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 UCL Academic Manual ([https://www.ucl.ac.uk/academic-manual/](https://www.ucl.ac.uk/academic-manual/)) and UCL Students ([https://www.ucl.ac.uk/students/](https://www.ucl.ac.uk/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](https://www.ucl.ac.uk/statistics/current) 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 academic session 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 2019.
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Dear students

To those of you who are returning, welcome back. To those of you who are new, congratulations for choosing UCL as your university. Whatever your degree programme, your UCL education offers fantastic opportunities to stretch your intellect, expand your experience and develop your skills. And you are in London, which is recognised by QS as one of the best cities in the world for students.

We want you to learn how to think, not what to think: through our Connected Curriculum you have the opportunity to take part in research and enquiry and to create new knowledge. Your programmes are informed by the work of UCL’s world-leading researchers and are designed to develop your skills of analysis and problem-solving, preparing you for your career, wherever it takes you. At UCL, we believe the best way to solve a problem is to bring together thinking from different academic disciplines. This is reflected in the UCL Grand Challenges, our joined-up approach to the world’s most pressing problems. Most of our degrees allow you to take elective modules from other disciplines within UCL and we encourage language study, to bring new perspectives to your studies.

I warmly encourage you to shape your journey at UCL. Take our university-wide surveys and make your voice heard. Become a ChangeMaker or an Academic Representative and work in partnership with academics to make your programme of study even better.

You’ll also have opportunities to learn outside your degree programme. Participate in our Global Citizenship Programme, exploring ways of addressing some of the world’s most pressing challenges. Get involved with amazing volunteering opportunities (coordinated by the Volunteering Services Unit) and make a difference locally. Investigate opportunities for entrepreneurship through UCL Innovation and Enterprise.

UCL is first and foremost a community of great minds. You are a valuable member of that community. I hope you will take every opportunity to shape your time here, so that your experience is the best possible.

Professor Michael Arthur
UCL President and Provost
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 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 Teaching & Learning Office can be found in room 123 on the first floor.

Staff

Academic staff

Prof RE Chandler (Head of Department)

Dr G Ambler  Prof G Baio  Dr JA Barber
Dr A Beskos  Dr FX Briol  Dr C Cotar
Prof P Dellaportas  Prof T Fearn  Prof JE Griffin
Prof SE Guillus  Dr FJ Király  Dr SJ Livingstone
Dr I Manolopoulou  Dr G Marra  Dr PJ Northrop
Dr AG O’Keeffe  Prof RZ Omar  Dr Y Pokern
Dr K Sadeghi  Prof AS Siddiqui  Dr RBA Silva
Dr T Soo (from Jan 2020)  Dr K Stavrianaki  Dr ADL van den Hout
Dr T Wang  Dr AR Watson  Dr HM Wilkinson-Herbots
Dr J Xue

Teaching staff

Dr N Abourashchi  Dr A Donov  Dr SJ Harden
Dr J Herbert*  Dr TR Honnor  Dr EM Jones
Dr MJ Rassias  Dr C Selcuk*

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

Professional services staff

Mrs D Jayawardena Wilkinson (Departmental Manager)

Miss SJ Dickinson  Dr RG Evans  Ms KA Leport
Mr J Picken  Miss A Somogyi  Mr C Visavakul

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 modules in their degree programme.

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

The Programme 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 Programme Administrator to notify absence from college, to submit medical documentation or to change a module registration.

The Programme Administrator is **Ms KA Leport** (room 123, 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 module, 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, Programme 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**

- **Careers Tutor:** Dr MJ Rassias (room 134)
- **Study Abroad Tutor:** Dr TR Honnor (room 127)
- **Tutor to Affiliate students:** Dr TR Honnor (room 127)
- **Co-chair of Staff-Student Committee:** to be confirmed
- **Chair of Departmental Teaching Committee:** Dr SJ Harden (room 140)

**Students’ common room and Departmental student society**

Room 117 is the common room for students registered for any of the degree programmes listed at the top of 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 13).

**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. Please check your **UCL email account** regularly. There may be urgent messages left for you, e.g. from Student and Registry Services, the Teaching & Learning Office, your Personal Tutor, or from staff teaching modules 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 modules, 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 information**

UCL uses student information for a range of purposes, including the provision of teaching and learning, managing accommodation and ensuring health and safety. Further information about how UCL uses student information can be found in the UCL General Student Privacy Notice.

Further information:

- **UCL General Student Privacy Notice**
- **UCL Information Security Policies**
• UCL Electronic (email) policy
• UCL Data Protection Policy
• Intellectual Property Rights: Policy for Students

Students may send queries on data protection matters to the following University Data Protection Officer UCL e-mail address: 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 programme transfer
• Planning and recording skills development
• Applying for graduation ceremonies

Further information:

• Portico login
• What is Portico
• 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. Instructions on how to update your personal information can be found on the UCL Students website. 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 Teaching & Learning 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 module 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 Teaching & Learning Office and the DOSSSH Moodle page (see page 9).
UCL term dates
Terms for the 2019/20 session are based on the pattern of 12 weeks, 11 weeks and 7 weeks.

First Term: Monday 23 September 2019 – Friday 13 December 2019
Second Term: Monday 13 January 2020 – Friday 27 March 2020
Third Term: Monday 27 April 2020 – Friday 12 June 2020

For those departments that operate them, Reading Weeks are the weeks beginning Monday 04 November 2019 (Term 1, Week 7), and Monday 17 February 2020 (Term 2, Week 6).

Christmas College Closure: Close 17:30 Friday 20 December 2019
Easter College Closure: Close 17:30 Wednesday 08 April 2020
Bank Holidays: Closed - Friday 08 May 2020

Further information:
- Term dates 2019/20

UCL examination periods
Main Exam Period: Monday 27 April 2020 – Friday 05 June 2020
Late Summer Exam Period: Monday 24 August 2020 – Friday 11 September 2020

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 generally re-enrol online.

  *Module registration* is done using the online Portico system. The procedure will be explained to you upon arrival (see also “Selecting Modules” section on page 21). Tutorial groups are allocated automatically and your groups will appear in your online timetable (see “Timetable” section on page 12).

- **Week 2**: Beginning of lectures for all modules in the Department of Statistical Science.

- **Week 3**: This 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 module lecturers. *Not all departments observe reading week and you MUST attend classes given in other departments if they continue during this time.*

- **Week 11**: This is the deadline for making Term 2 *module amendments*.
• **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 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:** Monday is the start of the *main examination period*.

• **Week 6:** Friday is the end of the *main examination period*.

*Modules 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.*

**TEACHING AND STUDYING ARRANGEMENTS**

**Modules**

*Modules* are self-contained, credit-rated blocks of learning and teaching that make up a degree *programme*. A student normally takes modules equivalent to 120 credits in each year of full-time study; most individual modules are worth either 15 or 30 credits. Most modules consist of *lectures* supplemented by at least one of the following: *tutorials*, *workshops*, *problem classes*. The proportions of these activities vary over modules; details for modules offered by the Department of Statistical Science are provided in the final section of this handbook (see the "Module Information" section from page 68 onwards). A few modules are *projects*. Outline details of modules 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 module information provided by the Economics and Mathematics Departments, and the School of Management, respectively, for details of the full range of Economics, Mathematics and Management modules that are potentially available.

**Timetable**

The timetable for lectures, workshops and problem classes can be found at [http://www.ucl.ac.uk/timetable](http://www.ucl.ac.uk/timetable). After making your module selections on Portico, tutorial allocation will be arranged by the relevant Teaching & Learning Administrator before lessons 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 lectures include students from other departments and those of you on joint degrees will be taking modules 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 modules, however, and therefore many Statistical Science lectures take place in other rooms around the College, as do lectures for other UCL modules.

**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 modules STAT0008 and STAT0009 are provided. For all other third year Statistical Science modules, 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 module staff. Some workshops will take place in computer cluster rooms. You should take a pocket calculator to all workshops (see page 15 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 modules offered by the 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 module 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 42) the module 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 module outside these times until the assessment is over.

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

**Learning resources and key facilities**

**UCL Library Services**

UCL has 18 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 modules 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.

**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 (now migrated to Linkedin Learning) which provides thousands of high quality video-based courses from programming to presentation skills. Learning on Screen (“bob”) provides students with access to an archive of 65 free-to-air channel programming for educational usage. In addition, Kanopy (“thoughtful entertainment”) is available to UCL students, and offers a wide range of movies.

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. Information on Learning and Teaching spaces as well as 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. Students also have access to a range of free and discounted software via ISD Software for Students.

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 13 foreign languages and English for Academic Purposes (EAP), across a range of academic levels to support UCL students, staff and London’s wider academic and professional community. CLIE provides modern foreign languages and EAP modules for UCL students,
courses satisfying UCL’s Modern Foreign Language requirements and degree preparation courses for international students. CLIE also offers UCL summer school courses. Students can access language-learning resources online through the CLIE Self-Access Centre, including film and documentary 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 modules in the Department of Statistical Science have a presence on Moodle, and students registered for these modules can use the service to access online resources such as module 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 modules.

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

**Calculators**

UCL has approved a standard calculator for use in examinations, which has solar and battery powered variants: Casio FX-85GT X (solar) and FX-83GT X (battery). If you already own one of the following older, discontinued models of the same calculator, you are still permitted to use it: Casio FX83ES, FX83GT+, FX83MS, FX83WA, FX85ES, FX85GT+, FX85MS and FX85WA. **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 offence 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 modules.

**Feedback on student work**

Students receive feedback on all items of assessed coursework (see “Components of Compulsory Assessment” section on page 42) 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</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>≥ 80.00%</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>
<tr>
<td>A</td>
<td>70.00% to 79.99%</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>60.00% to 69.99%</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>Pass</td>
<td></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>C</td>
<td>50.00% to 59.99%</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>40.00% to 49.99%</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>1.00% to 39.99%</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>
<tr>
<td>Fail</td>
<td>≤ 0.99</td>
<td>No/ minimal attempt. Marks in this range are awarded to students who are absent or do not submit an assessment, or attempt so little of it that it cannot be assessed.</td>
</tr>
</tbody>
</table>

**Model answers**

Many Statistical Science modules have regular sets of exercises. These are designed to help students learn and, in most modules, it is essential that students do the exercises in order to understand the subject. Module 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.

- 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 2017 onwards, via their module Moodle pages (see page 15).

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
- UCL Disciplinary Code and Procedure in Respect of Students
- UCL Policy on Harassment and Bullying
- UCL Code of Practice on Freedom of Speech
- Religion and Belief Equality Policy for Students

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 weeks (see page 11). If you wish to be absent from College for some special reason, you should obtain permission beforehand from the Departmental Tutor (see page 7).

If you have a good reason for needing to miss a compulsory class, you must inform the Programme 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 modules 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 modules. 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 and Absence
- Learning Agreements, Barring, Suspensions and Termination of Study

**Absence from assessment**

Any student who is absent from an assessment without prior permission will receive a mark of 0.00% unless they formally request to defer their assessment to a later date by submitting a claim for Extenuating Circumstances with appropriate supporting evidence (see page 40). If Extenuating Circumstances are not approved, the mark of 0.00% will stand and the student will be considered to have made an attempt.

**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. UCL is required to report to UK Visas and Immigration (UKVI) and engagement monitoring is undertaken by departments at regular points during a student’s registration. This is not only to meet the UKVI requirements, but also to identify any problems as early as possible to ensure action is taken to advise or assist the student.

Further information:
- Authorised Absence for Students on a Tier 4 Visa
- Immigration and Visas
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 modules 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 module. 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 modules and you will be told about them at the start of each module. You should ensure that you know what is required for each module 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 module and non-submission may mean that you cannot pass the module (see “Assessment” section on page 42). Furthermore, for modules 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 module. If you fail to satisfy this requirement you may be barred from taking the examination for the module 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 modules, 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 module 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 module 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 module during reading week.

**Total workload**
For a typical 15 credit module, 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 module. For example, if you are studying the equivalent of four 15 credit modules 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.

### DEGREE PROGRAMME SPECIFICATIONS

#### Modules
Modules are the individual units of study that lead to the award of credit. Many programmes offer students the opportunity to choose between different modules that they are interested in. However some new students will find they do not need to make selections as all their modules are compulsory.

#### Module codes
Each module has a code: this consists of a four character prefix that indicates the department responsible for organising the teaching of that module, followed by four numbers to provide a unique code within that department. Modules in Statistical Science have the prefix STAT.

