All students registered for the programme are expected to have read and to be familiar with the contents of this Handbook

Disclaimer: Every effort has been made to ensure the contents of this handbook are accurate at the time of printing. Unforeseen circumstances may necessitate changes to the procedures, curricula and syllabus described

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UK Quality Assured

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PART A: SCHOOL INFORMATION

1. CONTACT DETAILS

Programme Director
Year 1 – Actuarial Science
Mr Peter Ridges
Office: CMF.16, Telephone: 451 3906, Email: P.Ridges@hw.ac.uk
Mr Ridges is responsible for all academic matters relating to the first year of the programme.

Year 2 – Actuarial Management
Professor Angus Macdonald
(Office: CM T.04, Telephone: 451 3209, Email: A.S.Macdonald@hw.ac.uk
Professor Macdonald is responsible for all academic matters relating to the second year of the programme.

Appointments with the Programme Directors may be arranged by email.

Programme Administrator
Rodi Amiridou
Office: EM 1.24, Telephone: +44 (0) 131 451 8314, E-mail: R.Amiridou@hw.ac.uk
Rodi is responsible for all programme administrative matters and is the secretary to the Board of Examiners.

Students should contact staff in the School Office (EM1.25) in the first instance for any enquiries in relation to the programme. The School Office is open week days from 09.30 to 16.30. The School Office can also be contacted on: macs-schooloffice@hw.ac.uk; tel 0131 451 3432

School Student Website
Lots of information regarding MACS programmes and courses can be found at: http://www.macs.hw.ac.uk/students/

University Student Website
https://www.hw.ac.uk/students/index.htm

Student Portal
You can access the University Student Portal at: http://portal.hw.ac.uk/

Virtual Learning Environment (VLE)
Most courses have on-line material available at the University’s Virtual Learning Environment (VISION) which can be found at: http://vision.hw.ac.uk/

Student Self Service
This is where you can update your address and where you will get your on-line results - www.hw.ac.uk/selfservice.

Students can also get advice on a range of Finance, Hospitality Services and Academic Registry issues from the Student Service Centre (http://www1.hw.ac.uk/studentcentre/) which is situated in the Hugh Nisbet Building along from the Bank (email: studentcente@hw.ac.uk)
Course Information
Details on all the courses offered on the programme can be found at:
http://www.macs.hw.ac.uk/students/ams/pg-programmes/msc-actuarial-science-and-management/
. Brief course descriptors are also be found in the Appendix of this handbook.

Each course will also have on-line material available at the University’s Virtual Learning Environment (VISION) which can be found at: https://vision.hw.ac.uk. You will have access to information for all the courses for which you are enrolled.

Programme Codes

2. INTRODUCTORY INFORMATION

The University provides information for new students at: http://www.hw.ac.uk/students/index.htm

2.1. Enrolment
All student enrolment is completed online. You are responsible for ensuring your enrolment details are correct, and that you have enrolled for all courses that you wish to take. Information to assist with course selection will be provided at the Pre-Enrolment meeting. If you have any questions about enrolment you should speak to staff in the School Office. Students entering Year 1 are advised to enrol for ALL courses the first instance. This can always be changed at a later date.

You must enrol for either the PG Diploma or the MSc in Actuarial Science and Management. If you change your mind and wish to change programme you may only do so before 30 September by advising the Programme Administrator in writing. International students should be aware that any programme changes will be notified to the UK Border Agency and this may have implications for your student visas.

No refunds of programme fees will be provided to students who leave the University without completing the programme for which they are registered for any reason (ie regardless of whether this departure is voluntary or because students have failed to qualify for the desired award).

2.2 Timetable
Timetables can be found at: https://www.hw.ac.uk/students/studies/timetables.htm. Occasionally it is necessary to make adjustments to the timetable, such as rescheduling a class – all changes will be notified on the class VISION pages or by email.

Course F71SZ (Stochastic Modelling) will not begin until Week 3 (24 September 2018).

Classes are timetabled to start and finish at 15 minutes past the hour. The standard Heriot-Watt practice is that classes start at 20 minutes past the hour and finish at 10 minutes past. Please be courteous to staff and fellow students by ensuring you arrive on time to all your classes.

2.3. Attendance
In order to achieve course and programme learning outcomes, students are expected to attend all scheduled course learning sessions (e.g. timetabled lectures, tutorials, lab sessions, etc). Should you have to missed a timetabled session due to ill health or other legitimate reasons, you should submit a self-certification or medical certification or an application for consideration of Mitigating Circumstances http://www1.hw.ac.uk/committees/ltb/resources/mc-policy.pdf.

Students who fail to satisfy course attendance requirements may, after due warning, be disallowed from presenting themselves for examination in the course (see https://www.hw.ac.uk/students/doc/compulsorywithdrawal.pdf.
Coursework must be handed in by the stipulated dates, and students are required to see their personal tutors at agreed times. Students who fail to submit compulsory coursework may also be disallowed from presenting themselves for examination in the relevant courses.

All lectures and tutorials are compulsory and registers of attendance may be taken.

If you are absent from class due to illness for four days or less, you should complete a self-certification form, obtainable from the School Office (EM 1.25), and return it to the School office within a week of your return. If you are absent for more than four days, you must supply a medical certificate to the School Office within a week of your return.

Students here on a Tier 4 Student Visa are required to attend the signing-in sessions in October, November, February, March, June, July and August. You must also attend the re-enrolment session in January. It is your responsibility to make sure that you attend these events. Failure to attend will mean that you will be reported to UKVI and your right to remain in the UK maybe removed.

2.4. Computer Facilities
You will enrol as a user of the University computer network. This will give you an email account, and access to word-processing facilities and various packages which will be needed for some courses. Once you have completed on-line enrolment you will print out a letter which confirms your enrolment. Along with this letter are details of your University user name and password. Your user name will also be your email address eg user name ab111 will have the email address ab111@hw.ac.uk

You will be credited with a printing quota for use over the year. While an additional allocation may be made in the summer of Year 2 for those proceeding to the MSc, you are advised to use your quota sparingly.

Abuse of the computing facilities will result, at the very minimum, in a ban from the facility.

Information about our Information Services can be found at: http://www.hw.ac.uk/is/guides/getting-started.htm

2.5. Note from the Programme Directors
The programme is very demanding. In order to be successful you will have to work extremely hard. Also, poor attendance at classes is likely to lead to poor performance.

There are a total of 11 taught courses available in Year 1 and students must pass at least 8 (allowing for course weightings – see Section 5.4) to qualify for the PG Diploma (with an average of at least 60% to progress to Year 2). You may wish to discuss with your personal tutor the most appropriate courses for you to take in order to succeed on the programme.

Anyone who finds they are struggling with any aspect of the coursework should alert the course lecturer at the first available opportunity. Staff are always happy to help but cannot do so if they are not aware there is a problem.

Your academic personal tutor (see Section 4.5) is also available during the year to provide support when needed. It is a programme requirement to meet with your personal tutor at least once a semester.

3. IMPORTANT INFORMATION
<table>
<thead>
<tr>
<th>2017/18 dates</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 – 7 September 2018</td>
<td>Welcome Week</td>
</tr>
<tr>
<td>10 September – 30 November 2018</td>
<td>Semester 1 teaching</td>
</tr>
<tr>
<td>3 – 14 December 2018</td>
<td>Semester 1 exams</td>
</tr>
<tr>
<td>17 December 2018 – 4 January 2019</td>
<td>Semester 1 break</td>
</tr>
<tr>
<td>7 January – 29 March 2019</td>
<td>Semester 2 teaching</td>
</tr>
<tr>
<td>1 April – 22 April 2019 (Easter: 21 April)</td>
<td>Semester 2 break</td>
</tr>
<tr>
<td>23 April – 17 May 2019</td>
<td>Semester 2 exams</td>
</tr>
<tr>
<td>18 – 21 June 2019 (Edinburgh Campus)</td>
<td>Graduations</td>
</tr>
<tr>
<td>14 – 15 November 2019</td>
<td>Graduations</td>
</tr>
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</table>

Case Studies Dates:

<table>
<thead>
<tr>
<th>2017/18 dates</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 7 June 2019</td>
<td>Preparatory Week</td>
</tr>
<tr>
<td>10 June – 12 July 2019</td>
<td>1st Case Study</td>
</tr>
<tr>
<td>15 July – 16 August 2019</td>
<td>2nd Case Study</td>
</tr>
<tr>
<td>19 August – 23 August</td>
<td>Assessment Week</td>
</tr>
</tbody>
</table>

It is the student's responsibility to check all relevant examination timetables (including resits) on the Registry web page [http://www.hw.ac.uk/registry/examinations.htm](http://www.hw.ac.uk/registry/examinations.htm).

The publication of the exam timetables for Semesters 1 and 2 can be found here [https://www.hw.ac.uk/students/studies/examinations/timetables.htm](https://www.hw.ac.uk/students/studies/examinations/timetables.htm).

Please note that although the majority of semester 2 examinations will take place in the first two weeks of the University assessment block (in 2018, 23 April - 3 May), it may be necessary for examinations to run into the third week.

For both examination blocks, it is important that students do not make any travel arrangements until the final examination timetable has been published. However, please note that changes to the final timetable may still be required after it has been published due to circumstances beyond our control.

You will officially receive the provisional results of your semester 1 assessments in mid-January. You will receive the final results of your semester 1 & 2 assessments in mid-June. In Year 2, you will receive your MSc project work result and your award recommendation in mid-September. You will receive an email to your University email account to inform you when you can view your official results online at [www.hw.ac.uk/selfservice](http://www.hw.ac.uk/selfservice). You will receive a final assessment results letter with your award recommendations in mid-September.

Information on graduation can be found at: [http://www.hw.ac.uk/registry/graduation.htm](http://www.hw.ac.uk/registry/graduation.htm)

**Graduate Attributes**

As a student of Heriot-Watt University, you are part of our global community. You will meet new people, discover new interests, develop your life skills and enhance your employability and career prospects.

The University will provide you with opportunities to develop skills, qualities and academic abilities during your time as a Heriot-Watt student. These are known as the **Four Heriot-Watt Graduate Attributes**:

- **Specialist**
• Creative
• Global
• Professional

Further information can be found at: https://www.hw.ac.uk/students/doc/StudentGraduateAttributes.pdf

4. GENERAL INFORMATION

4.1. Teaching Accommodation and Staff Accommodation
Classes may be held in any teaching rooms on campus. Students on other postgraduate programmes will join the class for certain lectures.

The academic staff of the Department of Actuarial Mathematics and Statistics all have their offices in the Colin Maclaurin (CM) building. Administrative staff and the MACS School Office (EM 1.25) are nearby in that section of the Earl Mountbatten building close to the CM building.

4.2. Contacting You
The Programme Directors, Programme Administrator, and lecturers will regularly communicate with you by email. All emails will be sent to your Heriot-Watt email address (e.g. abc123@hw.ac.uk) and NOT to any personal email address you may have.

It is your responsibility to find out what arrangements have been made and what information has been sent to you.

You are expected to check your email in-box regularly.

You should also check VISION regularly for announcements and updates.

4.3. Student Mail
Mail arriving for all students in the School is put in pigeon holes in the School Office.

4.4. Finance
Students are reminded that tuition fees are due prior to or at enrolment and are payable immediately. Anyone who is experiencing difficulty in meeting their repayments should contact the Student Service Centre immediately. The University has a strict policy regarding the payment of invoices and students who fail to meet this will have their student privileges withdrawn and may in some cases be subject to legal proceedings.

If you are experiencing difficulties in meeting your payments it is essential you contact the Student Service Centre at the first available opportunity. You may also wish to seek advice from your personal tutor or from staff in the School Office who can liaise with Finance Office on your behalf.

If you are paying by recurring card plan the payments will be taken in six, equal monthly instalments on specific dates. This option is not flexible and one missed payment will result in the agreement being revoked and the remaining balance will be due for immediate payment.

No student with outstanding debt from the first year of the programme will be allowed to enrol for the second year of the programme. All outstanding debt must be cleared first.

No student with outstanding debt will be permitted to graduate from the University, and in some cases students with debt may be prevented from continuing to the MSc project work stage of the programme.
4.5 Personal Tutors

All Heriot-Watt students are allocated a mentor. [https://www.hw.ac.uk/students/studies/personal-tutors.htm](https://www.hw.ac.uk/students/studies/personal-tutors.htm). For year 2 students, the mentor is normally the Programme Director. If you have any academic, personal or financial problems during the year your personal tutor will be very willing to advise or help you within their competence. If they cannot help you they will advise who you should speak to for more expert advice.

You are required to meet with your personal tutor at least once each semester. For international students this counts as a required contact point for attendance monitoring purposes.

4.6 Faculty of Actuaries Students’ Society (FASS)

All students are entitled to become affiliated members of this Society without becoming full student members of the Institute and Faculty of Actuaries. There is a small membership fee.

Membership is recommended to students.

The Society meets about five times during the year for discussion of papers which cover a variety of topical actuarial issues. It also gives you the opportunity to meet other actuarial trainees in Edinburgh. Most meetings are preceded by tea, coffee and biscuits. The annual dinner is preceded by a meeting at which there will be a distinguished speaker.

FASS Student Representatives will contact you during the first semester with details on how to join.

4.7 Class Representatives

Early in semester 1 the class will elect two class representatives who will liaise with the Programme Director whenever any problems arise which are of a general nature for the class. It is intended that formal meetings will be held once a semester where any such matters can be discussed.
5. PROGRAMME STRUCTURE

5.1. Programme Aim

The principal aims of the programme are:

Year 1
- to provide intensive and high-quality education in a postgraduate context in a wide range of subjects in contemporary actuarial science and statistics, and in economics and finance
- to provide coverage of the material in the syllabuses of the subjects CT1 – CT8 in the "Core Technical" series of the Institute and Faculty of Actuaries and provide an opportunity for students to gain exemptions from some or all of the corresponding professional examinations as a result of dedicated study over a nine-month period
- to provide a challenging period of study which enables students to test themselves against standards requiring intensive work and strong commitment in a demanding postgraduate environment
- to enable students to develop detailed knowledge and critical understanding, and acquire a range of new skills, in central areas in actuarial science and statistics
- to provide tutorial and discussion opportunities of a style and at a level appropriate for postgraduate studies
- to enable students to communicate and work effectively with peers and academic staff, demonstrating appropriate levels of autonomy, initiative, and responsibility

Year 2
- to provide intensive and high-quality education in a postgraduate context in a wide range of subjects in contemporary actuarial management, and professional practice
- to provide coverage of the material in the syllabuses of the subjects CP1, CP3, SP2, SP4, SP5, SP6 and SP9 of the Institute and Faculty of Actuaries and provide an opportunity for students to gain exemptions from some or all of the corresponding professional examinations as a result of dedicated study over a nine-month period
- to provide a challenging period of study which enables students to test themselves against standards requiring intensive work and strong commitment in a demanding postgraduate environment
- to enable students to develop detailed knowledge and critical understanding, and acquire a range of new skills, in central areas in actuarial management
- to provide tutorial and discussion opportunities of a style and at a level appropriate for postgraduate studies
- to enable students to communicate and work effectively with peers and academic staff, demonstrating appropriate levels of autonomy, initiative, and responsibility
- to provide students at Master’s level with the opportunity to plan and execute a significant investigation and write case studies or a dissertation requiring detailed and critical understanding in an area of study related to actuarial practice, and demonstrating originality

5.2. Taught Programme

All students commence with the taught courses in Actuarial Science. There are 11 courses available. These correspond in total to Subjects CP1 to CP8 of the IFoA current education/examination strategy. The courses are listed below, with information about the lecturer, the course weight and when it is taught and examined and the corresponding professional actuarial subject.

