.

Accreditation will be renewed annually subject to RSS approval of any amendments to the programmes of study and the syllabuses of constituent courses.

Management courses

The Chartered Institute of Marketing ([http://www.cim.co.uk/](http://www.cim.co.uk/)) has accredited some Management courses taken by SAMB students: MSIN7009 Introduction to Marketing, MSIN3002 Marketing Communications, and MSIN3006 Digital Marketing. The School of Management has also been awarded “Partner in Learning” status with Institute of Chartered Accountants in England and Wales (ICAEW, [http://www.icaew.com/](http://www.icaew.com/)).

Industrial placement schemes

The Department is sometimes contacted by companies (e.g. actuarial, pharmaceutical) that are offering work placement schemes. These are normally taken at the end of the second year of a degree programme. Following the placement, undergraduate students return to complete the final year of their studies. Details of the arrangements for the current year will be emailed to all students when available.

These schemes are open to all students in principle, although Tier 4 students will need to check that their visa allows them to participate and subsequently to complete their studies, since for visa purposes a work placement is likely to be regarded by the UKBA as “full-time employment” rather than “full-time education”. Any student who is potentially interested in one of these schemes should discuss it further with the Departmental Tutor.

Entrepreneurship at UCL

UCL has a long and successful track record of supporting spin-outs and start-ups developed by its academic and student communities. Many of the student and staff entrepreneurs have won external awards and achieved substantial investment allowing their enterprises to grow and reach their full potential. UCL offers a wide range of support to students ranging from training programmes, advice on whether an idea has commercial potential, one-to-one sessions with business advisers, funding, competitions and incubator space to help them start or grow their business.

Further information:

- UCL Enterprise
UCL Global Citizenship Programme

The UCL Global Citizenship Programme is a two-week programme for UCL undergraduates and taught postgraduates offering the chance to put their studies in a global context, learn new skills and see the world differently. The Programme runs for two weeks after summer exams have finished, providing a range of opportunities to help students boost their studies, enhance their future and make an impact on the world. Participation is free and open to all UCL undergraduate and taught postgraduate students on a first come, first served basis.

Further information:
- UCL Global Citizenship Programme

HEALTH, SAFETY AND SECURITY

Health, safety and security at UCL

UCL’s overall objective is to provide and maintain a safe and healthy environment for staff, students, people who work with UCL and those who visit. Health and safety is an integral part of the way in which UCL’s activities are managed and conducted. The UCL Safety Services webpage includes further information about health and safety policies and useful guidance and tools for risk assessment. The UCL Security Services webpage includes information regarding security operations, emergency contacts and tips for staying safe at UCL.

Further information:
- UCL Health and Safety Policy
- UCL A-Z Safety Guidance
- General Fire Safety for UCL Students
- UCL Security Services
- Staying Safe at UCL

AFTER STUDY

Transcripts

All graduating students will receive an official transcript, detailing examinations taken and results achieved. Transcripts are issued automatically and sent to the contact address held on Portico. Additional transcripts are available via the UCL Transcript Shop.

Transcripts for affiliate students are issued automatically upon the students’ completion of their study at UCL and are issued to the student’s home university or posted to the student’s contact address.

Further information:
- Transcripts

Higher Education Achievement Report (HEAR)

The Higher Education Achievement Report (HEAR) is an electronic transcript of a student’s verified academic results and approved non-academic achievements whilst at UCL. Students who commenced their studies in or after September 2011 will have a HEAR made available to them online, via our HEAR provider, Gradintel, each summer - new students will
be invited to register for this facility during their first year of study and throughout their students. Students can share their HEAR, free of charge, as a secure electronic token with third parties via their registered Gradintel account.

Further information:
- Higher Education Achievement Report

UCL Alumni Online Community
The UCL Alumni Online Community is a global network of more than 200,000 former students of UCL. Alumni can take advantage of a wide range of benefits, services and discounts – on campus, across the UK and globally – including the Alumni Card, access to thousands of e-journals and library services and a free UCL-branded email service. The UCL Alumni Online Community also posts information about events and reunions happening around the world and other ways to get involved, including the UCL Connect professional development series.

Further information:
- UCL Alumni

COURSE INFORMATION
The following pages give more details, including outline syllabuses, of the courses offered by the Department of Statistical Science that are included in the Statistics, SEF, SEL, SAMB, Econ/Stats and MASS degree programmes. For most courses, some indication is also given of areas where the course material may be applied in practice; this is to help students decide which options might be most suitable for them.

- Details of all undergraduate courses offered by the Department of Computer Science are available at: http://www.cs.ucl.ac.uk/students/syllabus/ug/.
- Details of all undergraduate courses offered by the Department of Economics are available at: http://www.ucl.ac.uk/economics/undergraduate/module-list.
- Details of all undergraduate courses offered by the UCL Centre for Languages and International Education are available at: http://www.ucl.ac.uk/clie/CourseUnits.
- Details of all undergraduate courses offered by the School of Management are available at: https://www.mgmt.ucl.ac.uk/study.
- Details of all undergraduate courses offered by the Department of Mathematics are available at: http://www.ucl.ac.uk/maths/courses/undergraduates/.
- Details of all undergraduate courses offered by the Department of Science & Technology Studies are available at: http://www.ucl.ac.uk/sts/study.

Some of the information provided in the following pages is based on the courses as taught on the previous occasion and so may be out-of-date. The most likely changes are in the booklists and numbers of exercises.
Courses offered by the Department of Statistical Science

First Year

STAT1004
INTRODUCTION TO PROBABILITY AND STATISTICS (0.5 UNIT)

Level: First

Aims of course: To provide an accessible and application-oriented introduction to basic ideas in probability and statistics. Together with STAT1005 and STAT1006, this provides the foundation for further study of statistics in the degree programmes offered by the Department of Statistical Science or jointly with other Departments. It may also serve as a foundation course for students taking a Statistics stream as part of a Natural Sciences degree.

Objectives of course: On successful completion of the course, a student should understand, at an intuitive level, the basic concepts in probability theory; be able to use fundamental laws of probability to solve simple problems; recognise simple situations in which standard univariate probability distributions may be useful, and apply results for these distributions as appropriate in these situations; be able to choose and apply appropriate simple techniques for the presentation and description of data; understand the concepts of a probability model and sampling variability; and be aware of the need to check assumptions made when using a given probability model.

Applications: This course motivates the use of probability and statistics in a wide range of application areas. Recent high-profile statistical applications in areas such as politics, road safety, space travel, public health and criminal justice are discussed. Smaller teaching examples come from astronomy, medicine, meteorology, education, genetics, finance and physics.

Prerequisites: Grade A in GCE A Level Mathematics, or equivalent.


Texts:

Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2 ½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work: Weekly sets of exercises. These will not count towards the examination grading.

Timetabled workload:
Lectures: 3 hours per week.
Tutorials: 1 hour per week.
STAT1005
FURTHER PROBABILITY AND STATISTICS (0.5 UNIT)

Level: First

Aims of course: To introduce a formal framework for the study of probability and statistics, building on the intuitive concepts introduced in STAT1004. Together with STAT1004 and STAT1006, this provides the foundation for further study of statistics in the degree programmes offered by the Department of Statistical Science or jointly with other Departments. It may also serve as a core course for students taking a statistics stream as part of a Natural Sciences degree.