#### Levels of modules
All UCL modules have an associated academic level that determines the difficulty of the module and aligns with the Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies (FHEQ). These levels are as follows:

- Level 4 (formerly known as First – the level of most first year modules)
- Level 5 (formerly known as Intermediate – the level of most second year modules)
- Level 6 (formerly known as Advanced – the level of most third year modules)
- Level 7 (formerly known as Masters – the level of all fourth year MSci modules)
The levels of all modules offered by the Department of Statistical Science are given in the “Module Information” section from page 68 onwards. Students must take modules at an appropriate level for the degree programme for which they are registered (see “Award and Classification” section on page 49). For example, in order to qualify for a Bachelors degree with honours, a student must have taken a maximum of 150 credits at Level 4 and a minimum of 90 credits at Level 6 over their entire programme.

**UCL module catalogue**

UCL’s new module catalogue gives access to a comprehensive catalogue of all modules across the whole of UCL, published in a consistent, searchable and accessible format. Further information

- [Module Catalogue](#)

**Language modules**

Language modules 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, and Spanish.

Languages are offered as 15 credit modules across 7 language levels from complete beginner to professional. Two levels may be combined to form a 30 credit module. The correspondence between language levels and those described on page 20, and a full module listing are available on the [CLIE website](#).

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

**Selecting modules**

Each degree programme has some compulsory modules 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 120 credits in any particular year.

To take an optional module, 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 30 credits per year) of options from other modules offered by the College, **provided that there is no timetable clash.** These modules are sometimes referred to as electives. The timetable will not be amended so that you may choose an elective. 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 modules. 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.

The deadlines for making module selections are outlined in the below table and will be published each year in the “Module Selection Task” on Portico. It is therefore essential that you make sure you research your module choices thoroughly before selecting them. If you want to make a change after you have confirmed your module choices, please consult the Departmental Tutor. Changes can be made by the Programme Administrator and you will need to request any changes to your Term 2 module registrations in good time before the relevant deadline.

<table>
<thead>
<tr>
<th>Deadline</th>
<th>September Starters</th>
<th>January Starters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Selections Student requests</td>
<td>11 October 2019</td>
<td>17 January 2020</td>
</tr>
<tr>
<td>Departmental approval</td>
<td>25 October 2019</td>
<td>21 January 2020</td>
</tr>
<tr>
<td>Changes to Term 1 modules Student requests</td>
<td>11 October 2019</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>Departmental approval</td>
<td>25 October 2019</td>
</tr>
<tr>
<td>Changes to Term 2 modules Student requests</td>
<td>06 December 2019</td>
<td>17 January 2020</td>
</tr>
<tr>
<td></td>
<td>Departmental approval</td>
<td>13 December 2019</td>
</tr>
</tbody>
</table>

Please remember that your registration for any optional module 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 modules MUST discuss their options with the Departmental Tutor, since failed modules 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.

Further information

- Portico Login
- Module Selection

**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 Masters 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.

Curriculum

Year 1

Compulsory Modules

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH0045</td>
<td>Calculus and Linear Algebra</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>MATH0046</td>
<td>Calculus in Several Dimensions</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0002</td>
<td>Introduction to Probability and Statistics</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0003</td>
<td>Further Probability and Statistics</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0004</td>
<td>Introduction to Practical Statistics</td>
<td>4</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

Elective Modules

You may select up to 30 credits from a wide range of undergraduate modern foreign language modules. You must select the remaining 15-45 credits from a wide range of undergraduate module options, e.g. Economics, Management, Mathematics, Psychology & Language Sciences, Science & Technology Studies. Below is a list of suggested elective modules that students have taken in the past.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON0011</td>
<td>Basic Microeconomic Concepts</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0044</td>
<td>An Introduction to Applied Economic Analysis</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>HPSC0003</td>
<td>History of Science: Antiquity to Enlightenment</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>HPSC0006</td>
<td>Science Policy</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MATH0048</td>
<td>Mathematical Analysis</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0003</td>
<td>Communication and Behaviour in Organisations</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0004</td>
<td>Accounting for Business</td>
<td>4</td>
<td>15</td>
<td>1 or 2</td>
</tr>
<tr>
<td>MSIN0048</td>
<td>Understanding Management</td>
<td>4</td>
<td>15</td>
<td>1 or 2</td>
</tr>
<tr>
<td>PSYC0038</td>
<td>Introduction to Social and Business Psychology</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>PSYC0039</td>
<td>Introduction to Psychology</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

If you wish to select an elective module from outside this list, please attend one of the module registration sessions or office hours provided by the Departmental Tutor, who will
discuss the appropriateness of the alternative module and assist you to enter the selection on Portico.

**Year 2**

*Compulsory Modules*

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH0047</td>
<td>Advanced Linear Algebra</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0005</td>
<td>Probability and Inference</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0006</td>
<td>Linear Models and the Analysis of Variance</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0007</td>
<td>Introduction to Applied Probability</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0023</td>
<td>Computing for Practical Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

*Optional Modules*

You must select at least 15 credits from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0025</td>
<td>Optimisation Algorithms in Operational Research</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

*Elective Modules*

You must select the remaining 15-30 credits from a wide range of undergraduate module options, e.g. Economics, Languages, Management, Mathematics, Psychology & Language Sciences, Science & Technology Studies. You may not select a Level 4 Mathematics module. Below is a list of examples of elective modules that students have taken in the past.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC########</td>
<td>Modern Foreign Language</td>
<td>4-6</td>
<td>15-30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>MATH0048</td>
<td>Mathematical Analysis</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0004</td>
<td>Accounting for Business</td>
<td>4</td>
<td>15</td>
<td>1 or 2</td>
</tr>
<tr>
<td>MSIN0048</td>
<td>Understanding Management</td>
<td>4</td>
<td>15</td>
<td>1 or 2</td>
</tr>
<tr>
<td>MSIN0059</td>
<td>Managerial Accounting for Decision Making</td>
<td>5</td>
<td>15</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

**Year 3**

*Compulsory Modules*

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0008</td>
<td>Statistical Inference</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0035</td>
<td>Project</td>
<td>6</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

*Optional Modules*

You must select at least 45 credits from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0009</td>
<td>Stochastic Systems</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0010</td>
<td>Forecasting</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0011</td>
<td>Decision and Risk</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0012</td>
<td>Factorial Experimentation</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0013</td>
<td>Stochastic Methods in Finance</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0014</td>
<td>Medical Statistics 1</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0015</td>
<td>Medical Statistics 2(^1)</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0017</td>
<td>Selected Topics in Statistics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

\(^1\) You may only select this module in combination with STAT0014: Medical Statistics 1.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0018</td>
<td>Stochastic Methods in Finance II(^2)</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0019</td>
<td>Bayesian Methods in Health Economics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0020</td>
<td>Quantitative Modelling of Operational Risk and</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Insurance Analytics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
<td>5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>STAT0025</td>
<td>Optimization Algorithms in Operational Research</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

**Elective Modules**

When choosing any elective modules, please bear in mind that you must have selected a maximum of 150 credits at Level 4 over your entire programme in order to be considered for the BSc Statistics qualification at the end of year 3.

You may select up to 30 credits from a wide range of undergraduate module options, e.g. Economics, Languages, Management, Mathematics, Psychology & Language Sciences, Science & Technology Studies. You may not select a Level 4 Mathematics module, or both STAT0013: Stochastic Methods in Finance, and MATH0031: Financial Mathematics.

**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 Masters 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;

\(^2\) You may only select this module in combination with STAT0013: Stochastic Methods in Finance.
• Have a basic knowledge of central principles of macroeconomics including national accounts, relations between private sector and government, 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.

Curriculum

Year 1

Compulsory Modules

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH0002</td>
<td>Economics I (Combined Studies)</td>
<td>4</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>MATH0045</td>
<td>Calculus and Linear Algebra</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>MATH0046</td>
<td>Calculus in Several Dimensions</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0004</td>
<td>Accounting for Business</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0002</td>
<td>Introduction to Probability and Statistics</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0003</td>
<td>Further Probability and Statistics</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0004</td>
<td>Introduction to Practical Statistics</td>
<td>4</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

Year 2

Compulsory Modules

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH0047</td>
<td>Advanced Linear Algebra</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0005</td>
<td>Probability and Inference</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0006</td>
<td>Linear Models and the Analysis of Variance</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0007</td>
<td>Introduction to Applied Probability</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0023</td>
<td>Computing for Practical Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

Optional Modules

You must select at least 15 credits from the following.
You may select up to 30 credits from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON0004</td>
<td>Applied Economics</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0001</td>
<td>Economics 2 (Combined Studies)</td>
<td>5</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

Elective Modules

You may select up to 15 credits from a wide range of undergraduate module options, e.g. Economics, Languages, Management, Mathematics, Psychology & Language Sciences, Science & Technology Studies. You may not select a Level 4 Mathematics module.

Year 3

Compulsory Modules

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0008</td>
<td>Statistical Inference</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0013</td>
<td>Stochastic Methods in Finance</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

Optional Modules

When choosing your optional and elective modules, please bear in mind that you must have selected a maximum of 150 credits at level 4 and a minimum of 90 credits at level 6 over your entire programme in order to be considered for the BSc Statistics, Economics and Finance qualification at the end of year 3.

You must select at least 30 credits and at least two modules from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0009</td>
<td>Stochastic Systems</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0010</td>
<td>Forecasting</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0011</td>
<td>Decision and Risk</td>
<td>6</td>
<td>15</td>
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<td>STAT0014</td>
<td>Medical Statistics 1</td>
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<tr>
<td>STAT0015</td>
<td>Medical Statistics 2</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0017</td>
<td>Selected Topics in Statistics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0019</td>
<td>Bayesian Methods in Health Economics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0025</td>
<td>Optimization Algorithms in Operational Research</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0035</td>
<td>Project</td>
<td>6</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>STAT0036</td>
<td>Project</td>
<td>6</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

You must select at least 15 credits from the following, unless already taken in year 2.

---

3 STAT0001 is a prerequisite for the third year optional modules ECON0001: Economics of Financial Markets, ECON0019: Quantitative Economics and Econometrics, and ECON0113: Advanced Economics of Finance.

4 MSIN0059 is a prerequisite for the third year optional modules MSIN0039: Corporate Financial Strategy, and MSIN0028: Mergers and Valuation.

5 You may only select this module in combination with STAT0014: Medical Statistics 1.

6 You may not select both STAT0035: Project and STAT0036: Project. A list of available projects is posted on the DOSSSH page.
You may select up to 60 credits from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON0019</td>
<td>Quantitative Economics and Econometrics</td>
<td>5</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>ECON0027</td>
<td>Game Theory</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ECON0029</td>
<td>Economics of Information</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>MSIN0028</td>
<td>Mergers and Valuation</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0039</td>
<td>Corporate Financial Strategy</td>
<td>6</td>
<td>15</td>
<td>1 or 2</td>
</tr>
<tr>
<td>MSIN0059</td>
<td>Managerial Accounting for Decision Making</td>
<td>5</td>
<td>15</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

**Elective Modules**

You may select up to 45 credits from a wide range of undergraduate module options, e.g. Economics, Languages, Management, Mathematics, Psychology & Language Sciences, Science & Technology Studies. You may not select a Level 4 Mathematics module, or MATH0031: Financial Mathematics.

**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 Masters 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:

---

7 You may only select this module if you took STAT0001: Economics 2 (Combined Studies) in year 2.
8 You may not select both ECON0048: Economics of Finance and ECON0113: Advanced Economics of Finance.
9 You may only select ECON0113 if you took STAT0001: Economics 2 (Combined Studies) in year 2. Even then, this module is expected to be challenging for SEF students and ECON0048 may be a more accessible alternative.
10 You may only select this module if you took STAT0001: Economics 2 (Combined Studies) in year 2.
11 You may only select this module if you took MSIN0059: Managerial Accounting for Decision Making in year 2.
• 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, 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.

**Curriculum**

**Year 1**

**Compulsory Modules**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH0002</td>
<td>Economics I (Combined Studies)</td>
<td>4</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>MATH0045</td>
<td>Calculus and Linear Algebra</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>MATH0046</td>
<td>Calculus in Several Dimensions</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0002</td>
<td>Introduction to Probability and Statistics</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0003</td>
<td>Further Probability and Statistics</td>
<td>4</td>
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<tr>
<td>STAT0004</td>
<td>Introduction to Practical Statistics</td>
<td>4</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

**Optional Modules**

You must select 15 credits from a wide range of undergraduate modern foreign language modules. You can study at most two languages and select at most one module at language level 1 throughout your degree programme.
### Year 2

**Compulsory Modules**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH0047</td>
<td>Advanced Linear Algebra</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0005</td>
<td>Probability and Inference</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0006</td>
<td>Linear Models and the Analysis of Variance</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0007</td>
<td>Introduction to Applied Probability</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

**Optional Modules**

You must select at least 15 credits from a wide range of undergraduate modern foreign language modules. You can study at most two languages and select at most one module at language level 1 throughout your degree programme.