In Year 1 there are 3 mandatory courses:
- F71AF Life Insurance Mathematics 1
- F71BF Life Insurance Mathematics 2
- F71AB Financial Mathematics
In Year 2 there are 3 mandatory courses:

- F71CA Actuarial Risk Management 1
- F71CB Actuarial Risk Management 2
- F71MD Dissertation (MSc only)

Full details of courses can be found at: [http://www.macs.hw.ac.uk/students/ams/pg-programmes/msc-actuarial-science-and-management/](http://www.macs.hw.ac.uk/students/ams/pg-programmes/msc-actuarial-science-and-management/) Brief course descriptors can be found in the Appendix of this handbook.
<table>
<thead>
<tr>
<th>Course</th>
<th>Course code</th>
<th>Semester</th>
<th>Course weight</th>
<th>Examined in</th>
<th>Professional Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Mathematics</td>
<td>F71AB</td>
<td>1</td>
<td>1</td>
<td>December (3 hours)</td>
<td>CT1/CM1</td>
</tr>
<tr>
<td>Lecturer: Torsten Kleinow.</td>
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<td></td>
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<td></td>
<td></td>
<td>Office CM F.11; telephone 451 3252; <a href="mailto:T.Kleinow@hw.ac.uk">T.Kleinow@hw.ac.uk</a></td>
</tr>
<tr>
<td>Finance and Financial Reporting</td>
<td>C31FF</td>
<td>1</td>
<td>1</td>
<td>December (3 hours)</td>
<td>CT2/CB1</td>
</tr>
<tr>
<td>Lecturer: Melanie Wilson</td>
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<td></td>
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<td></td>
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<td></td>
<td><a href="mailto:M.J.Wilson@hw.ac.uk">M.J.Wilson@hw.ac.uk</a>, Andrea Eross <a href="mailto:a.eross@hw.ac.uk">a.eross@hw.ac.uk</a></td>
</tr>
<tr>
<td>Economics</td>
<td>C21AO</td>
<td>1</td>
<td>1</td>
<td>December (2 hours)</td>
<td>CT7/CB2</td>
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<tr>
<td>Lecturer: Prabir Bhattacharya</td>
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<td></td>
<td></td>
<td>Office MB1.01; telephone 451 3488; <a href="mailto:P.C.Bhattacharya@hw.ac.uk">P.C.Bhattacharya@hw.ac.uk</a></td>
</tr>
<tr>
<td>Statistical Methods</td>
<td>F71SM</td>
<td>1</td>
<td>1</td>
<td>December (3 hours)</td>
<td>CT3/CS1</td>
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<tr>
<td>Lecturer: Damian Clancy.</td>
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<td>Office CMS.02; telephone 451 3208, <a href="mailto:D.Clancy@hw.ac.uk">D.Clancy@hw.ac.uk</a></td>
</tr>
<tr>
<td>Life Insurance Mathematics 1</td>
<td>F71AF</td>
<td>1</td>
<td>1</td>
<td>December (2 hours)</td>
<td>CT5/CS2</td>
</tr>
<tr>
<td>Lecturer: Angus Macdonald.</td>
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<td>Office CMT.04; telephone 451 3209; <a href="mailto:A.S.Macdonald@hw.ac.uk">A.S.Macdonald@hw.ac.uk</a></td>
</tr>
<tr>
<td>Stochastic Modelling</td>
<td>F71SZ</td>
<td>1</td>
<td>0.5</td>
<td>December (2 hours)</td>
<td>CT4/CS2</td>
</tr>
<tr>
<td>Lecturer: Sergey Foss.</td>
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<td></td>
<td>Office CMG.07; telephone 451 3238; <a href="mailto:S.Foss@hw.ac.uk">S.Foss@hw.ac.uk</a></td>
</tr>
<tr>
<td>Life Insurance Mathematics 2</td>
<td>F71BF</td>
<td>2</td>
<td>1</td>
<td>April/May (2 hours)</td>
<td>CT5/CS2</td>
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<tr>
<td>Lecturer: Peter Ridges.</td>
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<td></td>
<td>Office CMF.16; telephone 451 3906; <a href="mailto:P.Ridges@hw.ac.uk">P.Ridges@hw.ac.uk</a></td>
</tr>
<tr>
<td>Survival Models</td>
<td>F71AE</td>
<td>2</td>
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<td>April/May (2 hours)</td>
<td>CT4/CS2</td>
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<tr>
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<td></td>
<td>Office CMT.04; telephone 451 3209; <a href="mailto:A.S.Macdonald@hw.ac.uk">A.S.Macdonald@hw.ac.uk</a></td>
</tr>
<tr>
<td>Risk Theory</td>
<td>F71AG</td>
<td>2</td>
<td>1</td>
<td>April/May (2 hours)</td>
<td>CT6/CS2</td>
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<tr>
<td>Lecturer: Seva Shmeer.</td>
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<td>Office CM.S07; telephone 0131 451 3902; <a href="mailto:V.Shmeer@hw.ac.uk">V.Shmeer@hw.ac.uk</a></td>
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<tr>
<td>Time Series Analysis</td>
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<td>Lecturer: Fraser Daly.</td>
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<td>Office CM.G06; telephone 451 3212; <a href="mailto:F.Daly@hw.ac.uk">F.Daly@hw.ac.uk</a></td>
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<tr>
<td>Financial Economics 1</td>
<td>F71AH</td>
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<tr>
<td>Lecturer: Prof Gavin Gibson.</td>
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<td>Office CM G.03; telephone 451 3205; <a href="mailto:G.J.Gibson@hw.ac.uk">G.J.Gibson@hw.ac.uk</a></td>
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<td></td>
<td>Office CM F.11; telephone 451 3252; <a href="mailto:T.Kleinow@hw.ac.uk">T.Kleinow@hw.ac.uk</a></td>
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### YEAR 2 COURSES

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<tr>
<th>Course</th>
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<th>Professional Subject</th>
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<td>December</td>
<td>CP1</td>
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<tr>
<td>Lecturer: Andrew Stott FFA. Office CM S.19; telephone 451 8293; <a href="mailto:A.D.Stott@hw.ac.uk">A.D.Stott@hw.ac.uk</a></td>
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<td>Pensions A</td>
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<td>1</td>
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<td>SP4</td>
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<tr>
<td>Lecturer: Peter Ridges FIA. Office CM F.16; telephone 451 3906; <a href="mailto:P.Ridges@hw.ac.uk">P.Ridges@hw.ac.uk</a></td>
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<td>Life Insurance 1</td>
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<td>April/May</td>
<td>SP2</td>
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<tr>
<td>Lecturer: Andrea Sneddon FIaA, FFA. Office CM S.10; telephone 451 3226; <a href="mailto:A.E.Sneddon@hw.ac.uk">A.E.Sneddon@hw.ac.uk</a></td>
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<tr>
<td>Lecturer: Dr Anke Wiese. Office CM T.13; telephone 451 3717; <a href="mailto:A.Wiese@hw.ac.uk">A.Wiese@hw.ac.uk</a></td>
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<tr>
<td>Lecturer: Dr Matthias Fahrenwaldt. Office CM F.13; telephone 451 3664; <a href="mailto:M.Fahrenwaldt@hw.ac.uk">M.Fahrenwaldt@hw.ac.uk</a></td>
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<tr>
<td>Lecturer: Bing Xu. Office MB G.54; telephone 451 3294; <a href="mailto:B.Xu@hw.ac.uk">B.Xu@hw.ac.uk</a></td>
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<td>Lecturer: Andrew Stott FFA. Office CM S.19; telephone 451 8293; <a href="mailto:A.D.Stott@hw.ac.uk">A.D.Stott@hw.ac.uk</a></td>
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<tr>
<td>Lecturer: Peter Ridges FIA. Office CM F.16; telephone 451 3906; <a href="mailto:P.Ridges@hw.ac.uk">P.Ridges@hw.ac.uk</a></td>
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<td>1</td>
<td>April/May</td>
<td>SP2</td>
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<tr>
<td>Lecturer: Andrea Sneddon fiaa, ffa. Office CM S.10; telephone 451 3226; <a href="mailto:A.E.Sneddon@hw.ac.uk">A.E.Sneddon@hw.ac.uk</a></td>
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<tr>
<td>Lecturer: Dr Tim Johnson. Office CM G.05; telephone 451 8343; <a href="mailto:T.C.Johnson@hw.ac.uk">T.C.Johnson@hw.ac.uk</a></td>
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<td>April/May</td>
<td>SP9</td>
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<td>Lecturer: Prof Andrew Cairns FFA. Office CM S.08; telephone 451 3245; <a href="mailto:A.J.G.Cairns@hw.ac.uk">A.J.G.Cairns@hw.ac.uk</a></td>
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<td>Lecturer: To be announced</td>
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</table>
5.3. Which courses should you take?

Year 1
To qualify for progression to Year 2 you must pass at least eight courses (taking account of course weights). Therefore you must ensure you are registered for at least eight courses (taking account of course weights).

There are three mandatory courses in Year 1 (F71AF/AB/BF). All other courses in Year 1 are optional. Students may choose any courses leading to a minimum of 120 credits, but are not limited to 120 credits. Students may study all available courses in order to obtain maximum possible exemptions from the examinations of the Institute and Faculty of Actuaries (IFoA). Guidance is provided to students on selection of courses.

If you are not sure which courses to take, please register for all courses at the start of the year. It is possible to drop one or more of the courses during the year, provided the subjects still being taken are equivalent to eight or more courses. You cannot drop the mandatory courses.

If you wish to drop/change a course before the standard University deadline (end of week 3), you should complete a Change of Course Form which is available from the School Office and should be handed in to the School Office. If you wish to drop a course after this time you may only do so before any assessments (eg coursework) has been handed in, or by the end of Week 8 of the semester, whichever comes earlier. If you de-register from a course it will not appear on your final transcript. However if you de-register for a course then you will not have a re-assessment opportunity in that course.

Some students may have studied Statistics or Economics before and may wish to drop one or both of these courses. However, it should be noted that it is not possible for us to decide whether this previous study is sufficient for an exemption from the corresponding professional actuarial subject - these exemption decisions can be taken only by the IFoA and then only after you have joined the IFoA. The decision to drop one or more courses should be taken only after a full discussion with your Personal tutor or the Programme Director.

In exceptional circumstances, you may be permitted to replace one or more of the courses with one or more actuarial courses given to honours undergraduate students. You will be advised accordingly which courses are considered a relevant replacement. Note that such courses may or may not lead to exemptions from professional actuarial subjects.

Year 2
To qualify for progression to the MSc, or the award of PG Diploma, you must pass at least eight courses. Therefore you must ensure you are registered for at least eight courses.

Actuarial Risk Management 1 and 2 are mandatory courses; you must register for them. Other courses listed above, in pairs over both semesters, may lead to exemptions from subjects SP2, SP4, SP5, SP6 and SP9. The actuarial profession requires students to pass TWO SP subjects in order to qualify as a Fellow. However, a student who has passes in THREE SP subjects will have broader employment prospects, and may go on to qualify as a Fellow with a choice of three SA subjects. Note also that the profession is strongly encouraging students and qualified actuaries to take subject SP9 which leads to the extra internationally-recognised qualification of Certified Enterprise Risk Actuary (CERA). Therefore, you may find your best option is to choose three of the pairs of courses listed above.
Any student who has been granted credits under the University’s Recognition of Prior Learning (RPL) policy should contact the Programme Administrator prior to registering.

If you are not sure which courses to take, you may register for more than eight courses at the start of the year. It is possible to drop one or more of the courses during the year, provided the subjects still being taken are equivalent to eight or more courses.

You may have been accepted on to the programme on the basis of previous studies in actuarial science at a university that does not have an accreditation agreement or exemptions from the UK actuarial profession. Your previous study may, possibly, be accepted by the profession for the purpose of granting exemption from some of subjects CT1 to CT8. However, it should be noted that it is not possible for us to decide whether the previous study is sufficient for an exemption from the corresponding professional actuarial subject - these exemption decisions can be taken only by the IFoA and then only after you have joined the IFoA.

5.4. Feedback
Feedback is a two-way process. Feedback is provided to students in a variety of ways in order to help you to reflect on and to evaluate your progress and to assist you to take steps to improve before the next relevant assessment. For most courses, students can expect feedback on assessed coursework within three teaching weeks of the coursework due date.

Feedback is sought from students via Student-Staff Liaison Committees and various surveys so that the School can continue to enhance the student learning experience. Your feedback is valued by the School, so please be sure to provide feedback whenever it is sought.

At the end of each course you will receive a Course Questionnaire. This will give you the opportunity to say what you thought was good and what was not so good about that course.

It is important for us that you take these questionnaires seriously - we do. We listen to what you say and always aim to improve the programme wherever possible. You are benefiting this year from improvements to the programme which have been made as a result of past students’ comments.

The IFoA may offer an online questionnaire and your participation in this would be appreciated. This questionnaire will be available for completion for a short period in Semester 2.

5.5. Award and Progression Requirements
The University operates the Heriot-Watt Assessment and Progression System (HAPS) which specifies minimum progression requirements. Schools have the option to apply progression requirements above the minimum University requirement, which are approved by the Studies Committees. Students should refer to the programme specific information on progression requirements. This information is detailed below.
For each course you will receive a mark and grade based on your performance in the examination and related coursework. The University’s standard grade classification is as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range of Marks</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>70 – 100%</td>
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<tr>
<td>B</td>
<td>60 – 70%</td>
</tr>
<tr>
<td>C</td>
<td>50 – 60%</td>
</tr>
<tr>
<td>D</td>
<td>40 – 50%</td>
</tr>
<tr>
<td>E</td>
<td>30 – 40%</td>
</tr>
<tr>
<td>F</td>
<td>0 – 30%</td>
</tr>
</tbody>
</table>

However, these grade boundaries may be changed by the Board of Examiners.

For MSc Project Work the Examiners will award a mark and grade based upon the following classification:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range of Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>70 – 100%</td>
</tr>
<tr>
<td>B</td>
<td>60 – 70%</td>
</tr>
<tr>
<td>C</td>
<td>50 – 60%</td>
</tr>
<tr>
<td>Resubmit</td>
<td>50% after resubmission with satisfactory amendments.</td>
</tr>
<tr>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Fail</td>
<td>0 – 50%</td>
</tr>
</tbody>
</table>

The Board of Examiners’ Meeting will be held each June and September to consider Progression and Award decisions.

**Progression Requirements**

**Progression from Year 1 to Year 2**
Progression will be on the basis of an average mark of 60% over any set of courses at grades A-D taken at the first attempt, bearing 120 credits in total, and grade C in all mandatory courses (F71AF, F71BF and F71AB).

Transfer to the MSc/PGDip in Actuarial Science as an exit award will be on the basis of their highest average mark and required grades over any set of courses bearing 120 credits in total.

**Progression to MSc**
Progression to MSc carrying Distinction requires at least eight courses passed at grade C or better in Year 2, with an average in the best eight courses of at least 70%.

Progression to MSc requires at least eight courses passed at grade D or better in Year 2, with an average in the best eight courses of at least 50%.

The Examiners reserve the right to exclude anyone who meets the minimum progression requirements but whom they consider to be unsuitable for project work.

**No student will be permitted to progress to the MSc before meeting the specified coursework requirements.**

No “exemptions” from courses, or “credits” of course passes are given, on the grounds of work done elsewhere or on any other grounds.
MSc project work (see section 5.7) will normally be carried out over the summer immediately after the end of the second semester in Year 2 - a period of 12 weeks is specified for this.

**Award Requirements**

**Award of MSc with Distinction** - credit-weighted average at least 70% over 8 courses at grades A-C in Year 2, plus a dissertation/project mark at least 70%

**Award of MSc** - credit-weighted average at least 50% over 8 courses at grades A-D in Year 2, plus a dissertation/project mark at least 50%

**Award of PG Diploma with Distinction** - credit-weighted average at least 70% over 8 courses at grades A-C in Year 2

**Award of PG Diploma** - credit-weighted average at least 40% over 8 courses at grades A-E in Year 2

**Award of PG Certificate** - credit-weighted average at least 40% over 4 courses at grades A-E in Year 2

**5.6 Re-Assessment Opportunities**

Students will be able to be re-assessed in a maximum of 3 courses. The resit opportunities described below are subject to this overall limit.

A student who has been awarded a Grade E or a Grade F in a course may be re-assessed in that course. A student who has been awarded a Grade D in a course may be re-assessed in that course in order to proceed to, or be eligible to receive the award of, Masters.

If you have already passed eight courses at D Grade or above in Year 1 but have not qualified for progression to Year 2 (as your average in the best eight courses is lower than 60%) you may resit the exam in up to three courses where you achieved no more than a D Grade at first attempt in order to increase your average in the best eight courses and proceed to Year 2.

If you have already passed eight courses at D Grade or above in Year 2 but have not qualified for progression to the MSc (as your average in the best eight courses is lower than 50%) you may resit the exam in any courses where you achieved no more than a D Grade at first attempt in order to increase your average in the best eight courses and proceed to the MSc.

You must take the resit examinations at the next available opportunity. For most students this will be in the next academic session. Only one resit opportunity will be permitted. All reassessment is based on examination results only, even in courses which include assessable coursework.

If you are required to be re-assessed before you are able to progress to Year 2 or to the MSc Project Work and if you are in the UK on a Tier 4 Visa, the University is obliged to inform the UKBI that you will not continuing immediately and therefore your visa will cancelled and you will be expected to leave the UK as soon as possible after the release of your results.

If you are not a UK resident you may be able to take the re-assessment exams off-campus i.e. in your home country. Further information on this will be provided to students at the relevant time.

Special arrangements may apply where a student has presented mitigating circumstances in relation to the first attempt. See the relevant section later in this Guide for more information.

Students who achieve the standards required to progress to the MSc following reassessment will be invited to return to the University at the appropriate stage of the next academic year. We do not normally offer MSc supervision at times except during the Summer.
Students who fail to meet the standards required for the PG Diploma following reassessment in Year 1 courses may be awarded the PG Certificate in Actuarial Science provided they have passed at least four courses at D Grade or above.

5.7. MSc Project Work
Students in Year 2 who have been allowed to progress to the MSc may go on to undertake project work leading to the award of MSc. The project work will normally take place during an 11-week period from the beginning of June until mid-August in the same academic year and students are expected to be on campus full-time during this period and available for regular meetings with academic staff.

The project work normally consists of two case studies, each undertaken over about five weeks. Students normally have a choice of two case studies. At the end of each case study, the student submits a substantial written report for assessment. Both count equally for the award of the MSc. The assessment of the first case study should normally be completed, and feedback given to the student, before the student begins to write the report on second case study.

In exceptional cases (e.g. a student intending to undertake a research degree, or a student on an industrial placement) the project work may consist of a single research dissertation.