Objectives of course: On successful completion of the course, a student should be able to derive simple results in probability using an axiomatic approach; know how to derive properties of discrete and continuous univariate probability distributions; be able to give an informal statement of the Central Limit Theorem for independent identically distributed random variables; and be able to calculate confidence intervals and carry out hypothesis tests in simple situations; be able to run a simple linear regression and interpret the results.

Applications: Probability and statistics have applications in almost every field of quantitative investigation; this course introduces techniques that are applicable in a variety of simplified real-life situations, and provides the foundations for the advanced methods required in more complex problems.

Prerequisites: Grade A in GCE A Level Mathematics, or equivalent, and STAT1004.

Course content: Axioms of probability, conditional probability, combinatorics. Discrete and continuous random variables: probability mass functions, probability density functions, distribution functions, expectation and variance, revision of necessary integration techniques, moment generating functions. Further distributions (negative binomial, hypergeometric, gamma). Transformations of random variables, idea of Central Limit Theorem. Introduction to point estimation methods. Definitions, properties and use of chi-squared, t and F distributions. Sampling distributions, standard errors, confidence intervals and significance. Methods applicable to binomial, Poisson and normally distributed data for one and two sample problems. Inference in the simple linear regression model.

Texts:

Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course.
2 ½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work: Weekly exercises and/or practical assignments. These will not count towards the examination grading.

Timetabled workload:
Lectures: 3 hours per week.
Tutorials: 1 hour per week.

STAT1006
INTRODUCTION TO PRACTICAL STATISTICS (0.5 UNIT)

Level: First

Aims of course: To provide training in the basic skills of practical statistics using a statistical software package. Together with STAT1004 and STAT1005, this provides the foundation for further study of statistics in the degree programmes offered by the Department of Statistical Science or jointly with other Departments.

Objectives of course: On successful completion of the course, a student should be able to use the R statistical software package for data analysis and simulation; be able to identify and carry out an appropriate statistical analysis of a simple data set using a computer; and be able to interpret the output
from a statistical software package when used for simple statistical analyses.

Applications: Modern statistical analysis in practice is almost entirely computer-based, and statistical software packages are widely used in all areas of quantitative investigation. The R package is widely used and extremely powerful, thereby providing students with a solid basis for using other packages in a wide variety of application areas.

Prerequisites: Grade A in GCE A Level Mathematics, or equivalent, and simultaneous or previous attendance on both STAT1004 and STAT1005.

Course content: Practical application of the methods taught in STAT1004 and STAT1005, in workshops. Use of the R statistical computing package for data analysis and simulation.


Assessment for examination grading: In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. One piece of extended coursework. The final mark is a 3 to 1 weighted average of the extended coursework and in-course assessment marks. There is no examination for this course. Students failing to submit either assessment will be declared non-complete for the course.

Other set work: Regular exercises and/or practical assignments. These will not count towards the examination grading.

Timetabled workload: Workshops: 2 hours per fortnight.

ECON160417
ECONOMICS I (COMBINED STUDIES)
(1 UNIT)

Level: First

Aims of course: To provide an analytical introduction to the core concepts of microeconomics and macroeconomics for students on combined-studies programmes with a high quantitative content. To provide the foundations for the second year course ECON2601.

Objectives of course: On successfully completing the course, students should: be familiar with many of the core concepts in modern economics and be able to use these concepts in thinking about a range of issues and problems in the real economy; be able to apply these concepts, along with quantitative techniques acquired elsewhere in their degree programme, to solve stylised numerical or algebraic economic problems; be able to move without undue difficulty to the more advanced economic analysis encountered in the second year of the programme.

Course content:
Microeconomics: Purpose and structure of economic models; supply-and-demand models; consumers and demand analysis; production and cost; business decisions and market structure; market failures and possible policy responses. Macroeconomics: Introduction to macroeconomics, equilibrium in the goods and financial markets, the IS-LM model, the effects of monetary and fiscal policy, the labour market, frictional unemployment, the AS-AD model, the Phillips curve, disinflationary policies, openness in goods and financial markets, depreciation and the trade balance, exchange-rate regimes, the Mundell-Fleming model.


17 This course comes under the Economics Department’s examination board, but is taught by staff based in the Departments of Statistical Science and Mathematics.
Second Year

STAT2001
PROBABILITY AND INFERENCE (0.5 UNIT)

Level: Intermediate

Aims of course: To continue the study of probability and statistics beyond the basic concepts introduced in STAT1004 and STAT1005. To provide further study of probability theory, in particular as it relates to multivariate random variables, and to introduce formal concepts and methods in statistical estimation.

Objectives of course: on successful completion of the course, a student should have an understanding of the properties of joint distributions of random variables and be able to derive these properties and manipulate them in straightforward situations; recognise the $\chi^2$, $t$ and $F$ distributions of statistics defined in terms of normal variables; be able to apply the ideas of statistical theory to determine estimators and their properties satisfying a range of estimation criteria.

Applications: As with other core modules in probability and statistics, the material in this course has applications in almost every field of quantitative investigation; the course introduces general-purpose techniques that are applicable in principle to a wide range of real-life situations.

Prerequisites: STAT1004 and STAT1005, or their equivalents. MATH6401 and MATH6402, or their equivalents.

Course content: Joint probability distributions: joint and conditional distributions and moments; serial expectation; multinomial and multivariate normal distributions. Transformation of random variables: distributions; approximation of moments; order statistics. Moment and probability generating functions: properties; sums of independent random variables; Central Limit Theorem. Relations between standard distributions: $\chi^2$, $t$ and $F$ distributions. Statistical estimation: bias, mean square error, consistency; method of moments, least squares, maximum likelihood, Cramé-Rao lower bound. Simple examples will be used throughout to motivate and illustrate the topics discussed.

Texts:

Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work:
Occasional Moodle quizzes. These will not count towards the examination grading.

Timetabled workload:
Lectures: 3 hours per week. Tutorials: 1 hour per week.

STAT2002
LINEAR MODELS AND THE ANALYSIS OF VARIANCE (0.5 UNIT)

Level: Intermediate

Aims of course: To provide an introduction to linear statistical modelling and to the analysis of variance with emphasis on ideas, methods, applications and interpretation of results.

Objectives of course: On successful completion of the course, a student should have an understanding of the basic ideas underlying multiple regression and the analysis of variance; be able to analyse, using a statistical package, data from some common experimental layouts and carry out and interpret simple and multiple regression
analyses; understand the assumptions underlying these analyses and know how to check their validity.

Applications: Linear models and the analysis of variance (ANOVA) are two basic and powerful statistical tools to model and analyse the relationship between random variables, and thus are widely used in almost all of classical and modern statistical practice. Their use exemplifies the modern, model-based approach to statistical investigations, and provides the foundations for more advanced techniques that may be required for the study of complex systems arising in areas such as economics, natural and social sciences and engineering as well as in business and industry.

Prerequisites: STAT1004 and STAT1005, or their equivalents.

Course content: Analysis of variance for a variety of experimental designs. Multiple regression: model fitting by least squares, model assessment and selection. Heteroscedastic and autocorrelated errors. Emphasis will be placed on ideas, methods, practical applications, interpretation of results and computer output, rather than on detailed theory.