You must select at least 15 credits from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON0004</td>
<td>Applied Economics</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0001</td>
<td>Economics 2 (Combined Studies)(^{12})</td>
<td>5</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
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</table>

You may select up to 30 credits from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0023</td>
<td>Computing for Practical Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0025</td>
<td>Optimisation Algorithms in Operational Research</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

**Elective Modules**

You may select up to 15 credits from a wide range of undergraduate module options, e.g. Economics, Management, Mathematics, Psychology & Language Sciences, Science & Technology Studies. You may not select a Level 4 Mathematics module.

### Year 3

**Compulsory Modules**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0008</td>
<td>Statistical Inference</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

**Optional Modules**

When choosing your optional and elective modules, please bear in mind that you must have selected a maximum of 150 credits at level 4 and a minimum of 90 credits at level 6 over your entire programme in order to be considered for the BSc Statistics, Economics and a Language qualification at the end of year 3.

You must select at least 15 credits from a wide range of undergraduate modern foreign language modules. You can study at most two languages and select at most one module at language level 1 throughout your degree programme.

You must select at least 45 credits and at least three modules from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0009</td>
<td>Stochastic Systems</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0010</td>
<td>Forecasting</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0011</td>
<td>Decision and Risk</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

\(^{12}\) STAT0001 is a prerequisite for the third year optional modules ECON0019: Quantitative Economics and Econometrics, and ECON0055: Economics of Science.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0012</td>
<td>Factorial Experimentation</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0013</td>
<td>Stochastic Methods in Finance</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0014</td>
<td>Medical Statistics 1</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0015</td>
<td>Medical Statistics 2&lt;sup&gt;13&lt;/sup&gt;</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<td>STAT0017</td>
<td>Selected Topics in Statistics</td>
<td>6</td>
<td>15</td>
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<tr>
<td>STAT0018</td>
<td>Stochastic Methods in Finance II&lt;sup&gt;14&lt;/sup&gt;</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0019</td>
<td>Bayesian Methods in Health Economics</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0020</td>
<td>Quantitative Modelling of Operational Risk and Insurance Analytics</td>
<td>6</td>
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<tr>
<td>STAT0023</td>
<td>Computing for Practical Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
<td>5</td>
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</tr>
<tr>
<td>STAT0025</td>
<td>Optimization Algorithms in Operational Research</td>
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<td>STAT0035</td>
<td>Project&lt;sup&gt;15&lt;/sup&gt;</td>
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<tr>
<td>STAT0036</td>
<td>Project&lt;sup&gt;15&lt;/sup&gt;</td>
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</table>

You must select at least 15 credits from the following.

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<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON0019</td>
<td>Quantitative Economics and Econometrics&lt;sup&gt;16&lt;/sup&gt;</td>
<td>5</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>ECON0027</td>
<td>Game Theory</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ECON0045</td>
<td>Money and Banking</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0048</td>
<td>Economics of Finance</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
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<td>ECON0052</td>
<td>Environmental Economics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0114</td>
<td>Computational Methods for Economists</td>
<td>6</td>
<td>15</td>
<td>1</td>
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<tr>
<td>MSIN0039</td>
<td>Corporate Financial Strategy&lt;sup&gt;17&lt;/sup&gt;</td>
<td>6</td>
<td>15</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

**Elective Modules**

You may select up to 30 credits from a wide range of undergraduate module options, e.g. Economics, Management, Mathematics, Psychology & Language Sciences, Science & Technology Studies. You may not select a Level 4 Mathematics module, or both STAT0013 and MATH0031 Financial Mathematics.

**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 Masters 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:

---

<sup>13</sup> You may only select this module in combination with STAT0014: Medical Statistics 1.

<sup>14</sup> You may only select this module in combination with STAT0013: Stochastic Methods in Finance.

<sup>15</sup> You may not select both STAT0035: Project and STAT0036: Project. A list of available projects is posted on the DOSSSH page.

<sup>16</sup> You may only select this module if you took STAT0001: Economics 2 (Combined Studies) in year 2.

<sup>17</sup> You may only select this module if you took MSIN0059: Managerial Accounting for Decision Making in year 2.
• 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.

Curriculum

Year 1

Compulsory Modules

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
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<tbody>
<tr>
<td>MATH0045</td>
<td>Calculus and Linear Algebra</td>
<td>4</td>
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<tr>
<td>MATH0046</td>
<td>Calculus in Several Dimensions</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0003</td>
<td>Communication and Behaviour in Organisations</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0006</td>
<td>Business Intelligence</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>MSIN0048</td>
<td>Understanding Management</td>
<td>4</td>
<td>15</td>
<td>1</td>
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<tr>
<td>STAT0002</td>
<td>Introduction to Probability and Statistics</td>
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<td>STAT0003</td>
<td>Further Probability and Statistics</td>
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<tr>
<td>STAT0004</td>
<td>Introduction to Practical Statistics</td>
<td>4</td>
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# Year 2

**Compulsory Modules**

<table>
<thead>
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<th>Credits</th>
<th>Term</th>
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<tbody>
<tr>
<td>MATH0047</td>
<td>Advanced Linear Algebra</td>
<td>5</td>
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<td>1</td>
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<tr>
<td>MSIN0004</td>
<td>Accounting for Business</td>
<td>4</td>
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<tr>
<td>MSIN0049</td>
<td>Business in a Competitive Environment</td>
<td>5</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0005</td>
<td>Probability &amp; Inference</td>
<td>5</td>
<td>15</td>
<td>1</td>
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<tr>
<td>STAT0006</td>
<td>Linear Models and the Analysis of Variance</td>
<td>5</td>
<td>15</td>
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</tbody>
</table>

**Optional Modules**

You must select at least 15 credits from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSIN0051</td>
<td>Business in the Digital Age</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0052</td>
<td>Law for Managers</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0053</td>
<td>Mastering Entrepreneurship</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>MSIN0059</td>
<td>Managerial Accounting for Decision Making(^\text{18})</td>
<td>5</td>
<td>15</td>
<td>1 or 2</td>
</tr>
<tr>
<td>MSIN0144</td>
<td>Entrepreneurship: Theory and Practice</td>
<td>5</td>
<td>15</td>
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</table>

You may select up to 30 credits from the following.

<table>
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</thead>
<tbody>
<tr>
<td>STAT0007(^\text{19})</td>
<td>Introduction to Applied Probability</td>
<td>5</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0023</td>
<td>Computing for Practical Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

**Elective Modules**

You may select up to 15 credits from a wide range of undergraduate module options, e.g. Economics, Languages, Management, Mathematics, Science & Technology Studies. You may not select a Level 4 Mathematics module.

# Year 3

**Compulsory Modules**

<table>
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<th>Level</th>
<th>Credits</th>
<th>Term</th>
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<tbody>
<tr>
<td>MSIN0057</td>
<td>Strategic Human Resource Management</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0147</td>
<td>Strategic Project Management</td>
<td>6</td>
<td>15</td>
<td>1 or 2</td>
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</tbody>
</table>

**Optional Modules**

When choosing your optional and elective modules, please bear in mind that you must have selected a maximum of 150 credits at Level 4 and a minimum of 90 credits at Level 6 over your entire programme in order to be considered for the BSc Statistics and Management for Business qualification at the end of year 3.

You must select at least 30 credits and at least two modules from the following, including at least 15 credits at Level 6. You must select at least 45 credits of Statistical Science options in total across years 2 and 3.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0007</td>
<td>Introduction to Applied Probability</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0008</td>
<td>Statistical Inference</td>
<td>6</td>
<td>15</td>
<td>1</td>
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</tbody>
</table>

\(^{18}\) MSIN0059: Managerial Accounting for Decision Making is a prerequisite for the third year optional module

\(^{19}\) MSIN0039: Corporate Financial Strategy.

\(^{19}\) STAT0007 is a prerequisite for third year module STAT0009: Stochastic Systems.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
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<th>Term</th>
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<tbody>
<tr>
<td>STAT0009</td>
<td>Stochastic Systems(^{19})</td>
<td>6</td>
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<td>STAT0010</td>
<td>Forecasting</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0011</td>
<td>Decision and Risk</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0012</td>
<td>Factorial Experimentation</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0013</td>
<td>Stochastic Methods in Finance</td>
<td>6</td>
<td>15</td>
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<tr>
<td>STAT0014</td>
<td>Medical Statistics 1</td>
<td>6</td>
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<td>STAT0015</td>
<td>Medical Statistics 2(^{20})</td>
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<td>STAT0017</td>
<td>Selected Topics in Statistics</td>
<td>6</td>
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<td>2</td>
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<tr>
<td>STAT0018</td>
<td>Stochastic Methods in Finance II(^{21})</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0019</td>
<td>Bayesian Methods in Health Economics</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td>STAT0020</td>
<td>Quantitative Modelling of Operational Risk and</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td></td>
<td>Insurance Analytics</td>
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<tr>
<td>STAT0023</td>
<td>Computing for Practical Statistics</td>
<td>5</td>
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<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
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<td>2</td>
</tr>
<tr>
<td>STAT0025</td>
<td>Optimization Algorithms in Operational Research</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0035</td>
<td>Project(^{22})</td>
<td>6</td>
<td>30</td>
<td>1 &amp; 2</td>
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<tr>
<td>STAT0036</td>
<td>Project(^{22})</td>
<td>6</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

You must select at least 15 credits from the following, and at least 45 credits of Management options in total across years 2 and 3:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
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<tbody>
<tr>
<td>ECON0027</td>
<td>Game Theory</td>
<td>6</td>
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<td>MSIN0029</td>
<td>Digital Marketing</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td>MSIN0039</td>
<td>Corporate Financial Strategy(^{23})</td>
<td>6</td>
<td>15</td>
<td>1 or 2</td>
</tr>
<tr>
<td>MSIN0051</td>
<td>Business in the Digital Age</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>MSIN0052</td>
<td>Law for Managers</td>
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<td>15</td>
<td>2</td>
</tr>
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<td>MSIN0053</td>
<td>Mastering Entrepreneurship</td>
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<td>15</td>
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<tr>
<td>MSIN0055</td>
<td>International Strategy</td>
<td>6</td>
<td>15</td>
<td>2</td>
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<tr>
<td>MSIN0059</td>
<td>Managerial Accounting for Decision Making</td>
<td>5</td>
<td>15</td>
<td>1 or 2</td>
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<tr>
<td>MSIN0060</td>
<td>Global Entrepreneurship</td>
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<tr>
<td>MSIN0061</td>
<td>Global Marketing Strategy</td>
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<td>2</td>
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<tr>
<td>MSIN0146</td>
<td>Financial Management</td>
<td>6</td>
<td>15</td>
<td>1</td>
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<tr>
<td>MSIN0153</td>
<td>Extended Project(^{22})</td>
<td>6</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

Subject to the same credit requirements, you may substitute Management modules listed above with other modules offered by the School of Management.

**Elective Modules**

You may select up to 30 credits from a wide range of undergraduate module options, e.g. Economics, Languages, Mathematics, Science & Technology Studies. You may not select a Level 4 Mathematics module, or both STAT0013: Stochastic Methods in Finance 1 and MATH0031: Financial Mathematics.

**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

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\(^{20}\) You may only select this module in combination with STAT0014: Medical Statistics 1.

\(^{21}\) You may only select this module in combination with STAT0013: Stochastic Methods in Finance.

\(^{22}\) You may only select one project module in year 3, either STAT0035: Project, STAT0036: Project, or MSIN0153: Extended Project. A list of available Statistical Science projects is posted on the DOSSSH page.

\(^{23}\) You may only select this module if you took MSIN0059: Managerial Accounting for Decision Making in year 2.
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.