A list of case studies being offered will be made available during Semester 2 of Year 2 and allocation will be made after the Board of Examiners meeting. Please note that student preferences will be considered but cannot always be guaranteed.

5.8 Graduation
Students who qualify for an award following the September Examiners’ meeting are eligible to graduate in November.

Students eligible to graduate will find all the relevant graduation details on Academic Registry’s website [http://www.hw.ac.uk/registry/graduation.htm](http://www.hw.ac.uk/registry/graduation.htm).

It is your responsibility to complete and return the required forms and payment to the Student Service Centre before the specified deadline to ensure you are included in the Graduation ceremony. No student with outstanding debt will be permitted to graduate from the University.
6. **EXEMPTIONS FROM PROFESSIONAL EXAMS**

Recommendations for exemptions from professional exams based on performance in the taught courses examinations will be agreed at the Examiners' Meetings in May.

6.1. **Year 1 – CT Subjects**

See the table in section 5.2.

To obtain any exemption, a student must take the examinations for all the courses listed for that exemption. For example a student hoping for the CS1 exemption must take the examinations for F71SM, F71AG and F71SZ.

6.1.1. **Accreditation**

The programme is accredited by the IFoA. Students with an overall average of at least 65% in all courses taken and who pass (at D grade or higher) all courses taken at first attempt will be recommended for block exemptions from all subjects where they have attempted all the underlying exemption courses.

6.1.2. **Subject-by-Subject Exemptions**

Students who do not achieve an overall average of 65% are recommended for exemption on a subject-by-subject basis.

The exemption level varies among subjects but usually lies in the range 60% to 65%.

Exemption levels are determined by the Board of Examiners in May. No information is available regarding exemptions prior to the May meeting.

6.2. **Year 2 - CP/SP subjects**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Course Code</th>
<th>Semester</th>
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<tbody>
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<td><strong>CP1</strong> Actuarial Risk Management 1 &amp; 2</td>
<td>F71CA/F71CB</td>
<td>1 and 2</td>
</tr>
<tr>
<td><strong>CP3</strong> Actuarial Risk Management 2 and MSc dissertation</td>
<td>F71CB/F71MD</td>
<td>2 and 3</td>
</tr>
<tr>
<td><strong>SP2</strong> Life Insurance 1 &amp; 2</td>
<td>F71LA/F71LB</td>
<td>1 and 2</td>
</tr>
<tr>
<td><strong>SP4</strong> Pensions A &amp; B</td>
<td>F71PC/F71PD</td>
<td>1 and 2</td>
</tr>
<tr>
<td><strong>SP5</strong> Financial Markets &amp; Finance and Investment</td>
<td>C31FM/C31FV</td>
<td>1 and 2</td>
</tr>
<tr>
<td><strong>SP6</strong> Derivative Markets and Pricing, &amp; Advanced Derivative Pricing</td>
<td>F71DV/F71AP</td>
<td>1 and 2</td>
</tr>
<tr>
<td>SP9</td>
<td>Quantitative Risk Analysis/ Risk Management: Techniques and Tools</td>
<td>F71QR/F71TT</td>
</tr>
</tbody>
</table>

### 6.2.1 Accreditation
The MSc programme is accredited by the UK actuarial profession. Students with an overall average of at least 60% in all courses taken in Year 2 ("the accreditation average") will be recommended for block exemptions from all subjects in the table above where they have achieved a C Grade pass or better (at first attempt) in each of the underlying exemption courses, except Subject SP9. If a student takes Quantitative Risk Analysis/ Risk Management: Techniques and Tools their marks in these subjects will be included in the accreditation average, but exemption from Subject SP9 is available only to students who meet the subject-by-subject exemption standard for Subject SP9. (The reason for this special treatment of Subject SP9 is that it leads to the additional CERA qualification. This is an international qualification and the Institute and Faculty of Actuaries is itself overseen by the International Actuarial Association as a body entitled to award CERA status.)
The Institute and Faculty of Actuaries requires CT subjects and C9/SP subjects to be kept separate for accreditation purposes, which is why separate accreditation averages are calculated for Years 1 and 2.

Exemption from Subject CA3 (Communications) is on the basis of three assessed pieces of work, as follows:
- the second case study or (exceptionally) research dissertation undertaken during the summer (weight 60%);
- a written test of communication undertaken at the end of the summer project period (weight 40%); and

The PG Diploma is not accredited by the UK actuarial profession, because project work is a requirement for accreditation. Students graduating with the PG Diploma are eligible for Subject-by-Subject exemptions, see below.

6.2.2 Subject-by-Subject Exemptions
Students who do not achieve an accreditation average of 60%, or who graduate with the PG Diploma, are eligible for exemption on a subject-by-subject basis.

The exemption level varies among subjects but usually lies in the range 60% to 65%.

Exemption levels are determined by the Board of Examiners in May and September (CP3). No information is available regarding exemptions prior to the May meeting.

Following the Board of Examiners' Meetings in September of Year 2, the Department will write to the education offices of the Institute and Faculty of Actuaries listing the specific exemption recommendations for each member of the class.

Once the exemption recommendations have been accepted by the UK Actuarial Profession, we will provide each student with a letter confirming the exemptions for which they have been recommended. This letter is expected to be issued shortly before your graduation.

6.3. Resits for Exemption
The IFoA has changed its policy on resits for exemption. The general principle is that an exam or other form of assessment may be considered for exemption only if the student is required to take it for progression or graduation. That is, there are no exams or other assessments taken for exemption purposes alone.

For exemption purposes, the mark in any resit exam or other assessment will be capped at the normal pass mark, which is 40%. This means that it will not usually be possible to gain an exemption on the basis of resits. However, the rules are more lenient if Section 7.4 of this handbook applies to you.

Any resits taken in accordance with this policy are for the purpose of subject-by-subject exemption only. Results from these examinations will not be included in calculating your accreditation average, and therefore will not affect your entitlement to exemptions under the accreditation agreement.

6.4. Claiming your exemptions
To claim your exemptions, you must join the Institute and Faculty of Actuaries as a student member. You must then submit the Application for Exemptions form, accompanied by a certified copy of your academic transcript. You do not need to provide a letter confirming your exemption recommendations as the IFoA will match your application with the information provided by the Department and then confirm your exemptions. More information is available from the IFoA website: www.actuaries.org.uk
You should note that fees are payable to become a student member and to claim your exemptions. We generally recommend that you wait until after you have completed the programme to join the profession. Applications for exemption will not be accepted by the IFoA until they have officially accepted the Department’s recommendations. At this time you will be provided with a letter from the Department confirming the exemptions for which you have been recommended.

Universities have the power only to recommend exemptions. The IFoA normally accept our recommendations, but the final decision is theirs alone.

7. HELP DURING THE YEAR

If you have any problems during the year you are encouraged to seek help as soon as possible. There are many sources of help available for students at Heriot-Watt, and staff are always happy to help.

7.1. Programme Problems
If you are having some problems with a particular subject then you should first see the lecturer for that course. It is common for staff to use an appointments system. If he or she is not able to help you then you should see the Programme Director.

7.2 Administrative Help
The Student Service Centre provides a single location for students to deal with the Finance Office, Hospitality Services and Academic Registry teams. It is located in the Hugh Nisbet Building, along from the shop and the bank. It is open Monday – Friday 10.00 – 16.00.

The principal areas of services that the Centre will offer to students are:

- Issue of ID cards
- Council Tax exemptions
- Transcripts and certifications – see http://www.hw.ac.uk/registry/forms.htm under Student Records
- Graduation applications – see http://www.hw.ac.uk/registry/forms.htm
- Processing payments and dealing with payment-related enquiries including tuition and accommodation fees

You can contact them on StudentCentre@hw.ac.uk

Common administrative requirements could include:

(i) Letters/confirmation of enrolment
Students often require letters for their sponsor, visas, banks etc to confirm their enrolment on the programme. All students are issued with a certification letter upon enrolling with the University. Please do not lose this letter, however you can reprint this letter by logging back into the on-line enrolment facility (www.hw.ac.uk/selfservice).

(ii) Updating contact details
It is important the University has up-to-date contact details for all students. If your contact details change during the year you can update them at: www.hw.ac.uk/selfservice

Other Administrative assistance
If you require any additional help of an administrative nature which is specific to your programme of study you should contact the School Office in the first instance. The School Office (EM 1.25) is normally
open Monday – Friday 09.30 – 16.30. The School Office can also be contacted on: macs-schooloffice@hw.ac.uk; Tel 0131 451 3432

7.3. Wider Support
For more general problems, your personal tutor is available to offer support, advice, and help if you run into difficulties, be it personal or academic. They will offer assistance as far as they can, and can put you in touch with appropriate University support services. The University offers a wide range of support services for students and you are encouraged to make use of these to make your time at Heriot-Watt as enjoyable and trouble-free as possible.

The Chaplaincy welcomes all students from any background and is available for prayer, counselling and support and social events. See: www.hw.ac.uk/chaplaincy; email: chaplaincy@hw.ac.uk

Student Support and Accommodation provides student counselling and welfare support. See: http://www.hw.ac.uk/students/health-wellbeing.htm

University Health Service is available to all students. You can make an appointment to see a doctor by telephoning 451 3010 or dentist by telephoning 451 3080. See: http://www.hw.ac.uk/students/health-wellbeing.htm

International Student Advisors are available to provide advice and support with visas, studying in Scotland and any other general support and advice to international students. See: http://www.hw.ac.uk/support/isao/about-us.htm

Heriot-Watt Students Union see: http://www.hwunion.com/

Careers Advisory Service has in-house advisers with considerable expertise in the actuarial and financial job market and can assist with job applications and preparing for interviews. See: www.hw.ac.uk/careers or contact Alan Smith (telephone 451 3390 or email A.Smith_3@hw.ac.uk).

Academic Skills Service provides coaching and counselling to assist students to work smarter. See: http://www.hw.ac.uk/sbc/library/academic_skills/index.htm

Also see the A-Z guide for students http://www.hw.ac.uk/students/doc/a-z-students-ed-sbc.pdf

7.4. Mitigating Circumstances
If you experience any mitigating circumstances which affect your ability to complete your assessments you must notify us as soon as possible.

You should read the University’s Policy on Mitigating Circumstances in Relation to Assessment at: http://www.hw.ac.uk/registry/resources/special-circumstances-policy.pdf and then complete the application form at: http://www.hw.ac.uk/registry/resources/special-circumstances-form.doc. This form along with any relevant evidence (eg medical certificates) should be submitted to the School Office. Evidence submitted after your results have been published cannot be taken into account.

If you think you qualify as a Special Needs student (if for example you are registered with a disability) please bring this to the attention of Ms Amiridou as soon as possible.

7.5. Important
It is very important that if you have a problem you see help as soon as possible, and notify us of the situation. The Examiners will always take such circumstances into account where appropriate, but the later the notification, the less scope there is to do so. Notification of mitigating circumstances must be given before the Exam Board meeting is held. Late notification will normally mean that no consideration can be taken of the circumstances.
Any information which you provide to us will be used solely by the Board of Examiners to determine how best to help you, given the circumstances. We will not share the information with other students or services of the University without your consent.

7.6 Temporary Suspension of Studies

If students are unable to study for a considerable period (i.e. more than one diet) they should inform their personal tutor, so that such periods of non-study can be taken into consideration when reviewing the students continued registration on the Programme.

If students continue to be unable to study for a specific known period (for example, more than one year) due to other external factors (for example, maternity), then they should seek to temporarily suspend their studies.

If you intend to apply for a suspension of studies, please contact your School/Institute Office. You can find useful information here: [https://www.hw.ac.uk/students/studies/leaving/temporary-suspension-studies.htm](https://www.hw.ac.uk/students/studies/leaving/temporary-suspension-studies.htm)

7.7 Withdrawing from Study

Students may find that the Programme is not suitable for them and they may decide to withdraw from it.

Students should think very carefully before they do withdraw. If they do so, it may well be that sometime later they decide that they would like to continue with their studies.

Before making a final decision about withdrawing, students should discuss their situation with their Personal Tutor.

The University has a “Thinking of Leaving” Service which you can use. Please see more information here: [https://www.hw.ac.uk/students/studies/leaving.htm](https://www.hw.ac.uk/students/studies/leaving.htm) where you can find a range of information and advice that can help you make the final decision.
8. IMPORTANT INFORMATION FOR ASSESSMENT

8.1 Unauthorised Material
You must not have any unauthorised electronic devices or pre-printed materials in the examination room. Cheating in an examination is treated very seriously by the University. If you do have any material relevant to the exam which you have brought in by mistake, you must hand it over to an invigilator before the start of the examination. Invigilators will carry out checks on authorised materials and calculators.

8.2 Calculators, Dictionaries & Electronic Devices/Mobile Phones
Where a calculator is required for the completion of an examination, a student may use any basic scientific calculator, except the following: graphics calculator, programmable calculator and a calculator which features text storage or retrieval facilities.

You must provide your own calculator: they will not be provided for you in any exams. Calculators can be purchased from the student union shop.

No translation dictionaries are permitted in any of the University’s examinations. The only exception to the policy is in the case of individual students who had been assessed by the University’s Disability Service as requiring access to a translation dictionary.

Students are not allowed to have mobile phones or other communication devices on or about their person during examinations. Phones may be left at the front of the examination room but must be switched off.

8.3 Coursework Submission Policy
The University recognises that, on occasion, students may be unable to submit coursework and dissertations by the submission date. As such, the University has agreed a new policy from 2018/19 which states:

- No individual extensions are permitted under any circumstances (unless course coordinators decide to give an extension to an entire class);
- Standard 30% deduction from the mark awarded (maximum of five working days);
- Alternative options if students cannot submit coursework or their dissertation on time

In the case where you submit coursework up to five working days late and you have valid mitigating circumstances, the mitigating circumstances policy will apply and appropriate mitigation will be applied.

Formative feedback will be provided on all coursework submitted up to five working days late.

Any coursework submitted after five calendar days of the set submission date shall be automatically awarded a no grade with no formative feedback provided.

There will be no extensions granted to coursework (this includes undergraduate and postgraduate taught dissertations).

A link to the policy can be found here - https://www.hw.ac.uk/services/docs/CourseworkPolicyFinal.pdf
8.4 Plagiarism
The University has a strict policy on Plagiarism – the passing off as one’s own the ideas or writing of another.

Plagiarism undermines every academic principle.

Plagiarism is cheating and the Department, the School, and the University treat it very seriously indeed.

This is relevant for all students and has implications for Diploma exams and the writing of MSc project work.

The sanctions for plagiarism range from the discounting of the course or MSc project work completely, to the withholding of the degree or Diploma concerned, to expulsion from the University.

Anyone indulging in plagiarism of any kind can expect no sympathy or understanding from the University.

All students should be familiar with the University’s policy on plagiarism, which can be downloaded from: http://www.hw.ac.uk/registry/resources/PlagiarismGuide.pdf.

If you have the slightest doubt about any aspect of this matter and of how your own work relates to it, you must discuss it with the Programme Director before submitting any work.

For information, some summary ideas are included below: (ref Georgetown University website, Washington DC, www.georgetown.edu/honor/plagiarism.html).

- If you use someone else's ideas, or quote from someone else's work, you must cite the source (i.e. provide a reference).
- If the way in which you are using the source is unclear, make it clear.
- If you received specific help from someone in writing the project work, acknowledge it.

Here is another version (from the website of the University of Indiana, Bloomington: see www.indiana.edu/~wts/pamphlets/plagiarism.html)

What is Plagiarism and Why is it Important?
In college programmes, we are continually engaged with other people’s ideas: we read them in texts, hear them in lecture, discuss them in class, and incorporate them into our own writing. As a result, it is very important that we give credit where it is due. Plagiarism is using others' ideas and words without clearly acknowledging the source of that information.

How Can Students Avoid Plagiarism?
To avoid plagiarism, you must give credit whenever you use
- another person's idea, opinion, or theory;
- any facts, statistics, graphs, drawings, any pieces of information that are not common knowledge;
- quotations of another person's actual spoken or written words; or
- paraphrase of another person's spoken or written words.

8.5 Useful Text
A recommended text for all students when starting their MSc project work is:

Although mathematics is highlighted, this book has much useful advice on writing precise technical material. Chapter 5 is entitled "When English is a Foreign Language". The advice in Sections 5.1 and 5.2 may be particularly useful in week 1 of the MSc project work.

9. **GENERAL INFORMATION**

9.1. **National Degree Standards**
All the undergraduate and taught postgraduate programmes offered by the Department of Actuarial Mathematics and Statistics (School of Mathematical and Computer Sciences) are believed to be compliant with the requirements of the Scottish Credit and Qualifications Framework (SCQF).

9.2. **Race Equality and Equal Opportunities Policies**
Heriot-Watt University is committed to the elimination of unlawful racial discrimination; and the promotion of equality of opportunity and good relations between persons of different racial groups. Heriot-Watt University is also committed to equal opportunities for all, irrespective of sex, colour, ethnic origin, disability, marital status, religious or political beliefs, trade union membership, sexual orientation or other irrelevant distinction.