Texts:

Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work: About 8 sets of practical exercises. These will not count towards the examination grading.

Timetabled workload:
Lectures: 3 hours per week, 1 hour of which to be used as necessary as a problems class.

STAT2003
INTRODUCTION TO APPLIED PROBABILITY (0.5 UNIT)

Level: Intermediate

Aims of course: To provide an introduction to the study of systems which change state stochastically with time and to facilitate the development of skills in the application of probabilistic ideas.

Objectives of course: On successful completion of the course a student should understand the Markov property in discrete and continuous time; for discrete-time Markov chains, be able to find and classify the irreducible classes of intercommunicating states, calculate absorption or first passage times and probabilities, assess the equilibrium behaviour; for simple examples of continuous-time Markov chains, be able to write down the forward equations, find and interpret the equilibrium distribution.

Applications: Stochastic processes are vital to applications in finance and insurance, and have many applications in biology and medicine, and in the social sciences. They also play a fundamental role in areas such as queueing theory and the study of system reliability. The material in this course can be applied to simplified real-world situations, and provides the foundations for further study of more complex systems.

Prerequisites: STAT2001, or its equivalent.

Course content: Revision of conditional probability. Markov Chains (discrete time and states): transient and equilibrium behaviour, first passage times, classification of states, applications. Markov processes (continuous time, discrete states): general theory, forward and backward equations, equilibrium distributions; Poisson process, interval and counting properties; birth and death processes and other simple examples.

Texts:
Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work:
About 8 sets of exercises. These will not count towards the examination grading.

Timetabled workload:
Lectures: 3 hours per week.
Tutorials: 1 hour per week.

STAT7001
COMPUTING FOR PRACTICAL STATISTICS (0.5 UNIT)

Level: Intermediate

Aims of course: To extend students’ practical experience of statistical software environments. To extend students’ abilities in applying ideas and methods already taught in a practical context. To enable students to perform computer-assisted statistical analyses.

Objectives of Course: On successful completion, a student should be able to independently perform a systematic analysis with the statistical software suites R and SAS to answer data-based or methodological questions, and report on it according to the scientific state-of-the-art.

Applications: This course provides training in performing statistical analyses with the R and SAS statistical software suites. R is one of the most widely used non-commercial statistical software packages, predominant in research and specialised areas in industry, which can easily be used for non-routine statistical analyses. SAS is the commercial statistical analytics suite with the largest worldwide market-share, widely-used in business and industry. The course provides, amongst others, basic programming skills, an introduction to R and SAS, and practice in basic statistical analysis workflows.

Prerequisites: STAT1006, STAT2001 and STAT2002, or their equivalents.

Course content: Introduction to SAS commands, SAS/ASSIST and the R environment. Use of these packages for descriptive statistics, graphics, and for fitting regression and ANOVA Models. Non-linear regression and generalised linear model fitting, simulation, programming and numerical maximisation/minimisation.

Texts:
R. Wicklin: Simulating Data with SAS. SAS Institute, 2013.

Assessment for Examination Grading:
Two pieces of extended coursework. There is no examination for this course. Students failing to submit either assessment will be declared non-complete for the course.

Other set work:
About 8 sets of exercises. These will not count towards the examination grading.

Timetabled workload:
Lectures: 1 hour per week.
Workshops: 3 hours per week.

STAT7002
SOCIAL STATISTICS (0.5 UNIT)

Level: Intermediate

Aims of course: To provide an introduction to the basic mathematical aspects of sample survey design and statistical analysis, to the practical aspects involved in carrying out a survey and to some key concepts in measurement theory.
Objectives of course: On successful completion of the course, a student should have an understanding of the basic principles and methods underlying sample surveys, be able to assess the appropriateness of various sampling schemes and to calculate precisions and sample sizes required to achieve specific precisions or costs, to have a basic understanding of the ideas underlying the scale type classification and the concepts of validity and reliability, to construct and evaluate a Likert scale and to have a general knowledge of practical survey methods and statistics in society.

Applications: Areas of application of the methods taught in this course include governmental statistics, public health research, opinion polls, market research, and customer relationship management. Sampling techniques are also used, for example, in industrial quality control.

Prerequisites: STAT2001 or its equivalent.

Course content: Introduction to sampling, simple random sampling. Sources of error, practical survey methods. Planning a survey, questionnaire construction (with some philosophical background) and data collection techniques. Scale types, Likert scales, validity and reliability. Basic ideas of stratified, cluster and systematic sampling and ratio estimation. Analysis of Social Statistics.

Central Statistical Office: Social Trends.

Assessment for examination grading: In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work: About 8 sets of exercises. These will not count towards the examination grading.

Timetabled workload: Lectures: 2 hours per week. Problem classes: arranged as necessary.

STAT7003
OPTIMISATION ALGORITHMS IN OPERATIONAL RESEARCH (0.5 UNIT)

Level: Advanced

Aims of course: To provide an introduction to the ideas underlying the optimal choice of component variables, possibly subject to constraints, that maximise (or minimise) an objective function. The algorithms described are both mathematically interesting and applicable to a wide variety of complex real life situations.

Objectives of course: On successful completion of the course, a student should be able to understand the theoretical concepts of linear programming, dynamic programming and finite Markov programming, set up correct models of real life problems, interpret results correctly and check the validity of assumptions.

Applications: Optimisation methods provide the means for successful business strategies, scientific planning and statistical estimation under constraints. They are a critical component of any area where decision making under limited resources is necessary.

Prerequisites: STAT1004, or its equivalent.


**Assessment for examination grading:**
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

**Other set work:**
About 6 sets of exercises. These will not count towards the examination grading.

**Timetabled workload:**
Lectures and problems classes: 3 hours per week.

**ECON2601**

**ECONOMICS II (COMBINED STUDIES)**
(1 UNIT)

**Level:** Intermediate

**Aims of course:** To provide a thorough understanding of core concepts and methods of microeconomics and macroeconomics to second year students on combined-studies programmes with a high quantitative content, and to prepare these students for optional courses in economics taken in the third year.

**Objectives of course:** On successfully completing the course, students should:
- understand the main elements of microeconomic and macroeconomic theory, at a level appropriate for an economics graduate;
- understand economic models and problems expressed in standard mathematical terms, and be able to solve and interpret problems based on such models at a level of difficulty appropriate for an economics graduate;
- be able to use economic concepts and methods to analyse and interpret real-world economic phenomena, and to assess issues of economic policy.

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**Course content:**

- **Microeconomics (consumers and producers):** Consumer choice (budget constraints, preferences and utility, revealed preference, Slutsky equation, indirect-utility and expenditure functions, consumer surplus and price indices); choice under uncertainty; firm behaviour (technology and production functions, profit maximisation and factor demands, cost functions, conditional factor demands, cost curves).
- **Microeconomics (markets and equilibrium):** Market demand; exchange equilibrium; competitive markets (short and long run behaviour); monopoly; price discrimination; oligopoly models; game theory.
- **Macroeconomics (growth and fluctuations):** Economic growth (Solow-Swan model, technological progress).