**Curriculum**

**Year 1**

**Compulsory Modules**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<th>Credits</th>
<th>Term</th>
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<tbody>
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<td>MATH0045</td>
<td>Calculus and Linear Algebra</td>
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<tr>
<td>MATH0046</td>
<td>Calculus in Several Dimensions</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0002</td>
<td>Introduction to Probability and Statistics</td>
<td>4</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0003</td>
<td>Further Probability and Statistics</td>
<td>4</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0004</td>
<td>Introduction to Practical Statistics</td>
<td>4</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

**Optional Modules**

You must select exactly 15 credits from the following.
Students who have not taken Economics A-level, or equivalent, should consider taking ECON0007: The World Economy, as this provides an introduction to basic economic concepts and methods. Students who have taken Economics A-level typically choose ECON0004: Applied Economics. ECON0004 is among the named prerequisites for the compulsory second year module ECON0019: Quantitative Economics and Econometrics, although students will take during their first year modules judged to be equivalent. If students are unsure about which option to take they should ask about this at the Economics induction meeting.

Year 2

**Compulsory Modules**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON0019</td>
<td>Quantitative Economics and Econometrics</td>
<td>5</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>MATH0047</td>
<td>Advanced Linear Algebra</td>
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<td>Economics 2 (Combined Studies)</td>
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<td>30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>STAT0005</td>
<td>Probability &amp; Inference</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0006</td>
<td>Linear Models and the Analysis of Variance</td>
<td>5</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

Optional Modules

You must select exactly 15 credits from the following.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0007</td>
<td>Introduction to Applied Probability(^{24})</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

Year 3

Optional Modules

When choosing your optional and elective modules, please bear in mind that you must have selected a maximum of 150 credits at Level 4 and a minimum of 90 credits at Level 6 over your entire programme in order to be considered for the BSc(Econ) Economics and Statistics qualification at the end of year 3.

You must select at least 30 credits and at least two modules from the following, including at least 15 credits at Level 6.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0007</td>
<td>Introduction to Applied Probability(^{24})</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0008</td>
<td>Statistical Inference</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0009</td>
<td>Stochastic Systems(^{24})</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0010</td>
<td>Forecasting</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0011</td>
<td>Decision and Risk</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0012</td>
<td>Factorial Experimentation</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0013</td>
<td>Stochastic Methods in Finance</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0014</td>
<td>Medical Statistics 1</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0015</td>
<td>Medical Statistics 2(^{25})</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0017</td>
<td>Selected Topics in Statistics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0018</td>
<td>Stochastic Methods in Finance II(^{26})</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

\(^{24}\) STAT0007 is a prerequisite for third year module STAT0009: Stochastic Systems.

\(^{25}\) You may only select this module in combination with STAT0014: Medical Statistics 1.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT0019</td>
<td>Bayesian Methods in Health Economics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0020</td>
<td>Quantitative Modelling of Operational Risk and Insurance Analytics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0023</td>
<td>Computing for Practical Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0024</td>
<td>Social Statistics</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>STAT0025</td>
<td>Optimization Algorithms in Operational Research</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>STAT0035</td>
<td>Project&lt;sup&gt;27&lt;/sup&gt;</td>
<td>6</td>
<td>30</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>STAT0036</td>
<td>Project&lt;sup&gt;27&lt;/sup&gt;</td>
<td>6</td>
<td>15</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

You must select at least 15 credits from the following, and at least 45 credits in total from the two lists of Economics optional modules.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON0001</td>
<td>Economics of Financial Markets</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0021</td>
<td>Microeconometrics</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ECON0022</td>
<td>Econometrics for Macroeconomics and Finance</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ECON0023</td>
<td>International Trade</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ECON0027</td>
<td>Game Theory</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ECON0029</td>
<td>Economics of information</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ECON0030</td>
<td>Issues in Economic Development</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0113</td>
<td>Advanced Economics of Finance&lt;sup&gt;28,29&lt;/sup&gt;</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

You must select at least 15 credits from the following, and at least 45 credits in total from the two lists of Economics optional modules.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Level</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON0045</td>
<td>Money and Banking</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0047</td>
<td>Economics of Labour</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ECON0048</td>
<td>Economics of Finance&lt;sup&gt;29&lt;/sup&gt;</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0052</td>
<td>Environmental Economics</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0053</td>
<td>Economics of Tax Policy</td>
<td>6</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ECON0114</td>
<td>Computational Methods for Economists</td>
<td>6</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

Subject to the same credit requirements, you may substitute Economics modules listed above with other modules offered by the Department of Economics. Your selection must include at least one module that is classified by the Department of Economics as being suitable for third years only.

**Elective Modules**

You may select up to 45 credits from a wide range of undergraduate module options, e.g. Languages, Management, Mathematics, Psychology & Language Sciences, Science & Technology Studies. You may not select a Level 4 Mathematics module, or both STAT0013: Stochastic Methods in Finance 1 and MATH0031: Financial Mathematics.

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<sup>26</sup> You may only select this module in combination with STAT0013: Stochastic Methods in Finance.

<sup>27</sup> You may not select both STAT0035: Project and STAT0036: Project. A list of available projects is posted on the DOSSSH page.

<sup>28</sup> This module is expected to be challenging for Econ/Stats students and ECON0048: Economics of Finance (Level 5) from the below list may be a more accessible alternative.

<sup>29</sup> You may not select both ECON0048: Economics of Finance and ECON0113: Advanced Economics of Finance.
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).

Curriculum
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 modules. 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 30 credits of language modules in the first two years. These language modules 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 modules 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 modules 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 programmes, that is, using accepted equivalence measures, be of 120 credits;
- be formally assessed by the host institution and the results of the assessment independently reported to the Study Abroad Tutor;
- include taught modules / credits, 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 15.
In year 4, the choice of modules should complement the ones taken in the year abroad. All 120 credits must be selected at Level 7, at least 90 credits of which should be chosen from amongst the modules offered by the Department of Statistical Science. The module STAT0008: 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 30 credits, either as a compulsory 30 credit Level 7 statistical project in the final year, or by registering for at least a 15 credit project module in each of years 3 and 4 and undertaking the work over two years. Optional modules must be agreed by the Study Abroad and Departmental Tutors, in order to avoid overlap caused by attending an overseas institution.

**BSc/MSci Mathematics and Statistical Science**

The MASS degree programme specifications are available from the Department of Mathematics at [http://www.ucl.ac.uk/maths/courses/undergraduates/maths-stats](http://www.ucl.ac.uk/maths/courses/undergraduates/maths-stats).

**EXTENUATING CIRCUMSTANCES AND REASONABLE ADJUSTMENTS**

**Students with disabilities and long-term conditions**

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:

- [Disability Support](http://www.ucl.ac.uk/maths/courses/undergraduates/maths-stats)
- [Mental health and wellbeing support](http://www.ucl.ac.uk/maths/courses/undergraduates/maths-stats)

**Pregnancy and maternity, paternity, parental and adoption leave**

UCL can also make Reasonable Adjustments for students who are pregnant or who need to go on Maternity, Paternity, Parental Leave and Adoption Leave. Students do not have to apply for a Summary of Reasonable Adjustments but should instead contact UCL Student Support and Wellbeing to find out about the support available.

Further information:

- [Support for pregnant students](http://www.ucl.ac.uk/maths/courses/undergraduates/maths-stats)
- [Support for student parents](http://www.ucl.ac.uk/maths/courses/undergraduates/maths-stats)

**Religious observance**

Students may need Reasonable Adjustments to help them observe their faith, particularly where classes or assessments might fall on important religious dates. Students do not have to apply for a Summary of Reasonable Adjustments but should instead contact the appropriate Chaplain for advice and support. Further information is also available in UCL’s Religion and Belief Policy.
Further information:

- Religion and faith
- Religion and belief equity policy for students

Examination adjustments

Examination Adjustments are adjustments to written examinations for students with a disability, medical or mental health condition, such as extra time, rest breaks or specialist equipment.

Students should contact the Disability, Mental Health and Wellbeing team who can help them to complete an application and advise them on gathering the required documentary evidence. Applications need to be received by the Disability, Mental Health and Wellbeing team three weeks before the examination period in question.

After this deadline students will need to apply to defer their assessment to the next opportunity (normally the Late Summer Assessment period) if they require mitigation, under the Extenuating Circumstances regulations (see next section).

Further information:

- Exam Arrangements

Illness and other extenuating circumstances

If a student’s assessments are disrupted by events which are unexpected, significantly disruptive and beyond the student’s control, such as serious illness or bereavement, they can apply for ‘Extenuating Circumstances’.

Students are responsible for letting UCL know about any event that might affect their performance in assessments (exams or assignments) at the time that it takes place. Applications need to be submitted within 1 week. Meeting this deadline is important: we can only consider late applications if ongoing circumstances mean that it was genuinely impossible for the student to submit on time.

Students should not wait for supporting evidence to become available before submitting their EC claim. If a student is unable to obtain the necessary evidence within the deadlines they should still submit their form on time and indicate that their evidence is to follow.

Applying for extenuating circumstances

- Read the Extenuating Circumstances procedures. The regulations include important information about eligibility and how to make a claim.
- Check whether the circumstances are covered under the Grounds for Extenuating Circumstances. We may be able to support students better through reasonable adjustments, examination adjustments or an interruption of study.
- Complete an Extenuating Circumstances Form. Students should make sure that they tick the box allowing us to share their request with members of staff who are directly responsible for making a decision (don’t worry, we will keep data secure). Students should make sure that they tell us about every assessment that has been affected – we won’t assume it applies to assessments that aren’t on the form.
- Get supporting evidence. This needs to be from a registered doctor or other verifiable source – students should ask their doctor or evidence provider to read the guidance.
notes on the form carefully—we need to understand how the circumstance has affected
the student’s ability to do their assessment. If students need time to get their evidence,
they should submit their form on time and submit their evidence as soon as they can.

- Submit the form within 1 week of the Extenuating Circumstance taking place. We may
  not be able to help if a claim is late. Students in the Department of Statistical Science
  need to submit their form to Dr RG Evans (room 123, russell.evans@ucl.ac.uk), who
  will forward the form and evidence, confidentially, to the appropriate person(s).

- What happens next. If students apply for a 1 week extension, this will be considered by
  staff in their department, who will try to give a response as quickly as possible. If
  students apply for other help, requests will be considered by either the faculty or
  departmental Extenuating Circumstances Panel. The Panel will usually offer one of the
  following, although they may suggest something else:
    - an extension of more than 1 week
    - a ‘deferral’ i.e. postponing the assessment to the next scheduled occasion
    - suspending the normal penalties for handing work in late.

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.

Longer term conditions

The Extenuating Circumstances regulations are designed to cover unexpected
emergencies; they are not always the best way to help students who might have a longer-
term medical or mental health condition, disability or learning difficulty. Although there may
be times when it is necessary for such students to use the Extenuating Circumstances
regulations, students should make sure they take advantage of all the other support
mechanisms provided by UCL such as:

- Reasonable Adjustments
- Examination Adjustments
- Interruption of Study
- Disability Support
- Mental health and wellbeing support

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
- Learning Agreements, Barring, Suspensions and Termination of Study
ASSESSMENT

Components of compulsory assessment

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

In-course assessment

At the beginning of each module, 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 module 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 module in the “Module Information” section from page 68 onwards. For students required to resit the in-course assessment during the late summer, an alternative form of assessment may be employed for the second attempt.

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 module.* Teaching staff will set aside extra office hours to discuss assessment-related matters (see page 13); 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 Teaching & Learning Office or the module lecturer by a set deadline. For such assessments, you will need to sign a cover sheet (provided by the module lecturer) containing a declaration that the submitted work is entirely your own (see “Plagiarism and collusion” section on page 44). 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 40). 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.

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.*
Further information:

- **Word Counts**

**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 Assessments website.

Further information:

- **Exams and Assessments**
- **Examinations**

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 15 for details of permitted calculators).

Recent past examination papers are available from the UCL Library Services website.

**Final module mark**

To pass a module at Levels 4, 5 and 6, a final mark of at least 40.00% is required. To pass a Level 7 module, a final mark of at least 50.00% is required. For Statistical Science modules with more than one assessment component, the scheme used for combining the individual marks is given for each module in the “Module Information” section from page 68 onwards.

**UCL feedback turnaround policy**

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:

- **Assessment Feedback**
Academic integrity

High academic standards are fundamental to ensuring continued trust and confidence in UCL’s world-leading research and teaching, as well as the individuals who work and study at UCL. UCL takes academic integrity very seriously, and expects students to familiarise themselves with UCL’s referencing and citation requirements. A good starting point is the UCL Library Guide to References, Citations and Avoiding Plagiarism. Students should also ensure that they are familiar with the specific referencing requirements of their discipline, as these may vary.