Policies relating to race equality and equal opportunities can be obtained from the following website: [Policies and Procedures](#)
10. FREQUENTLY ASKED QUESTIONS

10.1 Programme Progression and Award Requirements

FAQ 1  
_I have not passed eight courses after the second semester exams in Year 2. Can I take the resit exams while undertaking my MSc project work this summer?_

No. There are no resit examinations in August. You must take the re-assessments in the next academic year. If you are successful in meeting the progression requirements after the December and April/May diets you will be invited to return in Summer 2019 to undertake your MSc project work.

FAQ 2  
_Now that I have completed the taught programme, can I come back in a few years and do the MSc project work once I have some work experience / more money / taken a holiday?_

Under normal circumstances, the answer to this question is no. The University requires full-time MSc students to complete their degree within 24 months, so you are expected to continue to the MSc project work immediately after completing the taught coursework.

The Board of Examiners may allow students to defer their MSc project work for one year in extenuating circumstances. Requests for deferral must be made in writing to the Programme Director for discussion by the Board of Examiners at their June meeting.

10.2 Accreditation and Exemptions

FAQ 3  
_To qualify for exemption on a subject-by-subject basis in a subject that is covered by more than one course, do I have to meet the required exemption standard in each relevant course separately?_

No. Your average mark in the underlying courses must meet the required exemption standard for the subject as a whole.

FAQ 4  
_I am eligible for block exemptions in Year 1/Year 2 because my overall average is higher than 60%. Will I get an exemption even when I failed the underlying course?_

For single assessment exemptions in Year 1 (CT1, CT2, and CT7) if you failed the relevant course assessment you cannot be recommended for exemption (although the fail mark will count towards your accreditation average).

For those exemptions in Year 1 involving assessment in more than one course (CT3, CT4, CT5, CT6 and CT8) you will be recommended for exemption if your average mark in the underlying courses is at least a D Grade pass.

For exemptions in Year 2 you will be recommended for exemption if your average mark in the underlying courses is at least a C Grade.
10.3 Medical Certificates

FAQ 5  
I am eligible for block exemptions in Year 1 as my actuarial average was greater than 65%. However I did not get all available exemptions due to illness. Can I resit the exam(s) for exemption while I do my MSc project (or other form of assessment)?

No, the IFoA will not allow this.

10.4 Administrative Information

FAQ 6  
How do I get a letter for my bank/sponsor/landlord confirming my student status?

All students are issued with a certification letter upon enrolling with the University.

If you require an updated letter during the academic year, please see section 7.2 of this guide for the required procedure. Please bear in mind that support staff are extremely busy during the year and it is your responsibility to plan ahead and give sufficient notice. Please do not ask for a letter to be typed while you wait, as this will be refused.

FAQ 7  
Where can I find the exam timetable?

Timetables for all examination diets are prepared by Academic Registry and posted on their website. It is your responsibility to ensure you check the timetable for the correct date, time and location of the exams.

See: http://www1.hw.ac.uk/registry/examinations.htm

FAQ 8  
When will I get my results?

Provisional results from the December examinations released on-line following the Assessment Board in January. Final results will be released on-line by Academic Registry after the April/May examination diet and after the programme Award Board in early September. You will be sent an email to your University email address to let you know when your results are available. You can access your results at: www.hw.ac.uk/selfservice

In addition, progression and award notices will be posted on Vision after the May and September Board of Examiners’ Meetings.

Official academic transcripts will be prepared by Academic Registry and mailed to your correspondence address in late September.

The Department will notify you separately about your Exemptions after our recommendations have been accepted by the IFoA. We expect letters to be distributed around the end of September.
# COURSE DESCRIPTORS - YEAR 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
<th>Credits</th>
<th>Mandatory/Optional</th>
<th>Exemption</th>
</tr>
</thead>
<tbody>
<tr>
<td>F71AB</td>
<td>Financial Mathematics</td>
<td>1</td>
<td>15</td>
<td>Mandatory</td>
<td>CT1/CM1</td>
</tr>
<tr>
<td>F71AF</td>
<td>Life insurance Mathematics 1</td>
<td>1</td>
<td>15</td>
<td>Mandatory</td>
<td>CT5/CS2</td>
</tr>
<tr>
<td>F71SM</td>
<td>Statistical Methods</td>
<td>1</td>
<td>15</td>
<td>Optional</td>
<td>CT3/CS1</td>
</tr>
<tr>
<td>C31FF</td>
<td>Finance &amp; Financial Reporting</td>
<td>1</td>
<td>15</td>
<td>Optional</td>
<td>CT2/CB1</td>
</tr>
<tr>
<td>C21AO</td>
<td>Economics</td>
<td>1</td>
<td>15</td>
<td>Optional</td>
<td>CT7/CB2</td>
</tr>
<tr>
<td>F71SZ</td>
<td>Stochastic Modelling</td>
<td>1</td>
<td>7.5</td>
<td>Optional</td>
<td>CT4/CS2</td>
</tr>
<tr>
<td>F71BF</td>
<td>Life insurance Mathematics 2</td>
<td>2</td>
<td>15</td>
<td>Mandatory</td>
<td>CT5/CS2</td>
</tr>
<tr>
<td>F71AE</td>
<td>Survival Models</td>
<td>2</td>
<td>15</td>
<td>Optional</td>
<td>CT4/CS2</td>
</tr>
<tr>
<td>F71AG</td>
<td>Risk Theory</td>
<td>2</td>
<td>15</td>
<td>Optional</td>
<td>CT6/CS2</td>
</tr>
<tr>
<td>F71TS</td>
<td>Time Series</td>
<td>2</td>
<td>7.5</td>
<td>Optional</td>
<td>CT6/CS2</td>
</tr>
<tr>
<td>F71AH</td>
<td>Financial Economics 1</td>
<td>2</td>
<td>15</td>
<td>Optional</td>
<td>CT8/CM2</td>
</tr>
<tr>
<td>F71AJ</td>
<td>Financial Economics 2</td>
<td>2</td>
<td>15</td>
<td>Optional</td>
<td>CT8/CM2</td>
</tr>
<tr>
<td>Course Code: F71AB</td>
<td>Course Title: Financial Mathematics</td>
<td>Course Co-ordinator: Torsten Kleinow</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>-------------------</td>
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<td></td>
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</tr>
<tr>
<td><strong>Aims:</strong></td>
<td>This course aims to provide postgraduate students with a broad knowledge of basic concepts in financial mathematics including interest rates, arbitrage, stochastic interest rates, inflation and continuous cash flows.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Syllabus:**     | ♦ Rates of interests  
♦ Present values, equations of value and yields  
♦ Principle of equivalence  
♦ Annuities  
♦ Loan schedules and mortgages  
♦ Project appraisal and discounted cash flows  
♦ Measures of fund performance  
♦ Fixed interest securities  
♦ Inflation and index-linked securities  
♦ Continuous Compounding, force of interest and continuous cash flows  
♦ Immunisation, duration and convexity  
♦ Arbitrage and forward contracts  
♦ The term structure of interest rates and forward rates  
♦ Stochastic interest rate models |
| **Learning Outcomes: Subject Mastery** | Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning) |
|                   | On completion of this course the student should be able to:  
♦ Know how to discount and accumulate cash flows and calculate internal rates of return.  
♦ Know the derivation of formulae for standard cash flows.  
♦ Derive and solve equations of value.  
♦ Understand the principle of equivalence  
♦ Understand the theory and practice of loan repayments.  
♦ Understand measures of investment performance  
♦ Value fixed interest securities subject to tax and determine their yield.  
♦ Understand the concept of arbitrage and the no-arbitrage assumption  
♦ Calculate the forward price and the value of forward contracts using arbitrage free pricing.  
♦ Develop a replicating portfolio for forward contracts  
♦ Understand forward interest rates and the term structure of interest rates.  
♦ Calculate the duration and convexity of a set of cash flows.  
♦ Understand Redington’s theory of immunization and apply it in simple situations  
♦ Understand simple stochastic interest rate models.  
♦ Calculate the accumulated profit of projects using deterministic interest rates  
♦ Understand the concept of inflation and calculate inflation adjusted payoffs  
♦ Find the real yield and the monetary yield of inflation linked gilts  
♦ Calculate the break-even rate of inflation |
<table>
<thead>
<tr>
<th>Learning Outcomes: Personal Abilities</th>
<th>Industrial, Commercial &amp; Professional Practice; Autonomy, Accountability &amp; Working with Others; Communication, Numeracy &amp; ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>On completion of this course the student should be able to:</td>
<td></td>
</tr>
<tr>
<td>♦ Demonstrate knowledge and critical understanding of the basic concepts and models in financial mathematics.</td>
<td></td>
</tr>
<tr>
<td>♦ Demonstrate the ability to learn independently</td>
<td></td>
</tr>
<tr>
<td>♦ Manage time, work to deadlines and prioritize workloads</td>
<td></td>
</tr>
<tr>
<td>♦ Present results in a way that demonstrates that they have understood the technical and broader issues in financial mathematics</td>
<td></td>
</tr>
<tr>
<td>Assessment Methods:</td>
<td>Assessment: Examination: (weighting - 90%) Mid Semester Test: (weighting - 10%) Re-assessment: Examination (weighting –100%)</td>
</tr>
<tr>
<td><strong>Course Code:</strong> F71AF</td>
<td><strong>Course Title:</strong> Life Insurance Mathematics 1</td>
</tr>
<tr>
<td>------------------------</td>
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</tr>
</tbody>
</table>

### Aims:
This course aims to provide postgraduate students with a good knowledge of survival models, life tables and first and second moments of the present values of payment streams contingent on survival or death. This knowledge is then applied to the calculation of premiums and reserves for life insurance contracts.

### Syllabus:
- Survival models
- Select survival models
- Life tables
- Annuities and assurances
- Premiums
- Expenses
- With profits policies and bonuses
- Reserves
- Thiele’s differential equation
- Calculation of annual profit/loss
- Policy alterations

### Learning Outcomes: Subject Mastery
*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

On completion of this module the student should be able to:
- Demonstrate an understanding of survival models
- Demonstrate a knowledge of methods for the calculation of the moments of the present values of payment streams contingent on survival or death
- Demonstrate a knowledge of methods for the calculation of premiums and reserves for life insurance policies

### Learning Outcomes: Personal Abilities
*Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*

At the end of the course students should be able to:
- Demonstrate the ability to learn independently
- Manage time, work to deadlines and prioritise workloads
- Perform numerical calculations using a suitable computer package, or other available tools
- Present results in a way which indicates that they have understood the concepts involved

### Assessment Methods:
- **Assessment:**
  - Examination: (weighting - at least 80%)
  - Coursework (weighting up to 20%)
- **Re-assessment:**
  - Examination (weighting –100%)
<table>
<thead>
<tr>
<th><strong>Course Code:</strong></th>
<th><strong>Course Title:</strong></th>
<th><strong>Course Co-ordinator:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>F71SM</td>
<td>Statistical Methods</td>
<td>Damian Clancy</td>
</tr>
</tbody>
</table>

**Aims:**
This course aims to provide postgraduate students with a broad knowledge of the principal areas of mathematical statistics and statistical methods widely used in actuarial science and finance.

**Syllabus:**
- Data summary
- Probability
- Random variables, special distributions
- Multivariate distributions and linear combinations
- Sampling distributions, central limit theorem, t and F distributions
- Estimation – properties of estimators, methods of constructing estimators
- Interval estimation
- Hypothesis testing
- Linear relationships – regression and correlation

**Learning Outcomes:**

**Subject Mastery**
*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

On completion of this course the student should be able to:
- demonstrate knowledge of, and a critical understanding of, statistical methodologies (including the main concepts and methods of inference and modelling)
- understand and apply a range of statistical techniques based on the main theories and concepts which comprise the syllabus, including the central limit theorem
- perform basic probability calculations
- find/calculate moments and expected values of random variables and functions of random variables; use generating functions
- determine properties of estimators: efficiency, Cramer-Rao lower bound, (approx.) large sample distributions of MLEs
- perform inference on parameter estimates, including constructing confidence intervals and testing hypotheses on the values of parameters
- fit a linear regression model and critically evaluate other proposed models; test hypotheses concerning correlation coefficients

**Personal Abilities**
*Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*

At the end of the course students should be able to:
- show an awareness of how different statistical models and techniques can be applied to financial problems
- communicate meaningfully and productively with others (including practitioners and professionals in the financial services industry and elsewhere) on matters relating to and/or requiring the use of statistical methods

**Assessment Methods:**
Assessment: Examination: (weighting - 100%)
Re-assessment: Examination (weighting –100%)
<table>
<thead>
<tr>
<th>Course Code: F71SZ</th>
<th>Course Title: Stochastic Modelling</th>
<th>Course Co-ordinator: Sergey Foss</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aims:</strong></td>
<td>To introduce fundamental stochastic processes which are useful in insurance.</td>
<td></td>
</tr>
</tbody>
</table>
| **Syllabus:**     | ♦ Conditional expectation.  
                      ♦ Sequences of random variables and the Markov property  
                      ♦ Review of matrix algebra  
                      ♦ Review of summation notation and other useful concepts  
                      ♦ Using the Markov property  
                      ♦ Absorbing Markov chains with finite state space  
                      ♦ First step (backwards) equations  
                      ♦ Basic examples  
                      ♦ Stationarity problem for finite state space chains  
                      ♦ Tricks for the computation of the stationary distribution  
                      ♦ Convergence to stationarity  
                      ♦ Markov chains with infinite but countable state space  
                      ♦ Examples  
                      ♦ Simple point processes, Poisson and compound Poisson processes  
                      ♦ Continuous time Markov processes  
                      ♦ Chi-squared test for contingency tables and goodness of fit.  
                      ♦ One-way ANOVA. |
| **Learning Outcomes:** | **Subject Mastery** Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)  
                           After studying this half course, students should be able to:  
                           ♦ Understand and use the Markov property  
                           ♦ Write down equations for the stationary distribution of a Markov chain and use, wherever possible, additional structure to solve them  
                           ♦ Write down first step equations and use them to compute the time to death, probability of absorption etc.  
                           ♦ Apply Markov chain modelling in several problems  
                           ♦ Understand long term behaviour and stationarity of a Markov chain  
                           ♦ Apply Chi-squared tests for contingency tables or goodness of fit.  
                           ♦ Carry out a one-way ANOVA. |
| **Learning Outcomes:** | **Personal Abilities** Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT  
                           At the end of the half course, students should be able to:  
                           ♦ Demonstrate the ability to learn independently  
                           ♦ Manage time work to deadlines and prioritise workloads  
                           ♦ Present results in a way which demonstrates that they have understood the technical and broader issues of stochastic processes |
| **Assessment Methods:** | Assessment: Examination (weighting - at least 75%)  
                               Coursework (weighting – no more than 25%)  
                               Re-assessment: Examination (weighting –100%) |

| Course Code: C31FF | Course Title: Finance and Financial Reporting | Course Co-Ordinator: Andrea Eross and Melanie Wilson |
**Linked courses:**

**Aims:** To provide a basic understanding of issues in corporate finance

**Syllabus:**
- Instruments used by companies to raise finance
- Management of financial risk
- Personal and corporate taxation
- Interpretation of financial statements of companies and financial institutions

**Learning Outcomes:**

**Subject Mastery**
- Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)
  - Understanding of the principal terms in use in investment and asset management
  - Awareness of the principles of finance and how business of organisations are financed
  - Awareness of the principles of corporate governance
  - Understanding of the principles of personal and corporate taxation
  - Understanding of influences on capital structure and dividend policy
  - Awareness of the process of capital investment appraisal
  - An understanding of and the ability to interpret financial accounting statements of individual and groups of companies

**Learning Outcomes:**

**Personal Abilities**
- Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT
  - use of core computational and report writing skills in a variety of situations
  - work both independently and as a team player
  - develop a professional awareness of contemporary issues in finance and accounting

**Assessment Methods:**
- Assessment: Examination: (Weighting - 100%)
- Re-assessment: Examination (weighting –100%)
<table>
<thead>
<tr>
<th>Course Code: C21AO</th>
<th>Course Title: Economics</th>
<th>Course Co-ordinator: Prabir Bhattacharya</th>
</tr>
</thead>
</table>

**Aims:**
The aim of this module is to equip students with knowledge and understanding of the fundamental principles and concepts of microeconomics and macroeconomics. By the end of the module students should be able to apply their knowledge and understanding in the analysis of a range of economic problems.