**Key texts:**

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**Third Year**

**STAT3001**

**STATISTICAL INFERENCE (0.5 UNIT)**

**Level:** Advanced

**Aims of course:** To provide a grounding in the theoretical foundations of statistical inference and, in particular, to introduce the theory underlying statistical estimation and hypothesis testing, and to provide theory underlying the methods taught in the first and second years of degree courses offered by the Department of Statistical Science or jointly with other Departments.

**Objectives of course:** On successful completion of the course, a student should be able to:
- describe the principal features of, and differences between, frequentist, likelihood and Bayesian inference;
- define and derive the likelihood function based on data from a parametric statistical model, and describe its role in various forms of inference;
- define a sufficient statistic; describe, calculate and apply methods of identifying a sufficient
statistic; define, derive and apply frequentist
criteria for evaluating and comparing
estimators; describe, derive and apply lower
bounds for the variance of an unbiased
estimator; define and derive the maximum
likelihood estimate, and the observed and
expected information; describe, derive and
apply the asymptotic distributions of the
maximum likelihood estimator and related
quantities; conduct Bayesian analyses of
simple problems using conjugate prior
distributions, and asymptotic Bayesian
analyses of more general problems; define,
derive and apply the error probabilities of a
test between two simple hypotheses; define
and conduct a likelihood ratio test; state and
apply the Neyman-Pearson lemma.

Applications: The theory of statistical
inference underpins statistical design,
estimation and hypothesis testing. As such it
has fundamental applications to all fields in
which statistical investigations are planned or
data are analysed. Important areas include
engineering, physical sciences and industry,
medicine and biology, economics and finance,
psychology and the social sciences.

Prerequisites: STAT2001 and STAT2002,
or their equivalents.

Course content: Frequentist and Bayesian
approaches to statistical inference. Summary
statistics, sampling distributions. Sufficiency,
likelihood, and information. Asymptotic
properties of estimators. Bayesian inference.
Hypothesis testing. Likelihood ratio tests,
application to linear models.

Texts:
D.R. Cox: *Principles of Statistical Inference.*
P.H. Garthwaite, I.T. Jolliffe & B. Jones:
P.M. Lee: *Bayesian Statistics: An Introduction*
J.A. Rice: *Mathematical Statistics and Data
G.A. Young and R.L. Smith: *Essentials of
Statistical Inference.* Cambridge University

Assessment for examination grading:
In-course assessment (see page 40), the
exact method of which will be announced by
the lecturer at the beginning of the course.
2½ hour written examination in term 3.
The final mark is a 9 to 1 weighted average of
the written examination and in-course
assessment marks.

Other set work:
About 8 sets of exercises. These will not count
towards the examination grading.

Timetabled workload:
Lectures: 2 hours per week.
Workshops: two 2 hour classes.
Tutorials: 1 hour per week.

STAT3002
STOCHASTIC SYSTEMS (0.5 UNIT)

Level: Advanced

Aims of course: To provide a continuation
of the study of random processes started in
Introduction to Applied Probability
(STAT2003), but with the emphasis now on
Operational Research applications and
including queueing theory, renewal and semi-
Markov processes and reliability theory.

Objectives of course: On successful
completion of the course, a student should
understand such concepts for stochastic
processes as the Markov property, stationarity
and reversibility and be able to determine
whether such properties apply in
straightforward examples; recognise and
apply appropriately a range of models, as
listed in the course contents, in a variety of
applied situations so as to determine
properties relevant to the particular
application.

Applications: Stochastic systems arise in
many areas of application. They play a
fundamental role in Operational Research
which addresses real-world problems through
the use of mathematics, probability and
statistics; topics such as queueing theory and
reliability are important examples. Stochastic
processes are also vital to applications in
finance and insurance, and have many
applications in biology and medicine, and in
the social sciences. Stochastic process theory
underpins modern simulation methods like
Markov-chain Monte-Carlo (MCMC).

Prerequisites: STAT2003, or its equivalent.

Course content: Markov processes:
revision of general concepts, reversibility and
detailed balance equations. Renewal theory
and reliability: regenerative events and
renewal processes, alternating renewal processes, renewal reward processes.

Queues: the general single server queue, Markov queuing models (M/M/k), limited waiting room, more general queues (M/G/1, G/M/1), queuing networks. Semi-Markov processes: properties and simple examples. Reliability: single repairable units, simple systems of units.

**Texts:**

**Assessment for examination grading:**
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

**Other set work:**
About 8 sets of exercises. These will not count towards the examination grading.

**Timetabled workload:**
Lectures: 2 hours per week.
Workshops: two 2 hour classes.
Tutorials: 1 hour per week.

**STAT3003 FORECASTING (0.5 UNIT)**

**Level:** Advanced

**Aims of course:** To introduce methods of finding and extrapolating patterns in time-ordered sequences.

**Objectives of course:** On successful completion of the course, a student should be familiar with the most commonly-used models for time series; be able to derive properties of time series models; be able to select, fit, check and use appropriate models for time-ordered data sequences; understand and be able to interpret the output from the time series module of a variety of standard software packages.

**Applications:** Time series data take the form of observations of one or more processes over time, where the structure of the temporal dependence between observations is the object of interest. Such data arise in many application areas including economics, engineering and the natural and social sciences. The use of historical information to estimate characteristics of observed processes, and to construct forecasts together with assessments of the associated uncertainty, is widespread in these application areas.

**Prerequisites:** STAT2001 and STAT2002, or their equivalents.


**Texts**

**Assessment for examination grading:**
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 4 to 1 weighted average of the written examination and in-course assessment marks.

**Other set work:**
About 7 sets of exercises. These will not count towards the examination grading.

**Timetabled workload:**
Lectures: 2 hours per week.
Workshops: two 2 hour classes.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the course, will also be provided.
STAT3004
DECISION AND RISK (0.5 UNIT)

Level: Advanced

Aims of course: To provide an introduction to the ideas underlying the calculation of risk from a Bayesian standpoint, and the structure of rational, consistent decision making.

Objectives of course: On successful completion of the course, a student should be able to understand special measures of risk, understand the concepts of decision theory, find appropriate probability models for risky events and check the validity of the underlying assumptions, and be familiar with methodology for detecting changes in risk levels over time.

Applications: The ideas introduced in this course provide a generic framework for thinking about risk and decision-making in the presence of uncertainty. As such, they can be applied in many diverse areas. The course will use examples from natural hazards, environmental hazards, finance, and social policy.

Prerequisites: STAT1004 and STAT1005, or their equivalents.

Course content: Introduction to Bayesian inference, conditional probability, Bayes's formula, expectation and utility. Elicitation of subjective probabilities and utilities. Criteria for decision making. Comparison of decision rules. Probability models for the occurrence of extreme events. Time series approaches to detecting changes in risk levels over time.

Texts

Assessment for examination grading
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work
About 4 sets of exercises. These will not count towards the examination grading.

Timetabled workload
Lectures: 2 hours per week. Workshops: three 2 hour classes. Office hours, during which the lecturer will be available to discuss students' individual problems with the course, will also be provided.

STAT3005
FACTORIAL EXPERIMENTATION (0.5 UNIT)

Level: Advanced

Aims of course: To introduce $2^k$ experiments, fractions and blocking. To introduce designs for response surface modelling. To discuss experimental designs to achieve quality control, including Taguchi ideas.