Candidates for written examinations should also familiarise themselves with the requirements set out in the UCL Examination Guide for Candidates, which is published annually on the Examinations and Awards website. It is also very important that students are aware of what items they are permitted to bring into the Examination Halls, so they can ensure they do not unintentionally breach the examination rules.

UCL has a zero tolerance approach to the use of essay mills and contract cheating, as they go against every principle that UCL stands for. These types of service disadvantage honest students and devalue standards in our universities.

The vast majority of students at UCL will maintain their Academic Integrity throughout their studies, but it is important to be aware that UCL may consider breaches to your Academic Integrity as an instance of Academic Misconduct. When Academic Misconduct occurs there can potentially be penalties imposed, and it is important to note that repeated breaches will be taken very seriously and could result in the strongest penalties. For students who are unsure of what may be considered as Academic Misconduct, the procedures in Chapter 6 of the Academic Manual define all such behaviour and how this is taken forwards. UCL also has online tools available to help students identify what behaviours may be considered as Academic Misconduct.

Further information:

- Assessment Misconduct Procedure
- Library Guide to References, Citations and Avoiding Plagiarism

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 academic misconduct (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. All other cases must be dealt with formally, which involves adjudication by the module organiser, Departmental Tutor, a Departmental panel and/or a College Academic Misconduct Panel, depending on the extent of the alleged misconduct (see “Academic Integrity” 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, e.g. texts or figures, 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 module 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 given a mark of zero for the module 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 module. 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 for that component.

**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 module lecturer in the first instance.
- If you are stuck with an assessment, don't ask another student for help. Discuss it with the module lecturer.
- If another student asks you for help with an assessment, or asks to see your work, suggest that they approach the module 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).

**Examination marks**

*First and second marking*

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.
**Moderation**

The “raw” mark for an assessment may not be the final mark that is awarded. An Internal Examiner, usually the module organiser, will carefully consider *grade boundaries* by examining a sufficient range of scripts and using the grade descriptors summarised in the “Feedback on student work” section on page 15. These boundaries determine the raw mark required to achieve each grade. Once the grade boundaries have been set, the examiner will calculate the associated percentage mark on the UCL scale from 0.00% to 100.00%.

For example, for a particular assessment marked out of 100, the examiner may decide that submissions scoring at least 58/100 meet the criteria for a grade B (equivalent to a percentage mark of 60.00% on the UCL scale), while those scoring at least 71/100 meet the criteria for a grade A (equivalent to a percentage mark of 70.00% on the UCL scale). Therefore a score of 58/100 is converted to 60.00%, a score of 71/100 is converted to 70.00%, while a score strictly between 58 and 71 is converted to the relevant percentage mark using linear transformation.

It should be noted that the examiner may decide that such conversions are not necessary, e.g. a score of 60/100 (and no less) does indeed match the descriptor for a grade B so is converted to 60.00% on the UCL percentage scale, or that grade boundaries may be above or below what is expected as in the example above.

All examiners are required to justify their choice of grade boundaries formally, which the second examiner must agree. The External Examiner (see next section) also reviews this justification and can request changes if necessary.

**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 online 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 the “My Studies” page through their Portico account or by contacting their Programme Administrator in the first instance or Student and Registry Services directly at examiners@ucl.ac.uk. On the same Portico page, students can also access UCL wide External Examiners reports for the last three years.

**Boards of examiners**

Marks are finalised at meetings of examiners in the departments offering the modules. When finalising marks, examiners in the Department of Statistical Science compare results between modules of the same difficulty level in order to ensure comparability of standards. Recommended degree classifications for final year students registered on the Statistics, SEF, SEL and MSci 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 UCL Education Committee later in the summer and will be published individually to each student via the DOSSSH Moodle page. 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 40).
- 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 62). *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.

**Information about the consequences of failure**

Students are permitted a maximum of two attempts at any given assessment. If a student fails an assessment at the first attempt they might:

- Be eligible for Condonement
- Need to Resit or Repeat the assessment
- Apply for a Deferral or other support under the Extenuating Circumstances procedures (see page 39)

**Condonement**

Condonement allows a student to progress from one year to the next and/ or to be awarded a qualification where they are carrying a small amount of failure, as long as their overall performance is of a good standard and the requirements of any relevant professional, statutory or regulatory bodies are met. Students who meet the condonement criteria will not be reassessed. Condonement can be applied only to module marks falling within a certain range, and students will need to meet defined criteria to be eligible for condonement. For undergraduate programmes, the condonable range is 1.00-39.99% for modules at Levels 4, 5 and 6 and 1.00-49.99% for modules at Level 7.

Some modules may be ‘non-condonable’ i.e. students must pass them. A student’s eligibility for condonement in any given module is determined by the programme on which they are enrolled. For all six of the degree programmes listed at the top of page 1, the modules:
STAT0003 Further Probability and Statistics, and STAT0005 Probability and Inference\(^{30}\) are both non-condonable. These modules introduce and then develop a formal and mathematical framework for the study of probability and statistics that underpins almost all of Statistical Science, including most of the advanced topics studied in years 2 and 3.

Further information

- **Condonement**
- **Guide to Undergraduate Condonement**

A student will be awarded a mark of 0.00\% for an assessment component and will be deemed to have made an attempt where they:

- Are absent from an examination, presentation or other assessment event without prior permission.
- Do not attempt a paper or task.
- Attempt so little of a paper or task that it cannot be assessed.
- Do not submit coursework.

To avoid being awarded a mark below the condonable range for a particular module through absence from assessment, students must obtain authorisation for the absence by submitting a request for extenuating circumstances (see "Extenuating Circumstances" section on page 40).

**Reassessment**

Depending on the amount of failure, reassessment may take the form of either a resit, which usually takes place in the late summer, or a repeat in the following academic session. The marks for modules successfully completed at the second attempt will be capped at the pass mark – 40.00\% for modules at Levels 4, 5 and 6 and 50.00\% for modules at Level 7.

Further information:

- **Consequences of Failure**

**Deferred assessment**

If an assessment has been affected by Extenuating Circumstances students may be offered a deferral i.e. a ‘new first attempt’ or a ‘new second attempt’. If the student successfully completes a deferral of their first attempt, their module marks will not be capped. If the student successfully completes a deferral of their second attempt (i.e. they have Extenuating Circumstances on a resit or repeat), their module marks will be capped at the pass mark (i.e. the existing cap will not be removed).

Further information:

- **Deferred Assessment**

**PROGRESSION, AWARD AND CLASSIFICATION**

UCL’s progression and award requirements define how many credits and modules students need to pass to progress from one year of study to the next and to be awarded a UCL qualification.

\(^{30}\) STAT0005 is condonable for students who first enrolled on and began studying the module prior to the 2018/19 session.
Progression and award requirements

In order to progress from one year to the next, or to be awarded a Bachelors with Honours or an Integrated Masters with Honours, a student should pass 120 credits in each year of study. A student who does not pass 120 credits in a year of study will nonetheless be considered to have met the progression and award requirements if they satisfy all of the following condonement criteria in that year of study:

- Pass all non-condonable modules (STAT0003 in year 1; STAT0005 in year 2),
- Attain marks in the condonable range in no more than 30 credits,
- Pass the remaining credits,
- Have attained marks in the condonable range in no more than 60 credits up to and including the current year of study,
- Achieve a credit-weighted mean of at least 40.00% (50.00% in the Masters year) across 120 credits.

Students unable to meet these requirements having exhausted all reassessment attempts may be eligible for an interim qualification, i.e. a Certificate of Higher Education, Diploma of Higher Education or Ordinary Degree. Any such award will be unclassified.

MSci degree

In addition to the above criteria, the following progression rules apply to the MSci International programme:

- Year 2 to Year 3: a student will automatically progress who has an overall weighted mark (i.e. weighted mean of years 1 and 2) of 59.50% or greater, AND has a year 2 credit-weighted mean of 59.50% or greater.
- Year 3 to Year 4: a student will automatically progress who has an overall weighted mark (i.e. weighted mean of years 1, 2 and 3) of 59.50% or greater, AND has a year 3 credit-weighted mean of 59.50% or greater.
- If a student does not satisfy the 59.50% requirement, but has weighted means of 49.50% or greater, continuance on the MSci programme may be permitted at the discretion of the Programme Board of Examiners.

The relative weightings used in the calculation of the overall weighted mark are the same as those specified in the classification scheme (see below). A student who fails to progress 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 corresponding BSc programme.

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
Classification scheme for students first enrolling from 2018/19 onwards

Students who have successfully completed the progression and award requirements will be awarded a classification. A final weighted mark will be calculated from the individual module marks as follows, rounded to two decimal places:

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Year BSc</td>
<td>All 120 credits</td>
<td>All 120 credits</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>weighted at 1</td>
<td>weighted at 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>weighted at 5</td>
<td></td>
</tr>
<tr>
<td>4 Year MSci</td>
<td>All 120 credits</td>
<td>All 120 credits</td>
<td>All 120 credits</td>
</tr>
<tr>
<td></td>
<td>weighted at 1</td>
<td>weighted at 3</td>
<td>weighted at 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>weighted at 5</td>
<td></td>
</tr>
</tbody>
</table>

The follow rules will then be used to determine the classification:

First Class Honours (1)  
- A final weighted mark of at least 69.50%  
- OR  
- A final weighted mark of at least 68.50%, AND  
- Module marks of at least 70.00% in at least 50% of the final year credits

Second Class Honours Upper Division (2.1)  
- A final weighted mark of at least 59.50%  
- OR  
- A final weighted mark of at least 58.50%, AND  
- Module marks of at least 60.00% in at least 50% of the final year credits

Second Class Honours Lower Division (2.2)  
- A final weighted mark of at least 49.50%  
- OR  
- A final weighted mark of at least 48.50%, AND  
- Module marks of at least 50.00% in at least 50% of the final year credits

Third Class Honours (3)  
- A final weighted mark of at least 40.00%

Classification scheme for students first enrolling before 2018/19

Students who have successfully completed the progression and award requirements will be awarded a classification. 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 of the Statistics, SEF, SEL, SAMB and Econ/Stats programmes are 1, 3 and 5 respectively. The relative weights attached to the first, second, third and fourth year marks of the MSci programme are 1, 3, 2.5 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>

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In cases where a candidate resits a module, the highest available mark is used in the calculation. The resulting mark is credited to the year in which the module 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 credit value).

**Calculation of yearly marks**

The marks from all 120 credits are used in the calculation of each yearly mark. A 30 credit module is counted as two 15 credit modules.

**BSc Statistics**

- The first year mark is a weighted average of all first year module marks; full weight is attached to modules STAT0002 and STAT0003 and to the best 30 credits from your remaining modules, and half weight to the other 60 credits.
- The second year mark is a weighted average of all second year module marks; full weight is attached to STAT0005, STAT0007 and to the best 60 credits of your remaining modules, and half weight to the other 30 credits.
- The third year mark is a weighted average of all third year module marks; full weight is attached to STAT0008, 15 credits of STAT0035 and the best 60 credits of remaining modules, and half weight to the other 30 credits.

**BSc Statistics, Economics and Finance**

- The first year mark is a weighted average of all first year module marks; full weight is attached to modules STAT0002 and STAT0003 and to the best 30 credits from your remaining modules, and half weight to the other 60 credits.
- The second year mark is a weighted average of all second year module marks; full weight is attached to STAT0005, STAT0007 and to the best 60 credits of your remaining modules, and half weight to the 30 credits.
- The third year mark is a weighted average of all third year module marks; full weight is attached to STAT0008, STAT0013 and the best 60 credits of remaining modules, and half weight to the 30 credits.

**BSc Statistics, Economics and a Language**

- The first year mark is a weighted average of all first year module marks; full weight is attached to modules STAT0002 and STAT0003 and to the best 30 credits from your remaining modules, and half weight to the other 60 credits.
- The second year mark is a weighted average of all second year module marks; full weight is attached to STAT0005, STAT0007 and to the best 60 credits of your remaining modules, and half weight to the other 30 credits.
• The third year mark is a weighted average of all third year module marks; full weight is attached to STAT0008 and the best 75 credits of remaining modules, and half weight to the other 30 credits.

*BSc Statistics and Management for Business*

• The first year mark is a weighted average of all first year module marks; full weight is attached to modules STAT0002, STAT0003 and to the best 30 credits of remaining modules, and half weight to the other 60 credits.

• The second year mark is a weighted average of all second year module marks; full weight is attached to STAT0005, MSIN0049 and to the best 60 credits of your remaining modules, and half weight to the other 30 credits.

• The third year mark is a weighted average of all third year module marks; full weight is attached to the best 90 credits, and half weight to the other 30 credits.