**Syllabus:**
- The economic problem – scarcity, choice, resource allocation, opportunity cost, production possibility curve.
- Comparative and absolute advantage, gains from trade.
- Demand and supply, price determination, equilibrium.
- Elasticity, normal, inferior and Giffen goods.
- Risk, utility and insurance.
- The short and long run, production and costs.
- Market structures – perfect competition, monopolistic competition, oligopoly, monopoly.
- Wages and the distribution of income.
- Market failure.
- The national economy – circular flow of income, growth, the equilibrium level of national income, the business cycle, the multiplier.
- Aggregate demand and supply.
- Money – demand and supply, interest rates and prices.
- Unemployment, inflation and growth.
- Fiscal and monetary policy, demand and supply side policies.
- Balance of payments and exchange rates

**Learning Outcomes:**

**Subject Mastery**
*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

Knowledge and understanding of:
- key concepts and principles of microeconomics and macroeconomics
- economic theory, modelling approaches and elementary analysis
- how to apply economic reasoning to policy issues in a critical manner

Development of:
- general study and enquiry skills
- ability to abstract and simplify complex problems
- the ability to apply knowledge and skills to the solution of theoretical and applied problems in economics

**Learning Outcomes:**

**Personal Abilities**
*Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*

The course aims to develop:
- The ability to deploy key transferable concepts in addressing economic problems. These concepts include, opportunity cost, incentives, equilibrium, disequilibrium, stability, the relevance of marginal considerations and the possible gains from voluntary exchange.
- Familiarity with the possibility that many economic problems may admit of more than one approach, and may have more than one solution
- The ability to work autonomously and collaboratively
- The ability to draw on text-based, graphical and statistical sources of information (sourcing and gathering information)
- The ability to handle data and to use it in analysing simple economic problems
- The ability to communicate the results of economic analysis
<p>| Assessment Methods: | Assessment: Examination: (weighting - 60%) Mid Semester Test (weighting - 20%) Coursework: (weighting - 20%) | Re-assessment: Examination (weighting 100%) |</p>
<table>
<thead>
<tr>
<th>Course Code: F71BF</th>
<th>Course Title: Life Insurance Mathematics 2</th>
<th>Course Co-ordinator: Peter Ridges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aims:</strong></td>
<td>To introduce some more advanced topics in life insurance mathematics.</td>
<td></td>
</tr>
<tr>
<td><strong>Syllabus:</strong></td>
<td>♦ Markov multiple-state models,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♦ Insurances written on multiple lives,</td>
<td></td>
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<tr>
<td></td>
<td>♦ The features of disability and long-term care insurance contracts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♦ Duration dependence and semi-markov models,</td>
<td></td>
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<tr>
<td></td>
<td>♦ Heterogeneity and selection,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♦ Single-figure indices,</td>
<td></td>
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<tr>
<td></td>
<td>♦ Population projections,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♦ Pension fund mathematics,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♦ Profit testing conventional insurance contracts,</td>
<td></td>
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<tr>
<td></td>
<td>♦ Profit testing unit-linked contracts.</td>
<td></td>
</tr>
<tr>
<td><strong>Learning Outcomes:</strong> Subject Mastery</td>
<td>Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♦ Define Markov life-history models in terms of states, transitions and transition intensities;</td>
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<tr>
<td></td>
<td>♦ State and prove Kolmogorov's forward equations, state Thiele's differential equations, and use an Euler scheme to solve both numerically, for a general Markov multiple-state model;</td>
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<tr>
<td></td>
<td>♦ Define models for the joint life histories of two individuals; (a) as a multiple-state model; and (b) in terms of random future lifetimes;</td>
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<tr>
<td></td>
<td>♦ Calculate expected present values, premiums and policy values for the following types of joint-life policies: first-death and second-death assurances and annuities, reversionary annuities, and contingent assurances;</td>
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<tr>
<td></td>
<td>♦ Describe the main features of disability insurance and long-term care insurance;</td>
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<td></td>
<td>♦ Define multiple-state models representing life histories involving disability and long-term care, and show how these introduce duration dependence, hence semi-Markov models;</td>
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<td></td>
<td>♦ Derive integro-differential equations for the occupancy probabilities needed to compute actuarial quantities in special cases of semi-Markov models;</td>
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<tr>
<td></td>
<td>♦ Give expressions for expected present values, premiums and policy values in special cases of semi-Markov models;</td>
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<td></td>
<td>♦ Understand possible sources of heterogeneity, its effect on the analysis of insurance data, and its possible impact on insurance business;</td>
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<td>♦ Construct single figure indices to summarise mortality and other experiences, and understand the strengths and weakness of each;</td>
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<td></td>
<td>♦ Explain mathematical and component methods of population projection;</td>
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<td></td>
<td>♦ Describe the main retirement and death-in-service lump sum benefits found in a defined benefit pension scheme in the UK;</td>
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<tr>
<td></td>
<td>♦ Derive commutation functions to perform valuations of the main retirement benefits, death-in-service lump sum benefits, and future contributions;</td>
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<tr>
<td></td>
<td>♦ Calculate the profit vector, profit signature, net present value, profit margin, discounted payback period, and internal rate of return for conventional policies;</td>
<td></td>
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<tr>
<td></td>
<td>♦ Describe the effect on the profit vector of changes in the premium, valuation, and experience bases;</td>
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<td></td>
<td>♦ Describe the operation of the unit price and the charging structure for unit-linked policies;</td>
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<tr>
<td></td>
<td>♦ Calculate the unit fund, sterling fund, sterling reserve, and measures of profit for unit-linked policies.</td>
<td></td>
</tr>
<tr>
<td><strong>Learning Outcomes:</strong> Personal Abilities</td>
<td>Industrial, Commercial &amp; Professional Practice; Autonomy, Accountability &amp; Working with Others; Communication, Numeracy &amp; ICT</td>
<td></td>
</tr>
</tbody>
</table>
At the end of this course students should be able to:

- Demonstrate the ability to learn independently
- Manage time, work to deadlines and prioritise workloads
- Perform numerical calculations using a suitable computer package, or other available tools
- Present results in a way which indicates that they have understood the concepts involved

<table>
<thead>
<tr>
<th>Assessment Methods:</th>
<th>Assessment:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Examination: (weighting - at least 80%)</td>
</tr>
<tr>
<td></td>
<td>Coursework (weighting up to 20%)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Re-assessment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination (weighting –100%)</td>
</tr>
<tr>
<td>Course Code: F71AE</td>
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</tr>
</tbody>
</table>

Aims:
- To understand the use of mathematical models of mortality, illness and other life history events in the study of processes of actuarial interest
- To be able to estimate the parameters in these models, mainly by maximum likelihood
- To apply methods of smoothing observed rates of mortality and to test the goodness-of-fit of the models

Syllabus:
- Estimating the lifetime distribution
- Markov models: theory
- Markov models: data and estimation
- Binomial and Poisson models of mortality
- Graduation and statistical tests
- Exposed to risk

Learning Outcomes: Subject Mastery

*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

After studying this course, students should be able to:
- Estimate a survival function using the Kaplan-Meier method
- Find the partial likelihood function in the Cox model
- Use the partial likelihood to estimate parameters (with standard errors) in the Cox model
- Write down an appropriate Markov multi-state model for a system with multiple transfers
- Obtain the Kolmogorov Forward Equations in a Markov multi-state model
- Derive the likelihood function in a Markov multi-state model
- Use the likelihood function to estimate parameters (with standard errors) in a Markov multi-state model
- Obtain the likelihood function in the 2-state model with states Alive and Dead under the binomial or Poisson models
- Use any of two assumptions (uniform distribution of death, constant force of mortality) to reduce the binomial likelihood to a function of a single parameter, and estimate the parameter
- Understand the need for graduation of observed rates of mortality and be familiar with the main methodologies in this area of survival modelling
- Apply a range of appropriate tests to check adherence of a graduation to data
- Understand the effects of duplicate policies on estimates of mortality
- Calculate exactly and from census data the central exposed to risk

Learning Outcomes: Personal Abilities

*Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*

At the end of the course, students should be able to:
- Demonstrate the ability to learn independently
- Manage time, work to deadlines and prioritise workloads
- Present results in a way which demonstrates that they have understood the technical and broader issues of modelling mortality and morbidity data
- Communicate findings effectively in the actuarial and financial services industry

Assessment Methods:
- Assessment:
  - Examination (weighting - at least 75%)
  - Coursework (weighting – no more than 25%)
- Re-assessment:
  - Examination (weighting –100%)
<table>
<thead>
<tr>
<th>Course Code: F71AG</th>
<th>Course Title: Risk Theory</th>
<th>Course Co-ordinator: Seva Shneer</th>
</tr>
</thead>
</table>
| **Aims:**        | To provide an introduction to risk theory as applied to insurance processes and problems
|                  | To teach students methods of assessing premiums for short term insurance policies
|                  | To introduce students to simple methods of claim reserving |
| **Syllabus:**    | Loss distributions
|                  | Aggregate risk model and individual risk model
|                  | Risk sharing - simple reinsurance and deductibles
|                  | Premium calculation principles
|                  | Bayesian estimation and credibility theory
|                  | Experience rating - No Claims Discount Systems
|                  | Ruin Theory
|                  | Claims reserving - run-off triangles
|                  | Simulation |
| **Learning Outcomes: Subject Mastery** | Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning) |
|                  | After studying this course, students should be able to:
|                  | Explain and apply the concepts of conditional expectation and compound distribution
|                  | Calculate probabilities and moments of loss distributions
|                  | Construct and use collective and individual risk models
|                  | Explain the properties of and apply some simple premium calculation principles
|                  | Describe and apply the fundamental concepts of Bayesian statistics
|                  | Describe and apply the fundamental concepts of credibility theory
|                  | Explain a simple no claims discount system
|                  | Describe the problems of reserving in short term insurance, explain run-off triangles and calculate outstanding claim reserves using simple models
|                  | Explain what is meant by the surplus for an insurance process; define and understand probabilities of ruin
|                  | Simulate data from specified distributions |
| **Learning Outcomes: Personal Abilities** | Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT |
|                  | At the end of the course, students should be able to:
|                  | Demonstrate the ability to earn independently
|                  | Manage time, work to deadlines and prioritise workloads
|                  | Use an appropriate computer package to process data
|                  | Present results in a way which demonstrates that they have understood the broader issues of risk theory |
| **Assessment Methods:** | Assessment: Exam: (weighting - at least 80%)
|                  | Coursework: (weighting – up to 20%)
<p>|                  | Re-assessment: Examination (weighting –100%) |</p>
<table>
<thead>
<tr>
<th>Course Code: F71TS</th>
<th>Course Title: Time Series</th>
<th>Course Co-ordinator: Fraser Daly</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aims:</strong></td>
<td>This half-course aims to provide student with an introduction to time series analysis, including models with applications in finance. Presenting the material in the form of a specific half-course allows for greater flexibility and makes it available to postgraduate students on other programmes who would benefit.</td>
<td></td>
</tr>
</tbody>
</table>
| **Syllabus:**     | - Basic time series concepts and operators  
- Stationary processes, general linear filter, autocorrelation function and spectrum  
- MA, AR and ARMA processes  
- ARIMA processes and Random Walk (RW) with or without drift  
- Model estimation and model selection  
- Models with trend and/or seasonality  
- Forecasting  
- Introduction to nonlinear processes |
| **Learning Outcomes: Subject Mastery** | **Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)**  
On completion of this module the student should be able to:  
- demonstrate knowledge of, and a critical understanding of, the main concepts of time series analysis  
- demonstrate knowledge of, and a critical understanding of, the main properties of MA, AR, ARMA, ARIMA, and RW models  
- use least squares, maximum likelihood and other methods to fit time series models to the data  
- select proper model(s) using e.g. AIC or BIC  
- fit trend and seasonal trend to the data, and fit time series models to the residuals  
- understand methods used to produce forecasts  
- understand ARCH, GARCH and other nonlinear time series models and their applications for modelling of financial data  
- understand time series data well, and perform basic calculations and summaries of time series data  
- understand and critically assess time series models fitted by computer packages  
- use a range of time series models to produce forecasts |
| **Learning Outcomes: Personal Abilities** | **Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT**  
At the end of the module student should be able to:  
- communicate meaningfully and productively with others (including practitioners and professionals in the financial services industry) on time series analysis issues  
- Demonstrate the ability to earn independently  
- Manage time, work to deadlines and prioritise workloads |
| **Assessment Methods:** | **Assessment:**  
To be decided  
**Re-assessment:**  
Examination (weighting ~100%) |
Course Code: F71AH
Course Title: Financial Economics 1
Course Co-ordinator: Gavin Gibson

Aims: This aim of this course is to provide postgraduate students with a broad knowledge of asset pricing and portfolio selection models.

Syllabus:
- Utility Theory
- Stochastic Dominance
- Measures of Investment Risk
- Mean-Variance Portfolio Theory
- Models of Asset Returns
- Capital Asset Pricing Model
- Efficient Market Hypothesis and Behavioural Finance and Prospect Theory

Learning Outcomes: Subject Mastery

On completion of this module the student should be able to:
- Derive the properties of a utility function
- State the conditions for absolute, first order and second order stochastic dominance.
- Calculate some important measures of risk: variance, semi-variance, shortfall probability and mean shortfall.
- Calculate the mean and variance of return on a portfolio of assets.
- Demonstrate an understanding of methods used to select portfolios of assets, including utility theory, stochastic dominance and mean-variance analysis
- Describe the purpose and calculation of the following: opportunity set, efficient frontier, indifference curve, separation theorem.
- Develop a critical understanding on the theory of mean-variance model and understand its modifications using other risk measures
- Describe the properties of single-factor and multi-factor models. Show how to fit a single-factor model to market price data.
- Discuss the assumptions underlying and applications of the Capital Asset Pricing Model.
- Derive the capital market line and the security market line
- Understand the concept of risk premium in Arbitrage Pricing Theory.
- State the weak, semi-strong and strong forms of the efficient market hypotheses and discuss their economic implications
- Discuss the topics in prospect theory: framing, reference points, probability estimates

Learning Outcomes: Personal Abilities

Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT
- Demonstrate the ability to learn independently
- Manage time, work to deadlines and prioritise workloads
- Present results in a way which demonstrates that they have understood the technical and broader issues of asset pricing.
- Communicate findings effectively in the financial services industry.

Assessment Methods:
Assessment: Examination: (weighting - 100%)
Re-assessment: Examination (weighting ~100%)
<table>
<thead>
<tr>
<th>Course Code:</th>
<th>Course Title:</th>
<th>Course Co-ordinator:</th>
</tr>
</thead>
<tbody>
<tr>
<td>F71AJ</td>
<td>Financial Economics 2</td>
<td>Torsten Kleinow</td>
</tr>
</tbody>
</table>

**Aims:**
This course aims to provide a good understanding of the concepts, methods and mathematics used in arbitrage pricing in discrete and continuous time.

**Syllabus:**
- Background on financial derivatives.
- The binomial model of stock prices.
- Definition and properties of Brownian motion and stochastic integrals.
- Stochastic differential equations.
- Geometric Brownian motion and Ornstein-Uhlenbeck process.
- Definition and examples of continuous-time martingales, including the stochastic integral as a martingale.
- Statement of the Martingale Representation Theorem.
- Stochastic calculus and Ito’s Formula.
- Change of measure and Girsanov’s Theorem.
- The Black-Scholes Model.
- Other models of stock prices.
- Portfolio risk management.
- Models of the term structure of interest rates.
- Introduction to credit risk models.

**Learning Outcomes:**

*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

Students should be able to:
- Demonstrate an understanding of the main aspects of martingale theory in discrete and continuous time.
- Know the main results and basic applications of stochastic Ito calculus in problems of financial mathematics.
- Understand the role of equivalent martingale measures in the arbitrage-free pricing of contingent claims and their connection with arbitrage free/complete markets.
- Understand the martingale representation theorem and its role in financial applications.
- Understand stochastic differential equations.
- State the binomial and Black Scholes model.
- Derive the Black-Scholes formula and the Black-Scholes partial differential equation.
- Price simple contingent claims (in particular, European-style options and forward contracts).
- Understand the concepts of replication and hedging.
- Construct a buy-and-hold portfolio for a simple contingent claim.
- Construct a portfolio that is neutral with respect to the delta and gamma, and understand the implications of the neutrality.
- Simple extensions of the Black-Scholes model, for example to dividend-paying stocks, and the corresponding Black-Scholes formula.
- Know desirable characteristics of term structure models.
- Know well-known short rate models and their advantages and disadvantages.
- Derive relationships between forward interest rates, spot rates and zero-coupon bond prices.
- Manipulate explicit zero-coupon bond price formulae for the Vasicek and Cox-Ingersoll-Ross models, and derive the implied forward rate curves.
- Understand basic credit risk models and define the different approaches to the modelling of credit risk.
- Know stochastic models for stock prices other than the Black-Scholes model.
<table>
<thead>
<tr>
<th>Learning Outcomes: Personal Abilities</th>
<th>Industrial, Commercial &amp; Professional Practice; Autonomy, Accountability &amp; Working with Others; Communication, Numeracy &amp; ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On completion of this course the student should be able to:</td>
</tr>
<tr>
<td></td>
<td>◆ Demonstrate knowledge and critical understanding of the concepts and models in financial mathematics.</td>
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<tr>
<td></td>
<td>◆ Demonstrate the ability to learn independently.</td>
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<tr>
<td></td>
<td>◆ Manage time, work to deadlines and prioritize workloads.</td>
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<tr>
<td></td>
<td>◆ Present results in a way that demonstrates that they have understood the technical and broader issues</td>
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<td>in financial mathematics.</td>
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<tr>
<td>Assessment Methods:</td>
<td>Assessment:</td>
</tr>
<tr>
<td></td>
<td>Exam: (weighting around 90%)</td>
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<tr>
<td></td>
<td>Coursework: (weighting around 10%)</td>
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<td></td>
<td>Re-assessment:</td>
</tr>
<tr>
<td></td>
<td>Examination (weighting –100%)</td>
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### COURSE DESCRIPTORS - YEAR 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
<th>Credits</th>
<th>Mandatory/Optional</th>
<th>Exemption</th>
</tr>
</thead>
<tbody>
<tr>
<td>F71CA</td>
<td>Actuarial Risk Management 1</td>
<td>1</td>
<td>15</td>
<td>Mandatory</td>
<td>CP1</td>
</tr>
<tr>
<td>F71PC</td>
<td>Pensions A</td>
<td>1</td>
<td>15</td>
<td>Optional</td>
<td>SP4</td>
</tr>
<tr>
<td>F71LA</td>
<td>Life Insurance 1</td>
<td>1</td>
<td>15</td>
<td>Optional</td>
<td>SP2</td>
</tr>
<tr>
<td>F71DV</td>
<td>Derivative Markets and Pricing</td>
<td>1</td>
<td>15</td>
<td>Optional</td>
<td>SP6</td>
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<tr>
<td>F71QR</td>
<td>Quantitative Risk Analysis</td>
<td>1</td>
<td>15</td>
<td>Optional</td>
<td>SP9</td>
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<tr>
<td>C31FM</td>
<td>Financial Markets</td>
<td>1</td>
<td>15</td>
<td>Optional</td>
<td>SP5</td>
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<tr>
<td>F71CB</td>
<td>Actuarial Risk Management 2</td>
<td>2</td>
<td>15</td>
<td>Mandatory</td>
<td>CP1</td>
</tr>
<tr>
<td>F71PD</td>
<td>Pensions B</td>
<td>2</td>
<td>15</td>
<td>Optional</td>
<td>SP4</td>
</tr>
<tr>
<td>F71LB</td>
<td>Life Insurance 2</td>
<td>2</td>
<td>15</td>
<td>Optional</td>
<td>SP2</td>
</tr>
<tr>
<td>F71AP</td>
<td>Advanced Derivative Pricing</td>
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<td>15</td>
<td>Optional</td>
<td>SP6</td>
</tr>
<tr>
<td>F71TT</td>
<td>Risk Management: Techniques &amp; Tools</td>
<td>2</td>
<td>15</td>
<td>Optional</td>
<td>SP9</td>
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<tr>
<td>C31FV</td>
<td>Finance and Investment</td>
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<tr>
<td>F71MD</td>
<td>MSc Project</td>
<td>3</td>
<td>60</td>
<td>Mandatory for MSc</td>
<td>CP3</td>
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</tbody>
</table>