Objectives of course: On completion of the course, a student should have an understanding of the basic ideas relating to $2^k$ factorial experiments, including for fractional designs and with blocking; should be able to analyse data from these experiments by the analysis of variance and/or graphical techniques; be able to design experiments for response surface modelling; be able to understand and use practical aspects of experimental design including randomisation.

Applications: Factorial experiments are useful in any situation in which a complex system has to be investigated or optimised. The applications tend to be in the fields of science and technology, though that may be a result of a lack of imagination rather than a lack of wider applicability. Some examples are the optimisation of an industrial production process, the design of a new drug, the design of a human-computer interface, the optimisation of products and marketing campaigns, computer simulations to explore the effect of interventions on, e.g., economy or climate, or the quality of new statistical methodology.

Prerequisites: STAT2002, or its equivalent.

Course content: Experiments: What is an experiment? Advantages over observational studies. Importance of randomisation. $2^k$

**Texts:**

**Assessment for examination grading:**
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 4 to 1 weighted average of the written examination and in-course assessment marks.

**Other set work:**
About 8 sets of exercises. These will not count towards the examination grading.

**Timetabled workload:**
Lectures: 2 hours per week. Workshops: two 2 hour classes. Office hours, during which the lecturer will be available to discuss students’ individual problems with the course, will also be provided.

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**STAT3006**
**STOCHASTIC METHODS IN FINANCE I**
**0.5 UNIT**

**Level:** Advanced

**Aims of course:** To introduce mathematical concepts and tools used in the finance industry, in particular stochastic models and techniques used for financial modelling and derivative pricing.

**Objectives of course:** On successful completion of the course, a student should have a good understanding of how financial markets work, be able to describe basic financial products, have a good knowledge of the basic mathematical and probabilistic tools used in modern finance, including stochastic calculus, and be able to apply the relevant techniques for the pricing of derivatives.

**Applications:** The techniques taught in this course are widely used throughout the modern finance industry, including the areas of trading, risk management and corporate finance. They also have applications in other areas where investment decisions are made under uncertainty, for example in the energy sector where decisions on whether or not to build (i.e. invest in) new power plants are subject to uncertainty regarding future energy demand and prices.

**Prerequisites:** STAT2001, or its equivalent.


**Texts:**

**Assessment for examination grading:**
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

**Other set work:**
Several sets of exercises. These will not count towards the examination grading.

**Timetabled workload:**
Lectures: 2 hours per week. Workshops: four 2 hour classes. Office hours, during which the lecturer will be available to discuss students’ individual problems with the course, will also be provided.
STAT3008
MEDICAL STATISTICS I (0.5 UNIT)

Level: Advanced

Aims of course: To provide an introduction to the fields of clinical trials and epidemiology, with emphasis on the statistical ideas and methodology most widely used in these areas.

Objectives of course: On successful completion of the course, a student should have an understanding of ways to measure health outcome, types of observational studies and their design issues and design features of randomised trials. In addition, they should be able to implement and interpret results from basic methods of analysis used in health studies as well as logistic regression and methods for analysis of survival data.

Applications: This course, together with STAT3009, has applications in both medicine and epidemiology. Important areas include the design and analysis of medical research studies, including randomised controlled trials.

Prerequisites: STAT2001 and STAT2002, or their equivalents.

Course content: The role of medical statistics; Measures of health outcome including risk, rates, odds, relative and absolute measures; Basics of study design for health studies; Types of observational studies: case-control, matched case-control, cohort, cross-sectional; Design features of randomised trials: randomisation, blocking, stratification, minimisation, binding, use of placebos; Survival analysis: features of survival data, hazard and survivor functions, censoring, Kaplan Meier Curves, Log rank Tests, Cox regression; Analysis of parallel group trials: basic analysis, intention to treat and per protocol analyses, missing data, use of baseline data, subgroup analyses, interpretation of results; Confounding and interaction: concepts of confounding and interaction, stratification and matched analysis; Logistic regression: odds ratios, predictions, multiple logistic regression, categorical and continuous covariates, assumptions of linearity, interactions, goodness of fit (Hosmer-Lemeshow), conditional logistic regression; Calculation of sample size for trials and observational studies; Introduction to statistical software STATA.

There will be computer or paper based practical sessions on measuring health outcome, study design, survival analysis, analysis of trials, confounding and interaction, logistic regression and sample size calculation.

Texts:

Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work:
Several sets of exercises. These will not count towards the examination grading.

Timetabled workload:
Lectures: 2 hours per week.
Workshops: two 2 hour classes.
Office hours, during which the lecturer will be available to discuss students' individual problems with the course, will also be provided.

STAT3009
MEDICAL STATISTICS II (0.5 UNIT)

Level: Advanced

Aims of course: To provide a continuation of the study of medical statistics started in STAT3008, with emphasis on more advanced topics in epidemiological methods and the design and analysis of clinical trials.

Objectives of course: On successful completion of the course, a student should be
able to: model survival data using parametric regression models; develop and validate a risk prediction model; analyse clustered data using a regression model; design and analyse a cross-over trial, cluster randomised trial, equivalence trial and early phase trial; understand the issues concerning interim analyses and missing data; carry out a meta-analysis.

Applications: This course, together with STAT3008, has applications in both medicine and epidemiology. Important areas include the design and analysis of medical research studies, including randomised controlled trials.

Prerequisites: STAT3008, or its equivalent.

Course content: Modelling survival data using parametric models; Risk prediction models; Introduction to clustered data including cluster randomised trials, repeated measures and GEEs; Hierarchical regression models for continuous, binary and survival outcomes; Interim analyses in trials; Equivalence trials; Cross-over trials; Early phase trials; Systematic reviews and meta-analysis; Missing data. In addition, there will be weekly practical sessions on many of the topics listed above.

Texts:

Assessment for examination grading: In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3.

The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work: Several sets of exercises. These will not count towards the examination grading.

Timetabled workload: Lectures: 2 hours per week. Workshops: two 2 hour classes. Office hours, during which the lecturer will be available to discuss students' individual problems with the course, will also be provided.

STAT3019
SELECTED TOPICS IN STATISTICS
(0.5 UNIT)

Level: Advanced

Aims of course: To provide an introduction to, and practical experience of, key ideas in selected specialized topics that are at the forefront of developments in modern statistical research and practice. The module is aimed specifically at students who may be considering going on to do research in statistics or related areas.

Objectives of course: On successful completion of the module, students should be able to: explain the motivation for, and key ideas involved, in the topics that have been studied; identify situations in which the studied techniques are potentially applicable, while recognizing their potential limitation; use software packages that are available in R to apply the techniques to real-world examples where appropriate; and understand the context of research papers in the areas that have been studied.

Applications: the availability of huge and often complex data sets, coupled with cheap computing power makes it possible to contemplate analyses that were inconceivable even two decades ago. The development of statistical methodology has made full use of these opportunities, so that modern statistics has made significant contributions in a wide range of application areas. The material covered in this course will vary from year to year so that the specific applications will vary; however, it will provide students with some insight into the state of the art. As such it would be suitable for students contemplating...
research in statistics or, indeed, in any other subject where complex problems require the use of advanced statistical methods.