*BSc (Econ) Economics and Statistics*

• The first year mark is a weighted average of all first year module marks; full weight is attached to modules STAT0002, STAT0003 and (all 30 credits of) MATH0002, and half weight to the other 60 credits.

• The second year mark is a weighted average of all second year module marks; full weight is attached to STAT0005, 15 credits of STAT0001 and to the best 60 credits of your remaining modules, and half weight to the other 30 credits.

• The third year mark is a weighted average of all third year module marks; full weight is attached to the best 90 credits, and half weight to the other 30 credits.

*MSc Statistical Science (International Programme)*

• The first and second year marks are calculated in the same way as for the corresponding BSc programme (see above).

• Students on the International Programme spend their third year abroad and, since other universities do not necessarily operate the same credit 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 modules: rather, a single mark for the year abroad is recorded and this is treated as a 120 credit module for the purpose of applying the formula described above.

• The fourth year mark is an average of all fourth year modules, in which all credits are given equal weight.

Illustrative calculations for the pre-2018/19 classification scheme can be found in previous editions of this handbook, available from the DOSSSH Moodle page.

**Prizes and medals**

*Departmental*

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

• Two *first year sessional prizes* for outstanding performance in the first year;
• Two *second year sessional prizes* for outstanding performance in the second year;
• One final year sessional prize for outstanding performance in the final year;
• One undergraduate project prize: for the best undergraduate project.\(^{31}\)

**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
• **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.

**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 modules 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 modules in the degree programme.

**MSci students**: please consult the Departmental Tutor (this applies for modules 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 modules in any subject). You may also consult the Statistics Tutor to MASS Students about the Statistics modules in the degree programme.

Further information:

• [Changes to your studies](#)

**Informing the Student Loans Company of changes to your student status**

If a student makes a change to their programme or registration status during the course of the academic year, it is important that the Student Loans Company (SLC) is notified. The SLC can then re-assess and update its records. Changes could include a student withdrawing from their academic programme, an interruption in studies or transferring to a new programme. The SLC must also be notified when there is a change in mode of study or when a student has returned from an interruption.

To inform the SLC of a change in your student status, a Change of Circumstance (CoC) form must be completed online by your Faculty. See the Key Contacts section for details of who to contact in the Faculty if you require a CoC form to be submitted on your behalf or if you have any related queries.

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\(^{31}\) If the same recipient would otherwise be selected for both the third year sessional and project prizes, there will instead be two third year sessional prizes for outstanding performance in the final year (and no project prize).
Changing modules
If a student wishes to make changes to their individual modules they will need to do so by the deadlines in the “Selecting modules” section (see page 21). Students should contact their Teaching & Learning Office as soon as possible as all changes will need to be approved.

Further information:
- Change your degree programme or modules
- Module Selection

Changing programme
If a student wishes to transfer from one UCL degree programme to another, they must make a formal application. The usual deadline for change of degree programme during the academic session is the end of October each year (for students registering in September, with a later date for students registering in January) to be compatible with module selection deadlines, although later transfers may be possible, where the transfer does not affect module selections. 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:
- Change your degree programme or modules
- 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:
- Interrupting or withdrawing from your studies
- 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. 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.
Further information:

- Interrupting or withdrawing from your studies
- Withdrawing from a programme

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 Student Support and Wellbeing 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 Enquiries Centre

The Student Enquiries Centre (SEC), now open from 08:00 to 18:00 - Monday to Friday, except Tuesdays (11:00 – 17:00) - is based on the first floor of the new Student Centre building (open 24 hours a day, 365 days a year) in Gordon Square. It provides front-line administrative services to UCL students and is an excellent source of information about UCL in general and all of the services provided by Student and Registry Services (SRS). SRS is implementing an enquiry and case management system known as askUCL, to streamline processes and enable students to have the majority of their queries answered in one place, via a knowledge bank of frequently asked questions. If their question cannot be answered students are able to log and track an enquiry, thus replacing the use of multiple email addresses.

Further information:

- Student Enquiries Centre
- About the Student Centre

Disability, Mental Health and Wellbeing Team

The Disability, Mental Health and Wellbeing Team in Student Support and Wellbeing (SSW) provide a safe, confidential and non-judgemental space, in which students can discuss any wellbeing, mental health and/or disability concerns that may be affecting their ability to study. This encompasses any personal or emotional challenges students may be experiencing, mental health difficulties such as anxiety or depression and long-term health conditions. The service also supports students with physical and sensory impairments, specific learning difficulties, and autistic spectrum conditions. As well as arranging for adjustments to learning environments, the team loan out specialist equipment. They provide one-to-one tutoring and support for students with specific learning difficulties and mentoring for students with mental health conditions.

Further information:

- Disability Support
- Mental health and wellbeing support

Student Psychological and Counselling Services

Student Psychological and Counselling Services (SPCS) is dedicated to helping UCL students with personal, emotional and psychological concerns. The SPCS 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 and Counselling Services

International student support
The International Student Support team provide specialist support and advice for all non-UK students at UCL. They help international students settle into life in the UK and make the most of their time at UCL and in London. This includes practical guidance on healthcare, banking, transport and safety, as well as information about the International Student Orientation Programme (ISOP).

Further information:
- International Students

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. The team coordinates a diverse portfolio of global student opportunities via different projects: Student Exchanges and Exchange Agreements, the Erasmus Scheme, Study Abroad, Global Experience (Summer Schools, internships, short-term mobility).

Further information:
- Go Abroad

Accommodation
UCL Accommodation provides a range of housing options which includes two Halls of Residence (catered), self-catered Student Houses and Intercollegiate Halls (both catered and self-catered) shared with other colleges of the University of London. Each Hall has a designated Warden supported by a number of live-in Student Residence Advisers (SRA) to provide support for students and to foster a positive environment within the accommodation.

Further information:
- Wardens and Student Residence Advisers

Financial support
The UCL Student Funding Office provides a central service aimed at supporting students with money matters. We can assist with scholarship, bursary and loan queries, and help signpost students to sources of funding. We also offer a range of resources and tips on money management. The easiest way to access our information and guidance is online, but for students with more complex circumstances an appointment can be booked with one of our Student Funding Advisers.

Further information:
- Financial Support from UCL
- Manage your Money
**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 into UCL and London as well as focusing 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 Mentors

**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 Support and Wellbeing 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 quickly if they become ill or injured. When attending a university in the UK students under the age of 25 are also advised to be vaccinated against Meningitis (ACWY). The Ridgmount Practice is a National Health Service (NHS) practice providing healthcare 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

**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 and urgent help**

If anyone is in immediate danger, medical support can be received by:
• Attending an Accident & Emergency (A&E) department of a local hospital. University College Hospital is the nearest A&E department to UCL’s main campus (this A&E department has a dedicated mental health unit).

• Calling 999 to request an ambulance if you are unable to reach the hospital yourself. If a student is feeling distressed, urgent medical support can be obtained by:
  • Contacting the student’s GP surgery to request an emergency appointment.
  • If the GP surgery isn’t open, the free NHS out-of-hours medical line on 111 can help students access the right services.
  • Calling the Samaritans on 116 123 to talk to someone at any time, day or night.
  • Nightline are available overnight and can help students across London, call them on +44 (0) 207 631 0101

Further information:
• Crisis Support

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 –DEOLOs
DEOLOs provide support and assistance for students and staff about issues relating to equalities and diversity. The DELO for the Department of Statistical Science is Ms KA Leport (room 123, k.leport@ucl.ac.uk).

Further information:
• DEOLOs
  • Equalities, Diversity and Inclusion
  • Support for Pregnant Students
  • Support for Student Parents
  • Religion and Faith
  • LGBTQ+ Students

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.

To help with this, UCL has launched Report and Support, an on-line reporting tool where students can report any issues anonymously or contact an advisor to make an informed decision about their support options.
Further information:

- UCL Policy on Harassment and Bullying
- Report and Support
- Students’ Union UCL Advice Service

**Sexual misconduct**

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 the Students’ Union 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, or a Students’ Union student officer. Support is also available from the trained staff at the Students’ Union Advice Service, or the UCL Student Mediator.

Further information:

- Zero Tolerance to Sexual Harassment

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

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:

- Specialist information and support

**STUDENT REPRESENTATION**

**Students’ Union UCL**

The Union helps you to do more at UCL, experience something you’ve always dreamt of, turn a curiosity into a new passion and help you reach your potential. The Union cares about the things you care about, it’s made up of all kinds of people from all kinds of places and it’s there to fight for you when you need someone in your corner.

Students’ Union UCL is the representative body of all UCL students. It’s run by students for students and is a registered charity, independent of UCL. All UCL students at every level are automatically members of the Union (but can opt out), and the Union’s leaders are elected annually by and from all current students. The elected leaders are called Sabbatical Officers and they represent students on various UCL committees and campaign on the issues that matter to students. Alongside the Sabbatical Officers there are more than 1500 other student representatives, who cover every part of UCL life, from your programme, research students or the UCL accommodation you live in.

Further information:

- Students’ Union UCL website
- Elections information (including how to become a representative)

**Student societies**

UCL students currently run over 250 different clubs and societies through the Students’ Union, providing a wide range of extra-curricular activities for students to get involved with.
during their time at UCL. The Welcome Fair will be your opportunity to meet all of the clubs and societies in one place and will take place on 28 and 29 September.

Further information:

- [Students’ Union Clubs & Societies](#)
- [Club and Society Events](#)

**Academic Representatives**

Your Students’ Union is there to make sure you have the best possible time while you’re studying at UCL. One of the ways they do that is by working with departments and faculties to ensure that every student is represented and has a voice in the way that the university works.

Every student at UCL will have an Academic Representative who will be your eyes, ears, and voice. They’ll work closely with staff in your department to make sure that they understand what you most value, and take action to deal with things you’d like to see improve. They’ll also work with representatives in your faculty and the Students’ Union to make things better across the whole of UCL.

These Academic Representatives are appointed during early October – if you’d like to take up the role, staff in your department can tell you how. If you take up a representative role, the Students’ Union will work closely with you to provide training, support, and advice, and you’ll be able to change the experience of everyone on your programme or in your department for the better.

Even if you don’t fancy taking up a role yourself, keep an eye out for your chance to vote for which students you feel will do the best job.

Further information:

- [Academic Representatives](#)
- [Find your representative](#)

**Staff-Student Consultative Committee**

Every department at UCL has a Staff-Student Consultative Committee (SSCC) that meets at least three times a year. Staff Student Consultative Committees are meetings where Academic Reps and staff work together to develop solutions to students’ concerns, and prioritise areas for improvement. Some departments have a single SCC, while others split this into different levels of study. Most commonly, departments operate both an undergraduate and postgraduate SSCC.

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 DOSSSSH Moodle page for students to consult.

**Departmental Teaching Committee**

This committee oversees the organisation and structure of the degree programmes and modules 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.
Students’ Union Advice Service

The Students' Union Advice Service is available to UCL students. Trained and experienced staff are ready to support you with any difficulties that might occur during your time at UCL. The Advice Service specialises in:

- **Academic issues** - including extenuating circumstances, plagiarism and complaints
- **Housing** - including contract checks and housemate disputes
- **Employment** - including unpaid wages and part time employment contracts
- Many other legal and university matters

The service is free, confidential and independent. We will not disclose anything to your department or any other university staff unless at your request. Students can make an appointment or attend a drop-in session for advice and support.

Further information:

- [Students' Union Advice Service](#)

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 Academic Representative if they have any concerns about their programme. They can also speak to the UCL Student Mediator or the Students' Union 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. Students’ attention should be drawn to the timescales set out in the Procedure.

Further information:

- [UCL 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 module lecturers (regarding specific modules). 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 New to UCL survey. 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. We aim to minimize the volume of surveys students are asked to take, so undergraduates will be invited to take just one institutional survey per year, and full-time postgraduate students will be invited to take two. 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:
- You Shape UCL

**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 modules are running and whether improvements can be made. You will be asked to complete a questionnaire for each module that you take. This is usually done during the last two weeks of a module. 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 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 supports students and staff to work in partnership on projects that improve the learning environment at UCL. Each department in UCL is guaranteed funding of £850 for one project per year. Any student or member of staff can make a proposal, which should be submitted to the relevant department’s Staff Student Consultative Committee (SSCC). If you are a student but are not a member of your department’s SSCC, talk to one of the student representatives about your proposal and ask them to take it to the Committee on your behalf. Proposals must also be approved by the relevant Department Teaching Committee.