You should choose 3 optional courses in each semester which lead to an SP exemption
<table>
<thead>
<tr>
<th>Course Code: F71CA</th>
<th>Course Title: Actuarial Risk Management 1</th>
<th>Course Co-ordinator: Andrew Stott</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linked courses</strong></td>
<td>F71CB Actuarial Risk Management 2 for CP1 Exemption</td>
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</tr>
<tr>
<td><strong>Aims:</strong></td>
<td>The aims of this course (and of Actuarial Risk Management 2) are:  ♦ To provide students with a thorough grounding in the strategic concepts required to manage the business activities of financial institutions and programmes  ♦ To provide students with an understanding of the various types of risk faced and the processes used to manage those risks  ♦ To teach students to make use of those processes in order to formulate, justify and present plausible and appropriate solutions to business problems</td>
<td></td>
</tr>
<tr>
<td><strong>Syllabus:</strong></td>
<td><strong>Professionalism</strong>  ♦ The roles and statutory roles actuaries can play  ♦ The professionalism framework of the Actuarial Profession and the Board for Actuarial Standards  ♦ The factors and issues to be taken into account when doing a professional job  ♦ The components of and application of the Actuarial Control Cycle  <strong>Stakeholders and their needs</strong>  ♦ The variety of stakeholders and their needs  ♦ Products, schemes, contracts and other arrangements that can provide benefits on contingent events which meet the needs of clients and other stakeholders  <strong>The environment</strong>  ♦ The risk environment, the identification of risks, the classification of risks and related concepts  ♦ The principles and aims/rationale of prudential and market conduct regulatory regimes  ♦ The impact of the external environment  ♦ The investment environment; its behaviour and its contracts  ♦ The impact of capital requirements and their measures  <strong>Specifying the commercial problem</strong>  ♦ The factors to be considered in the design of products, schemes, contracts or other arrangements that provide benefits on contingent events  ♦ Project management and the use of actuarial techniques in the assessment of capital investment projects and cost-benefit analyses  ♦ How risks are taken into account in project management  ♦ What data is required and how it should be handled  ♦ The issues surrounding the management of risk  ♦ Methods of measuring risk  ♦ Risk management tools  <strong>Principal terms</strong>  ♦ The principal terms used in financial services and risk management</td>
<td></td>
</tr>
<tr>
<td><strong>Learning Outcomes: Subject Mastery</strong></td>
<td>Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♦ Know how to behave and present oneself professionally in a commercial environment and take relevant factors and issues into account  ♦ Be able to apply the Actuarial Control Cycle in a practical commercial situation  ♦ Know who all the stakeholders are and how to take appropriate account of their requirements when giving actuarial advice  ♦ Understand the risk, regulatory, external and investment environments in which a company is operating</td>
<td></td>
</tr>
</tbody>
</table>
| Learning Outcomes: Personal Abilities | Know what should be considered in terms of contract design and project planning and management  
|                                      | Know how to handle data  
|                                      | Know how to manage risks  
|                                      | Be able to describe/explain the principal terms used in financial services and risk management |

**Learning Outcomes:**
- Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT
- Ability to deal with complex issues and make informed judgements about
  - Demonstrate the ability to learn independently and as part of a group
  - Manage time, work to deadlines and prioritise workloads
  - Present results in a way that demonstrates an understanding of the workplace, market place and general environment
  - Understand the importance of risk management

| Assessment Methods: | Assessment:  
|                     | Examination: (Weighting at least 80%)  
|                     | Coursework: (weighting up to 20%)  
<p>| Re-assessment: | Examination (weighting –100%) |</p>
<table>
<thead>
<tr>
<th>Course Code: F71PC</th>
<th>Course Title: Pensions A</th>
<th>Course Co-ordinator: Peter Ridges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linked courses: F71PD Pensions B for ST4 Exemption</td>
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</tbody>
</table>

**Aims:**
- To provide an understanding of the roles and needs of the parties involved in the provision of pensions, including social security
- To provide a thorough understanding of alternative systems of pension provision, and their financing
- To provide an understanding of the factors involved in pension scheme design
- To provide an understanding of issues relating to sponsor covenants in occupational pension schemes

**Syllabus:**

**Different Types of Pension scheme**
- Defined Benefit
- Defined Contribution
- Hybrid
- Social Security
- Individual Accounts
- Personal Pensions

**Key Stakeholders**
- State
- Employers
- Individuals

**Timing of Contributions**
- Pay-As-You-Go
- Funding
- Book Reserving

**Types of Investment**
- Direct Investment
- Insurance Products

**Sponsor Covenant**
- Measurement
- Monitoring

**Scheme Design**
- Eligibility
- Benefits
- Contributions

**Learning Outcomes:**

*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

On completion of this course the student should be able to:
- Define the principal terms used in the provision of pensions
- Describe the role that the various parties may play in the provision of pensions and other benefits
- Compare alternative systems of social security, mandatory individual accounts, occupational pension schemes and personal pensions
- Describe the various ways in which the parties may meet their needs
- Discuss the implications, for the various parties of the environment in which benefits are provided
- Describe the ways in which providers may be able to finance the benefits to be provided
- Discuss the issues surrounding sponsor covenant
<table>
<thead>
<tr>
<th><strong>Learning Outcomes: Personal Abilities</strong></th>
<th>Discuss the factors to consider in determining a suitable design, in terms of benefits and contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Industrial, Commercial &amp; Professional Practice; Autonomy, Accountability &amp; Working with Others; Communication, Numeracy &amp; ICT</strong></td>
</tr>
<tr>
<td></td>
<td>♦ Show an appreciation of the interface between academic theory and industrial practice</td>
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<tr>
<td></td>
<td>♦ Demonstrate the ability to learn independently and as part of a group</td>
</tr>
<tr>
<td></td>
<td>♦ Manage time, work to deadlines and prioritise workloads</td>
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<td></td>
<td>♦ Present results in a way that demonstrates that they have understood the technical and broader issues of the pensions environment</td>
</tr>
<tr>
<td></td>
<td>♦ Show an appreciation of the various potential conflicts between pensions stakeholders</td>
</tr>
</tbody>
</table>

| **Assessment Methods:** | Assessment: Examination: (Weighting at least 80%)  
Coursework: (weighting up to 20%) | Re-assessment: Examination (weighting –100%) |
Course Code: F71LA
Course Title: Life Insurance 1
Course Co-ordinator: Andrea Sneddon

Linked courses: F71LB Life insurance 2 (synoptic) for ST2 Exemption

Aims:
The aims of this course are:
♦ To introduce the principles of actuarial planning and control within insurance companies
♦ To apply this knowledge and understanding to practical situations in life insurance

Syllabus:
Key Concepts in Life Insurance
♦ Introducing the balance sheet, risk & uncertainty, and the individual versus the collective

Asset Shares
♦ Describing how asset share is built up, including using a recursive formula
♦ Describing the main uses of asset share

Policy Values
♦ Describing the use of a valuation basis
♦ Describing the gross premium and new premium policy valuation methods
♦ Describing the recursive relationship between policy values over time

Strain, Surplus and Profit
♦ Describing the effect of the differences between the gross premium and new premium valuation methods
♦ Describing the concept of surplus, and sources of surplus

Analysis of Surplus
♦ Describing the interaction between the premium, valuation and experience bases
♦ Describing and applying how to analyse surplus into its various sources

Assets
♦ Describing the main asset classes in which life insurance companies may invest
♦ Describing the principles of investment, with reference to matching liabilities and level of free assets

Bonus and Cost of Bonus
♦ Describing different with profits bonus distribution systems, in particular the concept of reversionary and terminal bonuses
♦ Describing conventional and unitised with profits products

Life Insurance Products
♦ Describing the key features of the main products which a life insurance company writes, including
  o Savings, protection and income products
  o Without profit and with profit products
  o Conventional and linked products

General Business Environment
♦ Describing the background in which the insurance company operations, including
  o Distribution channels
  o Legislation and regulation
  o Professional matters

Sources of Risk
♦ Describing the main sources of risk within an insurance company

Risk Management
### Learning Outcomes: Subject Mastery

*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

On completion of this course the student should be able to:
- Describe the role and responsibility of the actuary within insurance management
- Describe the key features of the environment in which life insurance companies operate
- Demonstrate a thorough knowledge of life insurance products which insurance companies manage
- Describe the factors which contribute to the pricing and design of new products
- Demonstrate an understanding of the management and administration of products through their lifecycle, including reserving
- Describe the principal sources of profit within the insurance industry
- Determine surplus and to perform an analysis of the surplus
- Identify risks and suggest ways of implementing effective risk management
- Understand challenges / opportunities that the industry faces e.g. Solvency II

### Learning Outcomes: Personal Abilities

*Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*

- Show an appreciation of the interface between academic theory and industrial practice
- Demonstrate the ability to learn independently and as part of a group
- Manage time, work to deadlines and prioritise workloads
- Present results in a way that demonstrates that they have understood the technical and broader issues of the life insurance environment
- Show an appreciation of the various potential conflicts within the management of insurance companies

### Assessment Methods:

- **Assessment:** Examination: (Weighting at least 80%)
  - Coursework: (weighting up to 20%)
  - Synoptic with F71LB Life Insurance 2

- **Re-assessment:** Examination (weighting –100%)
<table>
<thead>
<tr>
<th>Course Code: F71DV</th>
<th>Course Title: Derivative Markets and Pricing</th>
<th>Course Co-ordinator: Anke Wiese</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linked courses:</strong></td>
<td>F71AP Advanced Derivative Pricing for ST6 Exemption</td>
<td></td>
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</tbody>
</table>

**Aims:**
- To provide a thorough grounding in the operation of derivative markets
- To provide an introduction to the methods of hedging using option and forward contracts, with particular emphasis on bond (interest rate) markets
- To provide students with a good understanding of the principles of no-arbitrage pricing
- To introduce mathematical concepts related to stochastic processes
- To teach students the CRR (discrete time binomial) model for derivative pricing
- To introduce the Weiner process and the BSM option pricing model

**Syllabus:**

**Introduction and Forward Contracts**
- Basic characteristics of the derivatives markets and the basic instruments (forwards, options and swaps).
- Uses and differences of forwards and futures

**Options**
- Uses and differences of puts/calls of European/American type, different types of options (stock, currency, index options, warrants, convertibles, property)
- Model independent properties of option prices
- Basic option structures (spreads, straddles, butterflies etc.)

**Hedging with Futures and Options**
- Minimum variance hedging and changing portfolio betas using forwards
- Basis risk
- Use of options in hedging

**Interest Rate Derivatives and Swaps**
- Interest rates, and interest-rate derivatives (Treasury, LIBOR, Zero, Forward Rates; FRAs, Gilt STRIPS; Interest Rate and Bond Futures, Caps and Floors)
- Construct and value swaps (IR, FX, Inflation, LPI swaps, LPI bonds)
- The relationship between swap rates and LIBOR zero rates

**No-Arbitrage Pricing of Forwards**
- Forward and future pricings by no-arbitrage (non-dividend and dividend-paying stock, foreign currency, consumption commodity)
- Cost of carry, convenience yield

**Single Period Derivative Pricing**
- Derivation of delta and prices
- Equivalent measures and risk neutral expectations
- Factors affecting derivative prices (stock, strike price, term to expiry, volatility, risk-free rate, dividends)
- Incomplete markets

**Mathematical Foundations of Multi-Period Derivative Pricing**
- Random variables, sigma-algebras, sample paths, filtrations, adapted and previsible process, conditional expectations, discrete time martingales

**The Binomial Model**
- The Binomial Representation Theorem, self-financing portfolio strategies and replicating strategies
- CRR model for American and European style derivatives
- Introduction to the Greeks

**Continuous Time Models**
- Limit of the CRR model
- The Weiner process
- Derivation of the BSM equation for a GBM asset, the BSM pricing formula and link to CRR formula
<table>
<thead>
<tr>
<th>Learning Outcomes: Subject Mastery</th>
<th>Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>On completion of this course the student should be able to:</td>
<td></td>
</tr>
<tr>
<td>♦ Show an awareness of the basic characteristics of the derivatives markets.</td>
<td></td>
</tr>
<tr>
<td>♦ Demonstrate a knowledge of forward and future prices Define what is meant by a coherent measure of risk;</td>
<td></td>
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<tr>
<td>♦ Show an awareness of the role of futures in hedging</td>
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<tr>
<td>♦ Define and describe the interest rates markets and interest-rate derivatives and the relationship between swap quotes and LIBOR zero rates</td>
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<tr>
<td>♦ Describe how different factors affect option prices</td>
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<tr>
<td>♦ Demonstrate a knowledge and understanding of the mathematics underpinning the pricing and hedging of derivative instruments.</td>
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<tr>
<td>♦ Demonstrate a knowledge and understanding of the theory underpinning the calculation of derivative prices and their hedging strategies using the binomial model</td>
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<tr>
<td>♦ Demonstrate a basic knowledge and understanding of the Black-Scholes-Merton model and be able to derive the Black-Scholes-Merton partial differential equation.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Outcomes: Personal Abilities</th>
<th>Industrial, Commercial &amp; Professional Practice; Autonomy, Accountability &amp; Working with Others; Communication, Numeracy &amp; ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Show an appreciation of the interface between academic theory and industrial practice</td>
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<tr>
<td>♦ Demonstrate the ability to learn independently and as part of a group</td>
<td></td>
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<tr>
<td>♦ Manage time, work to deadlines and prioritise workloads</td>
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</tr>
<tr>
<td>♦ Present results in a way that demonstrates that they have understood the technical and broader issues of derivative pricing</td>
<td></td>
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<tr>
<td>♦ Show an appreciation of the role of derivative markets in finance</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Methods:</th>
<th>Assessment: (Weighting at least 70%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination:</td>
<td></td>
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<tr>
<td>Coursework:</td>
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<tr>
<td>(weighting up to 30%)</td>
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</tbody>
</table>