**Prerequisites:** STAT7001 and STAT3001, or their equivalents.

**Course content:** This course will provide an introduction to two or three advanced topics in modern statistics. The precise topics covered will vary from year to year, depending on teaching staff availability and research interests. Examples of topics might include: bootstrap and related methods; extreme value theory; multivariate analysis; nonparametric smoothing; robust methods; spatial statistics; applied probability; and estimating functions. Where appropriate, the methods will be illustrated using software available in the R package.

**Topic 1: Multivariate Statistics (Dr J Xue)**
Multivariate statistics aims to model and analyse multivariate datasets, in which each data item (instance) contains simultaneous measurements on multiple variables. It is one of the most researched and applied areas in statistical analysis.

It embraces many popular statistical techniques, such as principal component analysis (PCA), canonical correlation analysis (CCA) and linear discriminant analysis (LDA). PCA can largely reduce the data size while still preserving much of the variability in the data; it can also visualise high-dimensional data (e.g., face image, gene expression, spectrum, web document) to explore the underlying structure of the data. CCA is able to find associations between two groups of variables (e.g., demography and finance, health and exercise, psychological and academic measures, videos of two people). LDA can create effective predictors to separate different classes of instances in a dataset (e.g., for bankruptcy prediction, customer categorisation, disease diagnosis, face recognition, spam identification); it can also reduce the data size while preserving most of the class separableness in the data. As we can imagine, these techniques have found applications in a wide range of fields in our life, such as health, security, business and the Internet.

This course will introduce the methodological and theoretical foundation with illustrative examples of some selected topics in multivariate statistics. The topics will include: the multivariate normal distribution, inferences about multivariate means, PCA, CCA and LDA. Knowledge of statistics and linear algebra is required; experience with R (STAT7001) is desirable. The following text is relevant to this part of the course:


**Topic 2: Multi-State Models (Dr ADL van den Hout)**
Statistical modelling can be used to describe stochastic processes that consist of transitions between states over time. In probability theory, a stochastic process is a set of random variables representing the evolution of a process over time. This course will show that probability theory can be applied to the statistical analysis of longitudinal data.

Multi-state processes can be found in many sciences. The following is an example from biostatistics. Consider a three-state process for dementia and survival in the older population. Such a process can be described by an illness-death model, where state 1 is the dementia-free state, state 2 is the dementia state, and state 3 is the dead state. Statistical analysis can investigate potential associations between the risk of moving to the next state and variables such as age, gender, or education. Statistical analysis can also be used to predict the multi-state process. An example of a prediction is the estimation of expected time spent in the dementia state.

The course will discuss what to model (we are going to model the transition intensities), how to estimate the model parameters (we are going to use maximum likelihood estimation), and how to interpret and use the fitted model. Methodologically, multi-state modelling is an elegant combination of statistical inference and the theory of stochastic processes. The course aims to show that the modelling is versatile and allows for a wide range of applications.

Topics will include: a revision of the theory on stochastic process, the difference between discrete-time and continuous-time processes, the relation between transition intensities and transition probabilities, the Kolmogorov forward and backward equations, design of longitudinal studies, maximum likelihood estimation, simulation, and computation in the R software. All this will be illustrated using data. Knowledge of R (STAT7001) and an understanding of statistics at the level of STAT3001 will be expected. The following
texts are relevant to this part of the course:

**Assessment for examination grading:**
Topic 1: unseen written examination in term 2 (50%).
Topic 2: a piece of extended in-course assessment (50%).
Any student who fails to attempt the assessments for both topics will automatically be declared non-complete for the course.

**Other set work:**
Several sets of exercises. These will not count towards the examination grading.

**Timetabled workload:**
Lectures: 2 hours per week.
Workshops: four 2-hour classes.
Office hours, during which the lecturer will be available to discuss students' individual problems with the course, will also be provided.

**STAT3020**
**STOCHASTIC METHODS IN FINANCE II**
(0.5 UNIT)

**Level:** Advanced

**Aims of course:** To explore advanced topics in finance via mathematical and statistical methods in order to gain a better understanding of optimal decision making, risk management and derivative pricing techniques. The course will be built on material covered in STAT3006.

**Objectives of course:** On successful completion of the course, a student should be able to: Define the concepts of risk aversion and stochastic dominance, and apply them to manage risk in, and rank capital projects; Understand how dynamic programming can be used to make optimal decisions under uncertainty; Understand how to apply mathematical and statistical modelling techniques to credit risk modelling, value-at-risk measurements and capital adequacy assessments; Understand a range of modelling techniques used in derivative pricing, and the concepts and assumptions that underpin them; Criticise and understand the limitations of these techniques as they are used in the modern finance industry.

**Applications:** The techniques taught in this course are widely used throughout the modern finance industry, including the areas of: business investments decisions (for example in the energy sector where decisions on whether or not to invest in and build new power plants are subject to uncertainty regarding future energy demand and prices); in corporate finance; in trading activities in the financial markets; in financial and other forms of risk management; in valuing and accounting for assets; and in the prudential regulation of the banking industry.

**Prerequisites:** STAT2001 and STAT2003, or their equivalents. STAT3006 or MATH3508.

**Course content:** Utility theory; Real options, including dynamic programming, optimal investment rules, and managerial flexibility; Risk management, including value-at-risk and credit risk modelling; More advanced techniques in derivative pricing.

**Texts:**

**Assessment for examination grading:**
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

**Other set work**
Several sets of exercises. These will not count towards the examination grading.

**Timetabled workload**
Lectures: 2 hours per week.
Workshops: two 2 hour classes.
Office hours, during which the lecturer will be available to discuss students' individual problems with the course, will also be provided.
STAT3021
BAYESIAN METHODS IN HEALTH ECONOMICS (0.5 UNIT)

Level: Advanced

Aims of course: To provide an introduction to Bayesian analysis and Markov Chain Monte Carlo (MCMC) methods using R and MCMC sampling software (such as BUGS or JAGS), as applied to cost-effectiveness analysis and the typical models used in health economic evaluations. Emphasis will be placed on the practical side of Bayesian inference.

Objectives of course: The course is targeted at students interested in decision modelling and in the practice of Bayesian analysis in health economics. However, the topics and statistical content are fairly general and applicable to other areas (e.g. economics, biostatistics, epidemiology). On successful completion of the course, a student should be able to: i) understand the basic concepts of Bayesian analysis; and ii) design, build, run and interpret the results of a Bayesian model, with specific application to health economic problems. These skills are widely transferrable to a variety of fields and applications. The course will be based on a mixture of lectures and computer practicals. Specific topics include an introduction to health economics, a review of a range of probability distributions, regression analysis, Markov models and random-effects meta-analysis.

Applications: This course has applications in medicine and studies on public health, epidemiology and health services research.

Prerequisites: STAT2002 and STAT3001, or their equivalents.