Further information:

- UCL ChangeMakers

**Student Quality Reviewers (SQR)**

Student Quality Reviewers are students who work with UCL to take an in-depth look at different areas of academic practice. They help to improve how the university works by providing detailed feedback and analysis from a student perspective. Taking part in the Student Quality Reviewer scheme gives students the opportunity to: act as a member of an Internal Quality Review panel; be a Student Reviewer for the Programme and Module Approval Panel; feed back on pedagogic practice as an ASER Facilitator; work with staff to reflect on their teaching practice as a Student Reviewer of Teaching; and/or providing a student view on how teaching can include more diverse perspectives as a Student Curriculum Partner.

Further information:

- Student Quality Reviewers

**EMPLYABILITY 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 10). 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. Services and events are available to all taught students, researchers (PhD students and postdocs) and graduates (for up to 2 years after programme completion).

UCL Careers also supports employability activities within departments such as work-related learning, including internships and placements. UCL students are helped with applications and sourcing opportunities with web resources and advice. They can book appointments via myUCLCareers and can source opportunities via myUCLCareers, UCL Talent Bank - a shortlisting service connecting students to small and medium sized organisations, and apply for opportunities within our summer internships and global internships schemes.

UCL has web resources, a student toolkit and bookable appointments for students to support them with applications for internships, and guidance in sourcing opportunities.

Further information:
- UCL Careers
- myUCLCareers
- UCL Careers information on internships

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 taught postgraduate level for a particular year on the basis of information supplied by the university. The Statistics, SEF, SEL, SAMB, MSci International and MASS programmes were accredited up until the end of the 2017/18 academic session, meaning that Graduate Statistician (GradStat) status will automatically be granted, on application to the RSS, to graduates of these programmes who achieved at least second class honours during the accredited years. Applicants must already be Fellows of the RSS or become Fellows concurrently. For some of these programmes, qualification for GradStat status requires that at least 50% of the modules selected in the second and third years are chosen from amongst those offered in the Department of Statistical Science. The Department has applied to retain this accreditation for eligible students who enrol from September 2018 onwards. Alternatively, graduates may apply individually for GradStat status; they will need to provide a transcript of modules taken.

**Management modules**

The Chartered Institute of Marketing ([http://www.cim.co.uk/](http://www.cim.co.uk/)) has accredited some Management modules taken by SAMB students: MSIN0054 Introduction to Marketing, MSIN0027 Marketing Communications, and MSIN0029 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 Innovation and Enterprise

UCL Global Citizenship Programme

The UCL Global Citizenship Programme is aimed at UCL undergraduates and taught postgraduates offering them the chance to put their studies in a global context, connect with students across UCL and develop their responses to the global issues. The Programme is interdisciplinary and includes a choice of activities, providing opportunities to help students gain a broader perspective on their studies, develop hands-on skills and explore solutions to global challenges. Participation is free and places are awarded 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:
- Safety Services
- UCL A-Z Safety Guidance
- General Fire Safety for UCL Students
- Security at UCL
- Safety in London
AFTER STUDY

Degree certificates and transcripts
A degree certificate will be sent to each successful student awarded a UCL degree within three months of conferral of the award. Five copies of your official transcript, detailing examinations taken and results achieved, is issued automatically to all graduating students and sent to their home addresses as held on Portico within 3 months from the date the award is conferred by UCL authorities.

Transcripts for affiliate students are issued automatically upon the students’ completion of their study at UCL and are dispatched as follows:

- JYA, Exchange and Erasmus Students – transcripts are issued to the students’ home universities.
- Independent affiliate students – transcripts are posted to the students’ contact addresses.

UCL Student Records can produce additional transcripts for students on taught programmes as well as for affiliate students via the UCL Transcript Shop.

Further information:
- Degree Certificates
- 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 studies. 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

Graduation ceremonies
Following successful completion of their studies, graduation ceremonies are held to celebrate students’ achievements.

Further information:
- Graduation Ceremonies

UCL alumni online community
The UCL Alumni Community is a global network of more than 250,000 former students. Alumni can take advantage of a wide range of benefits – 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 for life. All students and alumni can connect through the UCL Alumni Online Community, an exclusive mentoring platform with sector based and
international networks, and get involved through events, reunions, and the UCL Connect professional development series.

Further information:
- UCL Alumni

**MODULE INFORMATION**

The following pages give more details, including outline syllabuses, of the modules offered by the Department of Statistical Science that are included in the Statistics, SEF, SEL, SAMB, Econ/Stats, MSci and MASS degree programmes. For most modules, 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.

Some of the information provided in the following pages is based on the modules 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.

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**Modules offered by the Department of Statistical Science**

**First year**

**MATH0002 ECONOMICS 1 (COMBINED STUDIES)**

**Level:** 4  **Credits:** 30  **Term:** 1&2

This module is taught by staff based in the Departments of Mathematics and Statistical Science, but has been designed and is delivered in collaboration with the Department of Economics. In particular, the formal assessment arrangements are overseen by the Economics Board of Examiners.

**Aims:** 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 module STAT0001.

**Objectives:** On successfully completing the module, 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.

**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.

**Key texts:**
STAT0002
INTRODUCTION TO PROBABILITY
AND STATISTICS

Level: 4 Credits: 15 Term: 1

Aims: To provide an accessible and application-oriented introduction to basic ideas in probability and statistics. Together with STAT0003 and STAT0004, 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 module for students taking a Statistics stream as part of a Natural Sciences degree.

Objectives: On successful completion of the module, 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 module 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:
- In-course assessment (see page 42)
- 2 ½ hour written examination
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 final mark.

Timetabled workload:
Lectures: 3 hours per week.
Tutorials: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.
STAT0003
FURTHER PROBABILITY AND
STATISTICS

Level: 4  Credits: 15  Term: 2

Aims: To introduce a formal framework for the study of probability and statistics, building on the intuitive concepts introduced in STAT0002. Together with STAT0002 and STAT0003, 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 module for students taking a statistics stream as part of a Natural Sciences degree.

Objectives: On successful completion of the module, 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 module 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 STAT0002.

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 tests. Methods applicable to binomial, Poisson and normally distributed data for one and two sample problems. Inference in the simple linear regression model.


Assessment:
- In-course assessment (see page 42)
- 2 ½ hour written examination
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 final mark.

Timetabled workload:
Lectures: 3 hours per week.
Tutorials: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

STAT0004
INTRODUCTION TO PRACTICAL
STATISTICS

Level: 4  Credits: 15  Term: 1&2

Aims: To provide training in the basic skills of practical statistics using a statistical software package. Together with STAT0002 and STAT0003, 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: On successful completion of the module, 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 STAT0002 and STAT0003, or their equivalents.

**Content:** Practical application of the methods taught in STAT0002 and STAT0003, in workshops. Use of the R statistical computing package for data analysis and simulation.

**Texts:**
Freeman, 2009.


**Assessment:**
- In-course assessment (see page 42)
- One piece of extended coursework
  There is no written examination. The final mark is a 3 to 1 weighted average of the extended coursework and in-course assessment marks.

**Other set work:** Regular exercises and/or practical assignments. These will not count towards the final mark.

**Timetabled workload:**
Workshops: 2 hours per fortnight.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

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## Second year

**STAT0001 ECONOMICS 2 (COMBINED STUDIES)**

**Level:** 5  
**Credits:** 30  
**Term:** 1&2

This module is taught by staff based in the Departments of Mathematics and Statistical Science, but has been designed and is delivered in collaboration with the Department of Economics. In particular, the formal assessment arrangements are overseen by the Economics Board of Examiners.

**Aims:** 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 modules in economics taken in the third year.

**Objectives:** On successfully completing the module, 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; be able to assess issues of economic policy.

**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:

STAT0005 PROBABILITY AND INFERENCE

Level: 5 Credits: 15 Term: 1

Aims: To continue the study of probability and statistics beyond the basic concepts introduced in STAT0002 and STAT0003. 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: on successful completion of the module, 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 module has applications in almost every field of quantitative investigation; the module introduces general-purpose techniques that are applicable in principle to a wide range of real-life situations.

Prerequisites: STAT0002 and STAT0003, or their equivalents. MATH0045 and MATH0046, or their equivalents.

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, Cramér-Rao lower bound.
Simple examples will be used throughout to motivate and illustrate the topics discussed.

Texts:

Assessment:
• In-course assessment (see page 42)
• 2 ½ hour written examination
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 final mark.

Timetabled workload:
Lectures: 3 hours per week.
Tutorials: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

STAT0006 LINEAR MODELS AND THE ANALYSIS OF VARIANCE

Level: 5 Credits: 15 Term: 1

Aims: 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: On successful completion of the module, 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: STAT0002 and STAT0003, or their equivalents.

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.


Assessment: • In-course assessment (see page 42) • Two data analysis tasks
There is no written examination. The final mark is a 3 to 1 weighted average of the data analysis tasks and in-course assessment marks.

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

Timetabled workload: Lectures: 3 hours per week, to be used as workshops and computer practical sessions as necessary. Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

STAT0007 INTRODUCTION TO APPLIED PROBABILITY

Level: 5 Credits: 15 Term: 2

Aims: 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: On successful completion of the module 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 module can be applied to simplified real-world situations, and provides the foundations for further study of more complex systems.

Prerequisites: STAT0005, or its equivalent.

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:**
- In-course assessment (see page 42)
- 2 ½ hour written examination
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 final mark.

**Timetabled workload:**
Lectures: 3 hours per week, to be used as workshops as necessary.
Tutorials: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

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**STAT0023**
**COMPUTING FOR PRACTICAL STATISTICS**

**Level:** 5  
**Credits:** 15  
**Term:** 2

**Aims:** 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:** On successful completion of the module, 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 module 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 module provides, amongst others, basic programming skills, an introduction to R and SAS, and practice in basic statistical analysis workflows.

**Prerequisites:** STAT0004, STAT0005 and STAT0006, or their equivalents.

**Content:** Introduction to SAS commands 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:**

**Assessment:**
- In-course assessment (see page 42)
- Two pieces of extended coursework
There is no written examination. The final mark is a 3 to 1 weighted average of the extended coursework and in-course assessment marks.

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

**Timetabled workload:**
Lectures: 1 hour per week.
Workshops: 3 hours per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.
STAT0024
SOCIAL STATISTICS

Level: 5  Credits: 15  Term: 2

Aims: 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: On successful completion of the module, 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 module 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: STAT0005 or its equivalent.

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. Analysis of Social Statistics.

Texts:
Central Statistical Office: Social Trends.

Assessment:
- In-course assessment (see page 42)
- 2 ½ hour written examination
The final mark is a 9 to 1 weighted average of the written examination and in-course assessment marks.

Other set work:
About 9 sets of exercises. These will not count towards the final mark.

Timetabled workload:
Lectures: 2 hours per week.
Problem classes: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

STAT0025
OPTIMISATION ALGORITHMS IN OPERATIONAL RESEARCH

Level: 6  Credits: 15  Term: 1

Aims: 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: On successful completion of the module, 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: STAT0002, or its equivalent.

Content: Linear programming: graphical solution techniques, simplex method, duality, sensitivity analysis. Game theory: zero-sum two player games, minimax, maximin, Laplace, Hurwicz and minimax regret strategies, linear programming formulation.

Texts:

Assessment:
- In-course assessment (see page 42)
- 2 ½ hour written examination
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 final mark.

Timetabled workload:
Lectures and problems classes: 3 hours per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

Third and fourth year

STAT0008
STATISTICAL INFERENCE

Level: 6, 7  Credits: 15  Term: 1

Aims: 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 programmes offered by the Department of Statistical Science or jointly with other Departments.

Objectives: On successful completion of the module, 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: STAT0005 and STAT0006, or their equivalents.


Texts:

Assessment:
- In-course assessment (see page 42)
2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)
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 final mark.

Timetabled workload:
Lectures: 2 hours per week.
Workshops: two 2 hour classes.
Tutorials: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

STAT009
STOCHASTIC SYSTEMS

Level: 6, 7 Credits: 15 Term: 1

Aims: To provide a continuation of the study of random processes started in Introduction to Applied Probability (STAT007), but with the emphasis now on Operational Research applications and including queueing theory, renewal and semi-Markov processes and reliability theory.

Objectives: On successful completion of the module, 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 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: STAT0007, or its equivalent.


Texts:

Assessment:
• In-course assessment (see page 42)
• 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)
The final mark is a 4 to 1 weighted average of the written examination and in-course assessment marks.

Other set work:
About 9 sets of exercises. These will not count towards the final mark.