<p>| Re-assessment: | Examination (weighting –100%) |</p>
<table>
<thead>
<tr>
<th>Course Code: F71QR</th>
<th>Course Title: Quantitative Risk Analysis</th>
<th>Course Co-ordinator: Matthias Fahrenwaldt/ George Streftaris</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linked courses:</td>
<td>F71TT Risk Management Tools and Techniques for ST9 Exemption</td>
<td></td>
</tr>
</tbody>
</table>
| Aims:             | The aims of this course are:  
|                   | ♦ To provide a thorough grounding in the wide range of risks that a financial institution or other enterprise might be exposed to  
|                   | ♦ To provide an introduction to the statistical methods underpinning financial risk management  
|                   | ♦ To teach students the different methods of assessing financial risk  
|                   | ♦ To equip students with a variety of tools to tackle problems involving financial data |
| Syllabus:         | Introduction  
|                   | ♦ The concept of Enterprise Risk Management, the drivers behind it and the resulting value to organisations  
|                   | ♦ Risk and uncertainty, different definitions  
|                   | ♦ Direct and indirect stakeholders in an enterprise: Relevance of risk measurement and management to all stakeholders  
|                   | ♦ Risk taxonomy and overlaps  
|                   | Quantitative analysis of financial data  
|                   | ♦ Quantifiable and non-quantifiable risks  
|                   | ♦ Common univariate distributions, model fitting and diagnostic tests  
|                   | ♦ Extreme value theory  
|                   | ♦ Common multivariate distributions  
|                   | ♦ Modelling multivariate risks using copulas  
|                   | ♦ Different measures of correlation including tail correlation  
|                   | ♦ Risk measures; coherent risk measures  
|                   | ♦ Model and parameter risk  
|                   | ♦ Backtesting  
|                   | Contagion and credit risk  
|                   | ♦ Sources of credit risk; contagion  
|                   | ♦ Theoretical and commercial approaches to modelling credit risk  
|                   | Risk management  
|                   | ♦ Securitisation and alternative risk transfer  
|                   | ♦ The risk management control cycle |
| Learning Outcomes: | Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning) |
| Subject Mastery   | Understanding, Knowledge and Cognitive Skills |
|                   | On completion of this course the student should be able to:  
|                   | ♦ Demonstrate an understanding of the different reasons for measuring financial risk.  
|                   | ♦ Describe and apply the different measures of financial risk  
|                   | ♦ Define what is meant by a coherent measure of risk;  
|                   | ♦ Use appropriate statistical and computational methods to determine the fatness of the tails of returns data  
|                   | ♦ Describe and apply the main univariate and multivariate distributions to financial data  
|                   | ♦ Describe and apply the fundamental concepts and theorems in Extreme Value Theory (EVT)  
|                   | ♦ Describe how analysis of financial data using EVT differs from traditional statistical methods  
<p>|                   | ♦ Describe and apply the main statistical methods in EVT to financial data |</p>
<table>
<thead>
<tr>
<th>Learning Outcomes: Personal Abilities</th>
<th><strong>Scholarship, Enquiry and Research (Research-Informed Learning)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate how multivariate returns can be described using marginal distributions and copulas</td>
<td></td>
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<tr>
<td>Describe and apply the main copulas</td>
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</tr>
<tr>
<td>Explain how the use of different copulas can affect the returns distribution on a portfolio containing two assets</td>
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<tr>
<td>Demonstrate a good understanding of the different sources of credit risk and credit spreads</td>
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<tr>
<td>Understand how ratings agencies assess risk</td>
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<tr>
<td>Explain the risk management control cycle</td>
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<tr>
<td>Describe the feedback loop in risk management</td>
<td></td>
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<tr>
<td>Define what is meant by securitization and alternative risk transfer</td>
<td></td>
</tr>
<tr>
<td>Describe different forms of risk transfer and their advantages</td>
<td></td>
</tr>
<tr>
<td>Use appropriate statistical software to analyse problems involving financial risk</td>
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</tr>
<tr>
<td>Show an awareness of the different approaches to modelling and managing credit risk</td>
<td></td>
</tr>
<tr>
<td>Use an appropriate computer package to analyse financial data and solve complex problems</td>
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</tr>
</tbody>
</table>

**Industrial, Commercial & Professional Practice**

- Show an appreciation of the interface between academic theory and industrial practice
- Show an appreciation of the societal role of risk management in protecting the consumer and other stakeholders

**Autonomy, Accountability & Working with Others**

- Demonstrate the ability to learn independently and as part of a group
- Manage time, work to deadlines and prioritise workloads

**Communication, Numeracy & ICT**

- Use an appropriate computer package to analyse financial data and solve complex problems
- Present results in a way that demonstrates that they have understood the technical and broader issues of financial risk management.

<table>
<thead>
<tr>
<th>Assessment Methods:</th>
<th>Assessment: Examination: (Weighting at least 70%) (in semester 2) Coursework: (weighting up to 30%)</th>
<th>Re-assessment: Examination (weighting =100%)</th>
</tr>
</thead>
</table>
### Course Code: C31FM
### Course Title: Financial Markets
### Course Co-ordinator: Bing Xu

#### Linked courses
- C31FV Finance & investment for ST5 Exemption

#### Aims:
To introduce students to the way financial markets and institutions function in practice, with particular emphasis on equities and bonds. This will provide the context of underlying finance theory into which the mathematics will fit.

#### Syllabus:
**Introduction to Financial Markets**
- Introduction, purpose of financial markets, the Stock Exchange, types of investments.
- Institutional investors: pension funds, life funds, general insurance funds, mutual funds.
- Interest rate calculations: compound interest, annuities, real and nominal interest rates, spot and forward rates, discounted cash flow.
- Equities: fundamental analysis and technical analysis, portfolio management.
- Portfolio theory: Markowitz model, international diversification; basics of CAPM and Arbitrage Pricing Theory.
- Efficient markets: informational efficiency, behavioural finance.
- Portfolio performance measurement: rates of return, notional funds, consideration of risk.

**Bond Markets**
- Overview of fixed-income securities.
- Bond mathematics including bond prices, interest rates and yields.
- The concepts of duration and convexity, and their use in portfolio management.
- The term structure of interest rates and alternative theories, and empirical evidence.
- Index-linked securities.

#### Learning Outcomes:

**Subject Mastery**
*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*
- Know the principles of the valuation of shares and bonds
- Be able to apply certain analytical techniques regarding shares and bonds
- Understand the sources of bond risk and the factors affecting bond prices
- Have the ability to critically evaluate the performance of an equity fund manager

**Personal Abilities**
*Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*
- Understand the context within which market professionals work
- Have some familiarity with the main financial markets and instruments trades
- Have some familiarity with the investment industry
- Understand the role of the various institutions involved in financial markets
- Be able to write a coherent essay in a way which demonstrates that they have understood the material
- Demonstrate the ability to learn independently
- Manage time, work to deadlines and prioritise workloads

#### Assessment Methods:
- Assessment:
  - Examination: (weighting 80%)
  - Coursework: (weighting 20%)
- Re-assessment: Examination (weighting ~100%)
<table>
<thead>
<tr>
<th>Course Code: F71CB</th>
<th>Course Title: Actuarial Risk Management 2</th>
<th>Course Co-ordinator: Andrew Stott</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linked courses</td>
<td>F71CA Actuarial Risk Management 1 for CA1 Exemption</td>
<td></td>
</tr>
</tbody>
</table>

**Aims:**
The aims of this course (and of Actuarial Risk Management 1) are:
- To provide students with a thorough grounding in the strategic concepts required to manage the business activities of financial institutions and programmes
- To provide students with an understanding of the various types of risk faced and the processes used to manage those risks
- To teach students to make use of those processes in order to formulate, justify and present plausible and appropriate solutions to business problems

**Syllabus:**

**Solving a Commercial Problem**
- The requirements and use of a model and how its results should be tested
- How model assumptions should be determined
- The expenses that should be considered
- How costs of providing benefits based on contingent events should be determined
- How prices should be set to pay for benefits based on contingent events
- The principles, objectives and measures of investment management
- The approaches to establishing provisions
- The relationship between assets and liabilities

**Living with the Solution to a Commercial Problem**
- Approaches to maintaining profitability
- How expected results can be projected
- How actual results are reported and what systems are required to do this
- The issues facing the providers of benefits on contingent events relating to the reporting of risk
- The principles of asset management and allocation
- The principles of capital management
- The management of surplus and the issues surrounding its distribution/retention
- The issues that need to be taken into account on insolvent or closure
- The issues surrounding the management of options and guarantees

**Ongoing Monitoring**
- How experience is monitored and models/assumptions revised

**Principal Terms**
- The principal terms used in financial services and risk management

**Learning Outcomes:**

**Subject Mastery**
*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

- Be able to design appropriate models and make appropriate recommendations based on their results
- Be able to discuss the different approaches to investment management
- Be able to explain why provisions need to be established
- Know how to establish provisions for different types of liabilities, if necessary taking into account the assets backing them
- Be able to describe how a company is managed on an ongoing basis, particularly in respect of projecting future results, reporting results and managing assets, capital and any surplus arising
- Be able to discuss the issues surrounding the management of options and guarantees
- Be able to explain how actual experience is monitored and taken account of
- Be able to describe/explain the principal terms used in financial services and risk management

**Learning Outcomes:**

**Personal Abilities**

- *Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*

- Demonstrate the ability to learn independently and as part of a group
- Manage time, work to deadlines and prioritise workloads
- Present results in a way that demonstrates an understanding of the workplace, market place and general environment
- Understand the importance of risk management

**Assessment Methods:**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Re-assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination: (Weighting at least 80%)</td>
<td></td>
</tr>
<tr>
<td>Coursework: (weighting up to 20%)</td>
<td></td>
</tr>
<tr>
<td>Examination (weighting –100%)</td>
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</tr>
<tr>
<td>Course Code:</td>
<td>Course Title:</td>
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</tr>
<tr>
<td>F71PD</td>
<td>Pensions B</td>
</tr>
</tbody>
</table>

**Aims:**
The aims of this course are:
- To provide a good understanding of the risks and uncertainties facing the parties involved in pension provision
- To provide a thorough understanding of actuarial models used in the management of pension schemes
- To provide an understanding of risk management in pension schemes, including the use of reinsurance
- To provide an understanding of how to monitor the experience of pension schemes

**Syllabus:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risks and Uncertainties</strong></td>
<td>Benefits and Contributions, Returns on Assets, Security, Risk Management including Reinsurance</td>
</tr>
<tr>
<td><strong>Population Projections</strong></td>
<td>Models and their Weaknesses, Socio-economic Factors</td>
</tr>
<tr>
<td><strong>Models</strong></td>
<td>Objectives, Features, Uses, Sensitivity Analyses</td>
</tr>
<tr>
<td><strong>Managing a Social Security Scheme</strong></td>
<td>Evaluating Liabilities, Assessing Contributions</td>
</tr>
<tr>
<td><strong>Valuation of a Pension Scheme</strong></td>
<td>Selecting Assumptions, Calculating Values for Benefits, Contributions and Assets, Applying Results, Analysing Asset-Liability Matching, Analysing Surplus or Deficit, Analysing Experience</td>
</tr>
<tr>
<td><strong>Discontinuance</strong></td>
<td>Determining Benefits</td>
</tr>
</tbody>
</table>

**Learning Outcomes: Subject Mastery**

*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*

On completion of this course the student should be able to:
- Describe the risks and uncertainties affecting benefits, contributions, returns on assets and security
- Describe the process of population projection and its main determinants
- Discuss the use of actuarial models for decision making purposes in non-state pensions
- Discuss the application of actuarial methods and techniques to the financial management of a social security scheme
- Discuss the principles behind the determination of assumptions for valuing future benefits and contributions
- Discuss the principles behind the determination of discontinuance terms in respect of benefits
- Discuss how to determine values for assets, future benefits and future contributions
Discuss the application of actuarial methods and techniques to the financial management of defined contribution pension schemes
- Analyse the asset-liability matching requirements of a provider of pensions and related benefits
- Discuss the principles underlying the use of re-insurance
- Identify the sources of surplus/deficit for a benefit provider
- Explain why and describe how the actual experience of a pension scheme should be monitored and assessed

### Learning Outcomes: Personal Abilities

*Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*

- Show an appreciation of the interface between academic theory and industrial practice
- Demonstrate the ability to learn independently and as part of a group
- Manage time, work to deadlines and prioritise workloads
- Present results in a way that demonstrates that they have understood the technical and broader issues of the pensions environment
- Show an appreciation of the various potential conflicts between pensions stakeholders

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Assessment: Examination: (Weighting at least 80%)</th>
<th>Coursework: (weighting up to 20%)</th>
<th>Re-assessment: Examination (weighting –100%)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Course Code: F71LB</th>
<th>Course Title: Life Insurance 2</th>
<th>Course Co-ordinator: Andrea Sneddon</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linked courses:</strong></td>
<td>F71LA Life insurance 1 (synoptic) for ST2 Exemption</td>
<td></td>
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<tr>
<td><strong>Aims:</strong></td>
<td>The aims of this course are:</td>
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<tr>
<td></td>
<td>♦ To introduce the principles of actuarial planning and control within insurance companies</td>
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<tr>
<td></td>
<td>♦ To apply this knowledge and understanding to practical situations in life insurance</td>
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<tr>
<td><strong>Syllabus:</strong></td>
<td><strong>Models</strong></td>
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<tr>
<td></td>
<td>♦ Describing the use of actuarial models (including stochastic models) for decision making in life insurance companies</td>
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<tr>
<td></td>
<td><strong>Investment Guarantees and Options</strong></td>
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<tr>
<td></td>
<td>♦ Describing the uses of models and option pricing techniques to values investment guarantees</td>
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<td></td>
<td>♦ Describing the conventional and North American methods of valuing mortality options, and performing calculations using these methods</td>
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<td></td>
<td><strong>Reinsurance</strong></td>
<td></td>
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<tr>
<td></td>
<td>♦ Describing the uses of reinsurance in risk management</td>
<td></td>
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<tr>
<td></td>
<td>♦ Describing the main types of reinsurance and their uses</td>
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<tr>
<td></td>
<td><strong>Underwriting</strong></td>
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<tr>
<td></td>
<td>♦ Describing the uses of underwriting in risk management</td>
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<tr>
<td></td>
<td>♦ Describing the main types of underwriting</td>
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<tr>
<td></td>
<td>♦ Describing the sources of information used when carrying out underwriting</td>
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<tr>
<td></td>
<td><strong>Actuarial Funding</strong></td>
<td></td>
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<tr>
<td></td>
<td>♦ Describing techniques of taking credit upfront for future loadings in premiums/charges in respect of initial expenses</td>
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<td></td>
<td><strong>Unit Pricing</strong></td>
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<tr>
<td></td>
<td>♦ Describing the principles of unit pricing for internal unit-linked funds</td>
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<td></td>
<td><strong>Surrenders and Alterations</strong></td>
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<td></td>
<td>♦ Describing methods of determining discontinuance and alteration terms for without profit contracts</td>
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<td></td>
<td>♦ Calculating surrender values for without profit contracts</td>
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<td></td>
<td><strong>Product Design</strong></td>
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<tr>
<td></td>
<td>♦ Describing principles of determining a suitable design for a life insurance product</td>
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<td></td>
<td><strong>Reserving</strong></td>
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<tr>
<td></td>
<td>♦ Describing the principles for setting supervisory reserves</td>
<td></td>
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<td></td>
<td>♦ Describing the ways in which assumptions for setting reserves differ from those of pricing</td>
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<tr>
<td></td>
<td><strong>Setting Assumptions for Different Purposes</strong></td>
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<tr>
<td></td>
<td>♦ Describing purposes of insurance company valuations, including embedded value</td>
<td></td>
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<tr>
<td></td>
<td>♦ Describing appropriate assumptions for each purpose</td>
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<td></td>
<td><strong>Risk Discount Rate</strong></td>
<td></td>
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<tr>
<td></td>
<td>♦ Describing how the risk discount rate may be set for pricing/embedded value calculation purposes</td>
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<tr>
<td></td>
<td><strong>Monitoring Experience</strong></td>
<td></td>
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<tr>
<td></td>
<td>♦ Describe how and why the experience of a life insurance company should be monitored</td>
<td></td>
</tr>
<tr>
<td><strong>Learning Outcomes:</strong></td>
<td><strong>Subject Mastery</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)</td>
<td></td>
</tr>
</tbody>
</table>
On completion of this course the student should be able to:

- Describe the role and responsibility of the actuary within insurance management
- Describe the key features of the environment in which life insurance companies operate
- Demonstrate a thorough knowledge of life insurance products which insurance companies manage
- Describe the factors which contribute to the pricing and design of new products
- Demonstrate an understanding of the management and administration of products through their lifecycle, including reserving
- Describe the principal sources of profit within the insurance industry
- Determine surplus and to perform an analysis of the surplus
- Identify risks and suggest ways of implementing effective risk management
- Understand challenges / opportunities that the industry faces e.g. Solvency II

**Learning Outcomes:**

<table>
<thead>
<tr>
<th>Personal Abilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial, Commercial &amp; Professional Practice; Autonomy, Accountability &amp; Working with Others; Communication, Numeracy &amp; ICT</td>
</tr>
<tr>
<td>Show an appreciation of the interface between academic theory and industrial practice</td>
</tr>
<tr>
<td>Demonstrate the ability to learn independently and as part of a group</td>
</tr>
<tr>
<td>Manage time, work to deadlines and prioritise workloads</td>
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<tr>
<td>Present results in a way that demonstrates that they have understood the technical and broader issues of the life insurance environment</td>
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<tr>
<td>Show an appreciation of the various potential conflicts within the insurance environment</td>
</tr>
</tbody>
</table>