Course content: The course syllabus includes the following topics: Introduction to health economic evaluations; Introduction to Bayesian inference; Introduction to MCMC in BUGS/JAGS; Analysis of cost and cost-utility data; Statistical cost-effectiveness analysis; Probabilistic Sensitivity Analysis (PSA); Evidence synthesis and hierarchical models; Decision-analytic and Markov models. The practical sessions are based on a combination of R and BUGS and topics include: Monte Carlo estimation in BUGS; MCMC estimation in BUGS; Cost-effectiveness analysis with individual level data; Introduction to R and cost-effectiveness analysis using the R package BCEA; Health economic evaluation and PSA with R/BUGS/BCEA; Advanced topics in PSA in R using BCEA; Evidence synthesis (1): decision models; Evidence synthesis (2): network meta-analysis; Markov models in health economics.

Texts:

Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work:
Several sets of practical exercises involving R and BUGS. These will not count towards the examination grading.

Timetabled workload:
Lectures: 1 hour per week.
Workshops: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the course, will also be provided.

STAT3022
QUANTITATIVE MODELLING OF OPERATIONAL RISK AND INSURANCE ANALYTICS (0.5 UNIT)

Level: Advanced

Aims of course: To develop a core mathematical and statistical understanding of an important new emerging area of risk modelling known as Operational Risk which arose from the development of the Basel II/III banking regulatory accords. This will equip students with the necessary tools to undertake
core modelling activities required in risk management, capital management and quantitative modelling in modern financial institutions.

Objectives of course: On completion of the course, a student should be able to:
- describe the key quantitative requirements of the Basel II/III banking accord; describe the 56 risk cells (business units and risk types) required under the standard Basel II/III regulator frameworks; describe the basic indicator, standardized and advanced measurement approaches; describe the key components of a loss distributional approach model; develop frequency and heavy tailed severity models for Operational risk types including estimation or the model parameters and model selection; describe properties and asymptotic estimators for risk measures that are required for capital calculation; describe the coherent allocation of capital to business units from the institutional level; introduce and understand the influence of dependence modelling within an LDA model structure; obtain familiarity with particular classes of copula statistical models of basic relevance to practical Operational risk modelling; decide upon appropriate combining approaches for different sources of data required by regulation to be considered in OpRisk settings; develop loss aggregation methods to aggregate OpRisk loss processes.

Applications: An integral part of modern financial risk involves Operational Risk, the third key risk type that financial institutions must model and hold capital for according to the international banking regulations of Basel II/III. The key set of concepts and mathematical modelling tools developed in this course will equip the future risk modellers and quantitative analysts with the appropriate core mathematical and statistical background to undertake development of such risk models in industry.

Prerequisites: Familiarity with distribution theory and generating functions, for example as encountered in STAT2001, or equivalent. Also some basic experience in either Matlab, Python or R is needed, as taught in STAT7001, or equivalent.


Texts:

Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2½ hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.
Other set work:
About 8 sets of exercises. These will not count towards the examination grading.

Timetabled workload:
Lectures: 2 hours per week.
Workshops: two 2 hour classes.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the course, will also be provided.

STAT3901 PROJECT (1.0 UNIT)

Level: Advanced

Aims of course: To enable students, under supervision, to apply statistical science to real world problems and learn how to communicate technical ideas both by oral and written presentations.

Objectives of course: On successful completion of the course, a student should be able to obtain or access relevant background information and data; select and apply appropriate formal and informal statistical methods, using appropriate computer software; assess what has been achieved and point to further research; use appropriate word processing skills to write up the project report efficiently; communicate and defend the main points in a short verbal presentation; communicate the whole project in a word processed report.

Prerequisites: First and second year of degree courses offered by the Department of Statistical Science or jointly with other Departments.

Assessment for examination grading:
Written report (about 12000-15000 words, i.e. about 40 pages, A4 size, double-spaced typing, excluding graphs, tables and computer output), to be submitted by the start of term 3 (80%). Over-length reports will be penalised (see page 41).
Oral presentation (15 minutes excluding questions) at the start of term 3 (20%).

Project reports are read independently by two examiners, one of whom is normally the candidate’s project supervisor. Each examiner provides a brief written assessment. Reports are also read by a visiting examiner. The final mark is agreed by the whole exam board, which includes the visiting examiner.

Examiners will satisfy themselves that the report is the work of the candidate, and will take into account the following points: the difficulty and novelty of the project, the amount of new methodology/application knowledge that the student was required to learn, the degree of direction required from the project supervisor, the student’s progress throughout the project.

Subject to these overall criteria, examiners will consider both the content of the report and its presentation, with a higher priority being attached to content. Aspects considered will usually include the following:

Content: amount of work done; extent to which understanding has been demonstrated; quality and accuracy of reasoning, validity of interpretation, relevance of conclusions; critical appraisal, discussion of limitations and suggestions for further work; clarity of objectives; quality of literature review; quality of data organisation and collection (if applicable); quality of programming or use of software (if applicable).

Presentation: layout of report and care in its presentation; structure of the report; use of appropriate judgement in selecting material; clarity of expression, readability and coherence; correctness of grammar and spelling; adequacy of diagrams, graphs and tables (if applicable); quality of presentation of mathematical material (if applicable).

Each project presentation will be assessed by two examiners. The examiners make independent notes on the presentation prior to discussing and agreeing a mark. Aspects considered will usually include the following:

Content: was the presentation interesting? Did it focus on the important aspects of the work and flow logically? Was there sufficient detail to be intelligible to statistically literate listeners who do not have an in-depth knowledge of the specific topic? Were there clear aims and conclusions?

Presentation skills: was the verbal presentation confident and clearly audible with varied inflexion? Did the presentation engage with the audience? Were visual aids clear, well produced and well used? Were questions handled appropriately? Was the amount of material appropriate for the time allowed?

For a mark over 85, it is expected that the student, in addition to having submitted a well-presented report demonstrating a good understanding of the material and a comparatively high amount of work, will also
have shown some initiative rather than simply following instructions. Marks of 90 or more may be appropriate where, in addition, the technical or conceptual difficulty of the material is very high, or where some of the work could be considered original research on the part of the student.

**Timetabled workload:**
Workshops: about 3 hours.
Oral presentations: about 6 hours.
Tutorials with the project supervisor(s): about 30 hours.

**Individual study:**
Project work (including reading) and preparation of the oral and written presentation are expected to take about 260 hours. Students are expected to attend and actively participate in the oral presentations by other students.

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**STAT3902 PROJECT (0.5 UNIT)**

**Level:** Advanced

**Aims of course:** To enable students, under supervision, to apply Statistical Science to real world problems and learn how to communicate technical ideas both by oral and written presentations.

**Prerequisites:** First and second year of degree courses offered by the Department of Statistical Science or jointly with other Departments.

**Objectives of course:** On successful completion of the course, a student should be able to obtain or access relevant background information and data; select and apply appropriate formal and informal statistical methods, using appropriate computer software; assess what has been achieved and point to further research; use appropriate word processing skills to write up the project report efficiently; communicate and defend the main points in a short verbal presentation; communicate the whole project in a word processed report.

**Assessment for examination grading:**
Written report (about 7000-10000 words, i.e. about 20-25 pages, A4 size, double-spaced typing, excluding graphs, tables and computer output), to be submitted by the start of term 3 (80%). Over-length reports will be penalised (see page 41). Oral presentation (15 minutes excluding questions) at the start of term 3 (20%). See STAT3901 for more details on project marking.