Timetabled workload:
Lectures: 2 hours per week.
Workshops: two 2 hour classes.
Tutorials: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

STAT010
FORECASTING

Level: 6, 7 Credits: 15 Term: 2

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

Objectives: On successful completion of the module, 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:** STAT0005 and STAT0006, or their equivalents.


**Texts**

**Assessment:**
- In-course assessment (see page 42)
- 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)
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 final mark.

**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 module, will also be provided.

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**STAT0011**
**DEcision AND RISK**

**Level:** 6, 7  
**Credits:** 15  
**Term:** 2

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

**Objectives:** On successful completion of the module, 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 module 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 module will use examples from natural hazards, environmental hazards, finance, and social policy.

**Prerequisites:** STAT0002 and STAT0003, or their equivalents.

**Content:** Introduction to Bayesian inference, conditional probability, Bayes’ 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 modelling volatility and detecting/ modelling change in risk over time.

**Texts**

**Assessment:**
- In-course assessment (see page 42)
- 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)

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 final mark.

**Timetabled workload**
- Lectures: 2 hours per week.
- Workshops: three 1 hour classes.
- Office hours, during which the lecturer will be available to discuss students' individual problems with the module, will also be provided.

**STAT0012 FACTORIAL EXPERIMENTATION**

**Level:** 6, 7  
**Credits:** 15  
**Term:** 2

**Aims:** 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:** On successful completion of the module, 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:** STAT0006, or its equivalent.


**Texts:**

**Assessment:**
- In-course assessment (see page 42)
- 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)

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 final mark.

**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 module, will also be provided.
STAT0013
STOCHASTIC METHODS IN FINANCE

Level: 6, 7  Credits: 15  Term: 1

Aims: 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: On successful completion of the module, 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 module 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: STAT0005, or its equivalent.


Texts:

Assessment:
• In-course assessment (see page 42)
• 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)

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 final mark.

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 module, will also be provided.

STAT0014
MEDICAL STATISTICS 1

Level: 6, 7  Credits: 15  Term: 1

Aims: 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: On successful completion of the module, 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 module, together with STAT0015, has applications in both medicine and epidemiology. Important areas include the design and analysis of medical research studies, including randomised controlled trials.

Prerequisites: STAT0005 and STAT0006, or their equivalents.

Content: The role of medical statistics; Types of observational studies: case-control, matched case-control, cohort, cross-sectional and their analysis: introducing absolute and relative measures of risk, rates and odds; Design features of randomised trials: randomisation, blocking, stratification, minimisation, blinding, 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 analysis of observational studies, study design, analysis of trials, confounding and interaction, survival analysis, logistic regression and sample size calculation.

**Texts:**


**Assessment:**

- In-course assessment (see page 42)
- 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)

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 final mark.

**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 module, will also be provided.

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**STAT0015**

**MEDICAL STATISTICS 2**

**Level:** 6, 7  **Credits:** 15  **Term:** 2

**Aims:** To provide a continuation of the study of medical statistics started in STAT0014, with emphasis on more advanced topics in epidemiological methods and the design and analysis of clinical trials.

**Objectives:** On successful completion of the module, 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 module, together with STAT0014, has applications in both medicine and epidemiology. Important areas include the design and analysis of medical research studies, including randomised controlled trials.

**Prerequisites:** STAT0014, or its equivalent.

**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:**


D. Collett: *Modelling Survival Data in Medical Research*. Chapman and Hall.


**Assessment:**
- In-course assessment (see page 42)
- 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)
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 final mark.

**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 module, will also be provided.

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**STAT0017**

**SELECTED TOPICS IN STATISTICS**

**Level:** 6, 7  
**Credits:** 15  
**Term:** 2

**Aims:** 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:** 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 module 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:** STAT0005 and STAT0023, or their equivalents.

**Content:** This module 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: Monte Carlo methods (Dr S J Livingstone)**

Monte Carlo methods are a suite of techniques for dealing with difficult mathematical calculations involving integrals. Their use in Statistics has been transformative, allowing many previously impossible analyses to be performed and opening up the possibilities for modelling and inference far beyond what was previously feasible.

Classical statistics is built around the idea of building a model for some data, using a particular inference procedure to estimate the parameters of that model, and then relying on asymptotic results in the large data limit to make statements about uncertainty, perform hypothesis tests and make sensible decisions. Monte Carlo methods allow us to remove the need for large data asymptotic arguments and make more direct statements based on the data we have. This also removes the need to restrict modelling to simple scenarios in which asymptotic results are possible to show, opening up a world of possibilities. In Bayesian statistics, all of inference relies on computing expectations with respect to the posterior distribution for some parameter of interest. Outside of special cases this requires computing integrals that are often very hard or even impossible. Monte Carlo methods, and most prominently Markov chain
Monte Carlo, make this feasible, and hence open up Bayesian inference to the masses. Students will learn a little bit about all of these ideas and concepts throughout the course.

The basic Monte Carlo principle (named after the famous city and its many casinos) is to simulate data from a probability distribution, and then approximate expectations from this distribution by computing averages from the simulated data. We will begin by learning how to simulate data from different distributions using various methods. We will then look at Monte Carlo methods in hypothesis testing and their uses. The main focus of the course, however, will be Monte Carlo for Bayesian inference. We will motivate the problem, then study Markov chain Monte Carlo (MCMC), in particular the Metropolis—Hastings algorithm. You will learn how to implement methods on a computer and also understand the theory behind them and some common pitfalls in practice, using examples from throughout applied statistics.

**Prerequisites:** STAT0005 and STAT0023 are required. STAT0007 is desirable, as is some exposure to Bayesian methods.

The following texts are relevant to this part of the module:


**Topic 2: Stochastic differential equations (Dr MJ Rassias)** Not only in science but also in industry, it is of major interest to specify the stochastic process governing the behaviour of an underlying quantity whose value is potentially known in the present but is expected to change in the future. Quantities such as the number of cancer cells or the number of individuals affected by a virus, the share price in a company or the price of gold, oil or electricity are namely only some of the examples for which the rate of change is of major interest. However, the rate of change of an underlying quantity is in general not deterministic due to uncertainty and various other factors such as environmental disturbances that are to be taken into consideration in modelling.

Stochastic Differential Equations (SDEs), which can be understood as deterministic differential equations perturbed by noise, are at the forefront of stochastic modelling of evolution as time changes. The range of applications of SDEs within a variety of disciplines is vast and the relevant research area is constantly and rapidly developing.

In this short course we will provide an introduction to the topic by reviewing well-established theoretical results in the area. Prior to this an appropriate introduction to the fundamentals of Stochastic Calculus will be provided. Furthermore, we aim to present a number of numerical methods to approximate the solutions of SDEs as in many cases analytic solutions are not available for these equations. Emphasis will be placed into solution methods rather than analysis of the theoretical properties of the equations in order to offer a more intuitive understanding of the SDEs. The focus of our study will be on SDEs with Gaussian noise.

Finally we will consider carrying out statistical inference for diffusion models as it is common to model time evolution of dynamic phenomena by a diffusion process which is characterised by an SDE. The SDE itself will have parameters that often are not known accurately but instead we have in our disposal data relevant to the specific phenomena. It is not surprising, therefore, why the estimation of the parameters of the SDEs from discreetly-sampled data has attracted increasing research interest. We will thus consider statistical inference (e.g. likelihood inference) for diffusion problems - i.e. parametric estimation problems for diffusion processes sampled at discrete times.

**Prerequisites:** STAT0005 and STAT0023 are required. STAT0013 is desirable.

The following texts are relevant to this part of the module:


**Assessment:**
- Two pieces of extended coursework (one for each topic)
- There is no written examination. The final mark is an average of the two coursework marks (equally weighted).

**Other set work:**
- Several sets of exercises. These will not count towards the final mark.

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

**STAT0018**
STOCHASTIC METHODS IN FINANCE II

**Level:** 6, 7  **Credits:** 15  **Term:** 2

**Aims:** 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 module will be built on material covered in STAT0013.

**Objectives:** On successful completion of the module, 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 module 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 prudent regulation of the banking industry.

**Prerequisites:** STAT0005 and STAT0007, or their equivalents. STAT0013 or MATH0031.

**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:**
- In-course assessment (see page 42)
- 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)
- 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 final mark.

**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 module, will also be provided.

**STAT0019**
BAYESIAN METHODS IN HEALTH ECONOMICS

**Level:** 6, 7  **Credits:** 15  **Term:** 2

**Aims:** 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: The module 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 module, 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 module 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 module has applications in medicine and studies on public health, epidemiology and health services research.

Prerequisites: STAT0006 and STAT0008, or their equivalents.

Content: 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:
- In-course assessment (see page 42)
- 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)
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 final mark.

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 module, will also be provided.

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**STAT0020 QUANTITATIVE MODELLING OF OPERATIONAL RISK AND INSURANCE ANALYTICS**

Level: 6, 7 Credits: 15 Term: 2

Aims: 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: On successful completion of the module, 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 module 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 STAT0005, or equivalent. Also some basic experience in either Matlab, Python or R is needed, as taught in STAT0023, or equivalent.


**Texts:**

**Assessment:**
- In-course assessment (see page 42)
- 2 ½ hour written examination (Level 6), or 2 hour written examination (Level 7)

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 final mark.

**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 module, will also be provided.

**STAT0035**

**PROJECT**

**Level:** 6, 7       **Credits:** 30       **Term:** 1&2

**Aims:** 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:** On successful completion of the module, 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 programmes offered by the Department of Statistical Science or jointly with other Departments.

**Assessment:**

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 43).

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 care; 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.

STAT0036
PROJECT

Level: 6, 7 Credits: 15 Term: 1&2

Aims: 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 programmes offered by the Department of Statistical Science or jointly with other Departments.

Objectives: On successful completion of the module, 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:
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 43). Oral presentation (15 minutes excluding questions) at the start of term 3 (20%).

See STAT0035 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.

Fourth year

STAT0028
STATISTICAL MODELS AND DATA ANALYSIS

Level: 7 Credits: 15 Term: 1

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

Objectives: On successful completion of the module, 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 STAT0028 are very general, and they are used in almost all areas in which statistics is applied. In the module, we will analyse data sets from, among other areas, industrial quality control, astronomy, social sciences, and biology.

Prerequisites: STAT0005 and STAT0006. Simultaneous or previous attendance on STAT0008, or its equivalent.

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 module in the module STAT0030.)
Texts:

Assessment:
• In-course assessment (see page 42)
• 2 hour written examination
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 module, which will not count towards the final mark.

Timetabled workload:
Lectures: 2 hours per week.
Tutorials: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students' individual problems with the module, will also be provided.

STAT0029
STATISTICAL DESIGN OF INVESTIGATIONS

Level: 7  Credits: 15  Term: 1

Aims: 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: On successful completion of the module, 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 module 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: STAT0005 and STAT0006.

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:
• Two pieces of extended coursework, one of which involves working in groups to design, carry out and report the results of an experiment
There is no written examination. The final mark is an average of the two coursework marks (equally weighted).

Other set work:
Exercises will be set during the module which will not count towards the final mark.

Timetabled workload:
Lectures and workshops: 2 hours per week.
Tutorials: 1 hour per week.
Office hours, during which the lecturer will be available to discuss students' individual problems with the module, will also be provided.
STAT0030
STATISTICAL COMPUTING

Level: 7    Credits: 15    Term: 1&2

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

Objectives: On successful completion of the module, 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 modules STAT0028 and STAT0029. 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 module 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: STAT0005 and STAT0006. Simultaneous attendance on STAT0028 and STAT0029.


Texts:

Assessment:
• Three pieces of extended coursework

There is no written examination. The final mark is a 1:2:2 weighted average of the three coursework marks.

Timetabled workload:
About 10 two-hour workshops.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

STAT0031
APPLIED BAYESIAN METHODS

Level: 7    Credits: 15    Term: 2

Aims: 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: On successful completion of this module, 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 module focuses on fundamental concepts and techniques, and introduces the computational tools needed to apply Bayesian methods in challenging research-level problems.

Prerequisites: STAT0005 and STAT0006. STAT0008, or its equivalent.

Texts:

Assessment:
- in-course assessment (see page 42)
- 2 hour written examination

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 final mark.

Timetabled workload:
Lectures: 2 hours per week. Some of these may be devoted to workshops or coursework feedback.
Tutorials: 2 hours per fortnight.
Office hours, during which the lecturer will be available to discuss students’ individual problems with the module, will also be provided.

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 2019.