**Assessment Methods:**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Examiniation: (Weighting at least 80%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coursework: (weighting up to 20%)</td>
</tr>
<tr>
<td></td>
<td>Synoptic with F71LA Life Insurance 1</td>
</tr>
<tr>
<td>Re-assessment</td>
<td>Examination (weighting –100%)</td>
</tr>
<tr>
<td>Course Code: F71AP</td>
<td>Course Title: Advanced Derivative Pricing</td>
</tr>
</tbody>
</table>
|-------------------|------------------------------------------|---------------------------------
| Linked courses:   | F71DV Derivative Markets & Pricing for ST6 Exemption |
| Aims:             | The aims of this course are: |
|                   | ♦ To provide a thorough grounding in advanced topics of derivative markets |
|                   | ♦ To introduce mathematical concepts related to continuous time martingales processes |
|                   | ♦ To provide students with a good understanding of developing the BSM model to different asset price models, including dividends and stochastic volatility |
|                   | ♦ To provide students with a good understanding of pricing American options |
|                   | ♦ To provide students with a good understanding of exotic options |
|                   | ♦ To introduce the student to numerical methods for pricing |
|                   | ♦ To provide students with a good understanding of modelling the term structure of interest rates |
|                   | ♦ To introduce the student to securitisation and credit derivatives |
| Syllabus:         | **Stochastic Calculus applied to financial markets** |
|                   | - Ito calculus, Ito’s formula, statement of the Cameron-Martin-Girsanov Theorem, the concept of the Radon-Nikodym derivative, the Martingale Representation Theorem |
|                   | - Self-financing portfolios in continuous time and the construction of replicating strategies using the martingale approach |
|                   | - OU and Feller processes and derivation of BSM PDE |
|                   | - The role of the market price of risk in the transfer between the real-world and the risk-neutral probability measures |
|                   | - Hedging derivatives and the Greeks in continuous time models and structures |
|                   | **Exotic options and derivative portfolios** |
|                   | - Description of exotic options (including Quanto, Chooser, Barrier, Binary, Lookback Asian, Exchange, Basket options) |
|                   | - Management of derivative portfolios of using scenario analysis. |
|                   | - Risk management characteristics of certain exotic products |
|                   | **Stochastic Volatility** |
|                   | - The role of the volatility parameter in the valuation of options |
|                   | - Estimation of volatility from market data |
|                   | - The “smile” effect and volatility surfaces |
|                   | **Numerical methods** |
|                   | - Finite differences and lattices |
|                   | - Trinomial trees |
|                   | - Monte Carlo techniques |
|                   | - Least-Squares (Longstaff-Schwartz) approach for American options |
|                   | **Modelling the Term Structure of Interest Rates** |
|                   | - The Black, Hull & White Vasicek and Cox-Ingersoll-Ross models (Ho & Lee, Black, Derman & Toy, Black & Karasinski) |
|                   | - HJM framework. |
|                   | - Libor Market Models |
|                   | - Implementation and calibration of models |
|                   | **Structured Derivatives and Synthetic Securities** |
|                   | - Products for hedging non-financial risks |
|                   | - Securitisation |
|                   | - Credit risk |
|                   | - CDOs and CDSs |
### Learning Outcomes: Subject Mastery

**Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)**

- Show how to adapt the martingale approach to the pricing of foreign-exchange options and options on stock indexes paying dividends continuously.
- Demonstrate an understanding of the role of the market price of risk in the transfer between the real-world and the risk-neutral probability measures.
- Understand the risk management characteristics of certain exotic products (e.g. foreign exchange or equity barrier options).
- Demonstrate an understanding of the role of the volatility parameter in the valuation of options.
- Describe a variety of numerical methods for calculating equity and foreign exchange derivative prices and hedging strategies.
- Demonstrate an awareness of the problems in pricing American options.
- Demonstrate the way in which option prices and Greeks change in relation to underlying variables.
- Describe how to manage portfolios of derivatives using scenario analysis.
- Demonstrate a knowledge and understanding of models of the term structure of interest rates.
- Demonstrate an awareness of the characteristics of different types of structured derivatives and synthetic securities.
- Identify the credit risks and market risks that arise in the use of derivatives and how credit derivatives can be used to manage the credit risk present in a portfolio of securities.

### Learning Outcomes: Personal Abilities

**Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT**

- Show an appreciation of the interface between academic theory and industrial practice.
- Demonstrate the ability to learn independently and as part of a group.
- Demonstrate knowledge of computational issues.
- Manage time, work to deadlines and prioritise workloads.
- Present results in a way that demonstrates that they have understood the technical and broader issues of derivative pricing.
- Show an appreciation of the role of derivative markets in the management of a variety of risks.

### Assessment Methods:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Methods:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination:</td>
<td>(Weighting at least 70%)</td>
</tr>
<tr>
<td>Coursework:</td>
<td>(weighting up to 30%)</td>
</tr>
<tr>
<td>Re-assessment:</td>
<td>Examination (weighting –100%)</td>
</tr>
<tr>
<td>Course Code: F71TT</td>
<td>Course Title: Risk Management: Techniques &amp; Tools</td>
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<tr>
<td>-------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td><strong>Linked courses:</strong></td>
<td>F71QR Quantitative Risk Analysis for ST9 Exemption</td>
</tr>
<tr>
<td><strong>Aims:</strong></td>
<td>The aims of this course are:</td>
</tr>
<tr>
<td> </td>
<td>♦ To equip students with a variety of tools to tackle problems involving univariate financial time series</td>
</tr>
<tr>
<td> </td>
<td>♦ To provide a good grounding in the best practice of risk management within an organisation</td>
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<tr>
<td> </td>
<td>♦ To understand economic measures of capital and capital allocation</td>
</tr>
<tr>
<td> </td>
<td>♦ To have a thorough understanding of operational risk in its various forms</td>
</tr>
<tr>
<td> </td>
<td>♦ To identify and measure risks and then to take actions to mitigate risks and exploit risky opportunities through good risk management strategies.</td>
</tr>
<tr>
<td><strong>Syllabus:</strong></td>
<td>♦ <strong>Operational risk management</strong></td>
</tr>
<tr>
<td> </td>
<td>- Non-quantitative and quantitative methods and tools for managing operational risk</td>
</tr>
<tr>
<td> </td>
<td>- Different ways of quantifying operational risk under Basel II</td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>Banking and insurance regulatory systems</strong></td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>Risk management governance and culture</strong></td>
</tr>
<tr>
<td> </td>
<td>- Risk management governance structures and the risk management culture</td>
</tr>
<tr>
<td> </td>
<td>- Governance issues including agency, audit and legal risk</td>
</tr>
<tr>
<td> </td>
<td>- Rating agency assessments of an organisation’s risk management operation</td>
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<tr>
<td> </td>
<td>♦ <strong>ERM frameworks and assessment</strong></td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>Risk appetite and risk tolerance</strong></td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>Economic capital and capital allocation</strong></td>
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<tr>
<td> </td>
<td>♦ <strong>Credit risk management</strong></td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>Modelling and assessment of market risk</strong></td>
</tr>
<tr>
<td> </td>
<td>- Models for volatility clustering</td>
</tr>
<tr>
<td> </td>
<td>- Non-normality, fat tails and skewness</td>
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<tr>
<td> </td>
<td>- Assessment of value at risk</td>
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<tr>
<td> </td>
<td>- Backtesting VaR models</td>
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<tr>
<td> </td>
<td>♦ <strong>Market risk management</strong></td>
</tr>
<tr>
<td> </td>
<td>- Dynamic versus static hedging using financial derivatives; practical considerations</td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>Interest rate risk management</strong></td>
</tr>
<tr>
<td> </td>
<td>- Modern approaches to immunisation of interest-rate risk</td>
</tr>
<tr>
<td> </td>
<td>- Asset-liability modelling</td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>How risks and risky opportunities affect the selection of strategy</strong></td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>Advantages and disadvantages of different approaches to risk reduction; e.g. costs and benefits; information asymmetry; transparency; liquidity; basis risk; moral hazard</strong></td>
</tr>
<tr>
<td> </td>
<td>♦ <strong>Optimising risks and opportunities relative to the Board’s declared risk appetite and risk tolerances</strong></td>
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<tr>
<td> </td>
<td>♦ <strong>Case studies: examples of past disasters and examples of good practice</strong></td>
</tr>
<tr>
<td> </td>
<td>- Risk analysis of real and hypothetical scenarios including non-quantifiable risks; views of different stakeholders</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Outcomes: Subject Mastery</th>
<th>Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>On completion of this course the student should be able to:</td>
<td>♦ Analyse a variety of financial time series</td>
</tr>
</tbody>
</table>
Learning Outcomes: Personal Abilities

- Demonstrate a good understanding of the different types of operational risks that might arise in an organisation, and be able to identify potential operational risks in a given scenario
- Use quantitative and qualitative methods for identifying and analysing operational risk
- Demonstrate an understanding of the main international guidelines on good risk management practice and good governance
- Understand how a ratings agency assess risk management practice and use this to improve risk management practice in an organisation
- Show how to measure the economic value of a risky venture and how this can be used to influence decision making
- Understand the different methods for how to allocate capital within an organization and apply these methods in a variety of situations
- Demonstrate how to establish at Board level an organisation’s risk appetite, risk objectives and risk tolerances
- Show to optimize risk and opportunities given Board-level constraints on risk appetite and risk tolerances
- Determine an organisation’s overall risk exposure
- Show an understanding of the importance of asset-liability modeling for a financial institution
- Analyse real and hypothetical case studies of good and bad risk management practice
- Analyse real and hypothetical scenarios from the perspective of different stakeholders

Scholarship, Enquiry and Research (Research-Informed Learning)

- Develop and recommend strategies for active management of risks using a variety of methods
- Recommend risk mitigation strategies by transfer of risk
- Develop strategies for management and mitigation of credit risk
- Recommend risk reduction strategies without transferring risk to an external agency
- Demonstrate an understanding of the pros and cons of the different approaches to risk mitigation
- Show an understanding of modern methods for management of interest-rate risk

Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT

- Show an appreciation of the interface between academic theory and industrial practice
- Demonstrate the ability to learn independently and as part of a group
- Manage time, work to deadlines and prioritise workloads
- Present results in a way that demonstrates that they have understood the technical and broader issues of financial risk management
- Show an appreciation of the societal role of risk management in protecting the consumer and other stakeholders

Assessment Methods:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>(Weighting at least 80%)</td>
</tr>
<tr>
<td>Coursework</td>
<td>(weighting up to 20%)</td>
</tr>
<tr>
<td>Re-assessment</td>
<td>Examination (weighting ~100%)</td>
</tr>
<tr>
<td>Course Code:</td>
<td>Course Title:</td>
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<tr>
<td>C31FV</td>
<td>Finance &amp; Investment</td>
</tr>
</tbody>
</table>

**Linked courses**: C31FM Financial Markets for ST5 Exemption

**Aims**: To install in successful candidates the ability to apply, in simple situations, the principles of actuarial planning and control to the appraisal of investments, and to the selection and management of investments appropriate to the needs of investors.

**Syllabus**:
- Typical ways in which investment returns are taxed and the effect of the taxation basis on investor behaviour
- Influences over the commercial and economic environment from central banks, main investor classes and government policy
- Methods for the valuation of individual investments and their appropriateness in different situations
- Methods by which an institution can monitor and control its exposure to the relevant types of risk
- Principles and aims of market conduct regulatory regimes; principles underlying the legislative and regulatory framework for investment management and the securities industry; and how these principles can be applied in the relevant areas
- Aspects of the theory of finance, including motives for mergers and acquisitions, long-term financial planning and short-term financial planning
- Distinctive characteristics of specialist financial instruments
- Derivative contracts and their payoffs
- Use of actuarial techniques to develop an appropriate investment strategy
- Analysis of the performance of an investment and the limitations of such measurement techniques
- Analysis of the performance of an investment portfolio and the limitations of such portfolio performance measurement
- Principal techniques in portfolio management including risk control techniques

**Learning Outcomes: Subject Mastery**
*Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)*
- Display knowledge of the principles of finance and investment management;
- Apply the principles of actuarial planning and control to the appraisal, selection and management of investments;
- Critically analyse the issues involved in the topics introduced.

**Learning Outcomes: Personal Abilities**
*Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT*
- Understand the context within which investment management professionals work;
- Demonstrate the ability to learn independently;
- Communicate ideas effectively by written and verbal means;
- Recognise, evaluate and comment critically on alternative points of view;
- Develop skills of planning and organising their own learning.

**Assessment Methods**
- Examination: (weighting 80%)
- Coursework: (weighting 20%)

**Re-assessment**
- Examination (weighting –100%)
<table>
<thead>
<tr>
<th><strong>Course Code:</strong> F71MD</th>
<th><strong>Course Title:</strong> MSc Project Work</th>
<th><strong>Course Co-ordinator:</strong> Various</th>
</tr>
</thead>
</table>

**Linked courses**

**Aims:**

To carry out a sustained and intensive piece of independent work on topics in actuarial management and to write a substantial report or reports that communicates the results of this work to others interested in actuarial mathematics and practice.

**Syllabus:**

Students can carry out projects on a variety of topics in Actuarial Management. The project or projects should take the student beyond the courses they have already been taught and examined in on the MSc.

**Learning Outcomes: Subject Mastery**

Understanding, Knowledge and Cognitive Skills; Scholarship, Enquiry and Research (Research-Informed Learning)

On completion of this course the student should:
- Be able to access, use and demonstrate an understanding of the appropriate research literature
- Have broadened their knowledge of actuarial management
- Have improved their skills in reading research papers in actuarial management
- Detailed and critical understanding of a selected recent development in actuarial management
- Demonstrate expertise in applying a variety of actuarial techniques in the context of the problems contained within the project(s)

**Learning Outcomes: Personal Abilities**

Industrial, Commercial & Professional Practice; Autonomy, Accountability & Working with Others; Communication, Numeracy & ICT

- Demonstrate the ability to learn independently
- Manage time, work to deadlines and prioritise workloads
- Conduct a sustained and intensive piece of independent work on topics in actuarial management over a period of weeks
- Discuss the detail of their project(s) with their supervisor(s)
- Perform numerical calculations using a suitable computer language or package as required for the project(s)
- Write well-structured and coherent reports on their work in a way which can be easily be understood by their examiners
- Assess issues with working as part of a team, as required for the project(s)

**Assessment Methods:**

Assessment:
Coursework: (weighting 100%)

Re-assessment:
Coursework: (weighting 100%)
PART B: UNIVERSITY INFORMATION

The Academic Registry is responsible for producing Part B of the handbook to provide information and assistance on University policies and support services.

Please note that the following sections are standard sources of information provided to all students. However, certain aspects are programme-specific and you should refer to Part A where directed. Students are advised that the University will make changes to study programmes and progression requirements from time to time in accordance with strategic developments and it is therefore important to ensure that you check the most recent version of the handbook for up-to-date information.

B1. Our Values

At Heriot-Watt, we have an established set of values that help up to nurture innovation and leadership and show our commitment to continuous development in all our activities. They are:

- Value and Respecting Everyone
- Pursuing Excellence
- Pride and Belonging
- Shaping the Future
- Outward Looking

Find out more about the Heriot-Watt values and what they mean to us.

B2. Student Learning Code of Practice

The Student Learning Code of Practice outlines information about the University, its culture, policies, regulations and the expectation for students and staff. Please familiarise yourself with the relevant Code that is located within the Learning and Teaching Policy Bank.

B3. University Policies and Support Services

Heriot-Watt University has a detailed set of rules that governs the operation and management of University business. These are referred to as Ordinances and these Ordinances are set by the Court, which is the governing body of the University. The Ordinances provide a regulatory framework for corporate governance. The University Ordinances are supported by University Regulations which provide a regulatory framework for the governance of academic-related matters which staff and student must adhere to for all academic matters. Wherever practicable, University policy is designed to include all members of the University’s community, both within and outwith the main campus environments.

Read more about the University Policies, Ordinances and Regulations.

As part of your University enrolment, you signed the Student Declaration and agreed to abide by the regulations of the University and conform to its policies, procedures, ordinances and regulations that underpin the Ordinances and Regulations. During your time at Heriot-Watt, the following policies, procedures, reference information and support services may be relevant and useful guidance for you.
B4. Your Student Portal

The Student Portal brings together your services and relevant information in one place. Below is a summary of the services available to you via the portal:

- Office 365 suite: through single sign-on, all of your Office 365 services will be accessible through the Portal.
- Library: whether you want to search for books or view your loans & reservations, the Portal allows you to do this on your phone or desktop.
- Vision: your Portal will present you with announcements and tasks related to this course.
- Student Information: all university-level regulations and policies relating to your studies can be found on the Portal.
- Campus and School News: the Portal enables the University to promote events and experiences which will help you develop your skills.
- Personalised: You can hide, add and move tiles on your dashboard.
- AskHWU: You can find everything you need to help you navigate your time at HWU through the new AskHWU search tile. Ask questions of the University and enquire directly with members of staff to get information about exams, enrolment, careers, wellbeing services and much more.

You can access your student portal here.

B5. Quick Finder Guide to Academic and Support Services

The following provides an A-Z guide on the academic and support services available to you during your studies.

By clicking on the subject heading you will link to the relevant information in the student portal/website. Please ensure that you check the portal/web at the regular times throughout the year for the most up-to-date information:

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     ➢ Dubai Campus  
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   • Financial Services |
| G | • Go Global  
   • Guide to Student Life  
   • New Student Information:  
     ➢ Edinburgh and Scottish Borders Campuses available [here](#)  
     ➢ Dubai Campus available [here](#)  
     ➢ Malaysia Campus available [here](#)  
   • Graduate Attributes  
   • Graduation |
| H | • Harassment and Bullying  
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