**Timetabled workload:**
Workshops: about 3 hours.
Oral presentations: about 6 hours.
Tutorials with the project supervisor(s): about 15 hours.

**Individual study:**
Project work (including reading) and preparation of the oral and written presentation are expected to take about 130 hours. Students are expected to attend and actively participate in the oral presentations by other students.

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**Fourth Year**

**STATM001 STATISTICAL MODELS AND DATA ANALYSIS (0.5 UNIT)**

**Level:** Masters

**Aims of course:** To introduce the theory of linear and generalised linear / additive models and associated data analysis.

**Objectives of course:** On successful completion of the course, a student should have an understanding of the exponential family of distributions and their use in the formulation of generalised linear / additive models, and should be able to interpret the results of fitting such models in both a technical and non-technical manner.

**Applications:** The statistical methods introduced in STATM001 are very general, and they are used in almost all areas in which statistics is applied. In the course, we will analyse data sets from, among other areas, industrial quality control, astronomy, social sciences, and biology.

**Prerequisites:** STAT2001 and STAT2002. Simultaneous or previous attendance on STATM012, or its equivalent.

**Course content:** Multiple Linear Regression: inference techniques for the General Linear Model, applications, variable selection. Generalised Linear Models:
structure incorporating an introduction to the exponential family of distributions, inference procedures. Categorical data: special cases of generalised linear models leading to logistic regression and log-linear models, use in data analysis. Introduction to non-linear modelling, mixed modelling, generalised estimating equations. Introduction to Generalised Additive Models: penalised regression splines and penalised estimation. (Students are expected to obtain the computing skills to implement the methodology discussed in this course in the course STATM003.)

**Texts:**

**Assessment for examination grading:**
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2 hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

**Other set work:**
Exercises will be set during the course, which will not count towards the examination grading.

**Timetabled workload:**
Lectures: 3 hours per week. Tutorials: 1 hour per week.

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**STATM002**

**STATISTICAL DESIGN OF INVESTIGATIONS (0.5 UNIT)**

**Level:** Masters

**Aims of course:** To provide an introduction to the statistical aspects relating to the design of experimental and observational studies, and to introduce associated methods of statistical analysis.

**Objectives of course:** On completion of the course, a student should have an understanding of the basic ideas of experimental design and observational studies; should be able to analyse data from a variety of experimental designs by the analysis of variance; should be able to assess the appropriateness of various sampling schemes and perform appropriate analyses.

**Applications:** This course addresses the issues of what data are needed to answer a particular substantive question, and conversely what questions can reasonably be answered using data that may be available. These issues are fundamental to quantitative analyses in all application areas.

**Prerequisites:** STAT2001 and STAT2002.

**Course content:** Principles of experimental design; planning of experiments; comparative experiments; common designs: completely randomised, randomised blocks, Latin square; factorial experiments; nested and split-plot; fixed and random effects; associated analyses - analysis of variance. Observational studies v. experiments: problems of bias, confounding, difficulty of causal interpretation; planning observational studies; analysis: matching, adjusting for confounding variables; cohort studies; case-control studies. Sampling: target and sampled populations, finite populations, simple random sampling, stratification and cluster sampling. Ratio and regression estimators, randomised response methods; introduction to questionnaire design.

**Texts:**
Assessment for examination grading:
In-course assessment: two compulsory assignments. One of these involves working in pairs to design, carry out and report the results of an experiment. There is no written examination. Any student who fails to submit any coursework will automatically be declared non-complete for the course.

Other set work:
Exercises will be set during the course which will not count towards the examination grading.

Timetabled workload:
Lectures and workshops: 2 hours per week. Tutorials: 1 hour per week.

STATM003
STATISTICAL COMPUTING (0.5 UNIT)
Level: Masters

Aims of course: To introduce the statistical package R with particular application to statistical modelling and a selection of computational techniques.

Objectives of course: On successful completion of the course, a student should be able to use the statistical package R to input, edit and manipulate data, produce appropriate graphics and implement statistical methods taught in courses STATM001 and STATM002. In addition, the student should be familiar with some basic principles of programming, and should be able to carry out simple programming in R with application to a variety of computational and numerical techniques.

Applications: the generic programming skills acquired in this course are applicable across a wide variety of scientific disciplines as well as in the IT sector. More specifically, the R programming environment is gaining popularity among many research communities as well as in specialised areas of business and industry, such as finance and reinsurance, where non-routine statistical analyses are increasingly required.

Prerequisites: STAT2001 and STAT2002. Simultaneous attendance on STATM001 and STATM002.


Texts:

Assessment for examination grading:
In-course assessment: by compulsory coursework. There is no written examination. Any student who fails to submit any coursework will automatically be declared non-complete for the course.

Timetabled workload:
About 10 two-hour workshops.

STATM004
APPLIED BAYESIAN METHODS (0.5 UNIT)
Level: Masters

Aims of course: To introduce the Bayesian approach to statistical inference, to develop relevant theory, methodology and computational techniques for its implementation and to develop basic skills in use of the WinBUGS software for Bayesian modelling.

Objectives of course: On successful completion of this course, a student should be able to give an account of the underlying principles of Bayesian inference, and contrast these with those of other schools of inference; manipulate probability formulae to derive posterior and predictive distributions; perform conjugate prior-to-posterior analysis for simple Binomial, Poisson and Normal models; analyse these and more complex Normal models, using priors representing great prior uncertainty; use hierarchical and graphical modelling to represent and analyse complex systems; describe and implement Gibbs sampling methods for estimating posterior quantities; and use WinBUGS software to estimate complex Bayesian models.
Applications: Bayesian methods are currently gaining increasing popularity, largely because advances in computing facilities and in modern simulation-based Markov Chain Monte Carlo (MCMC) methods provide a means of analysing the complex data structures that arise in application areas as diverse as artificial intelligence, biology, genetics and environmental science. This course focuses on fundamental concepts and techniques, and introduces the computational tools needed to apply Bayesian methods in challenging research-level problems.

Prerequisites: STAT2001 and STAT2002, STATM012, or its equivalent.


Texts:

Assessment for examination grading:
In-course assessment (see page 40), the exact method of which will be announced by the lecturer at the beginning of the course. 2 hour written examination in term 3. The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work:
About 5 sets of exercises. These will not count towards the examination grading.

Timetabled workload:
Lectures: 2 hours per week. Some of these may be devoted to workshops or coursework feedback.
Tutorials: 2 hours per fortnight.
STATM020 STOCHASTIC METHODS IN FINANCE II (STAT3020)

Prerequisites: STATM017.

STATM021 BAYESIAN METHODS IN HEALTH ECONOMICS (STAT3021)

Prerequisites: STAT3001 or STATM012, or their equivalents.

STATM022 QUANTITATIVE MODELLING OF OPERATIONAL RISK AND INSURANCE ANALYTICS (STAT3022)

Assessment for examination grading:
For each of the courses listed above, the method of assessment and weighting of the assessment components is the same as for the corresponding third year course, except that the duration of any written examination in term 3 is only 2 hours. (A separate exam paper is set for the Masters-level students.)

The information given in this document is as far as possible accurate at the date of publication but the Department reserves the right to amend it.

Department of Statistical Science, UCL, September 2016.