F723-ACS Bachelor of Science in Actuarial Science

PROGRAMME DETAILS
Programme Code: F723-ACS
Department: Actuarial Maths & Statistics
Main Award: BSCH - Bachelor of Science Honours
Full Award Title: Bachelor of Science in Actuarial Science
Level: Undergraduate

LOCATION OF STUDY

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ASSOCIATED AWARDS

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ACCREDITATION

The Edinburgh programme is accredited by the Institute and Faculty of Actuaries in both Edinburgh and Malaysia. The Melbourne and Waterloo exchange programmes are covered only by a subject-by-subject exemption agreement with the Institute and Faculty of Actuaries.
**LEARNING OUTCOMES – SUBJECT MASTERY**

**Understanding, Knowledge and Cognitive Skills**

On completion of the course, students will be able to demonstrate:

- the acquisition of a range of new skills required in actuarial science, including skills in statistical analysis
- awareness and understanding of current issues in actuarial science, through teaching informed by current developments in professional matters and in actuarial research
- extensive knowledge and critical understanding of many of the principal theories and concepts of contemporary actuarial science, and of some of the principal theories and concepts of contemporary statistics, economics, and finance
- expertise in applying many of the principal skills and techniques used in actuarial science and some of the principal skills and techniques used in statistics, economics, and finance
- extensive knowledge and understanding of problems in some or all of the following areas: financial mathematics, life insurance mathematics, survival models, risk theory, stochastic processes, financial economics, and the statistics of general insurance.

**Scholarship, Enquiry and Research (Research Informed Learning)**

On completion of the course, students will be able to:

- demonstrate that they have developed and can apply skills in critical analysis and evaluation of a wide range of theories, concepts, and techniques which arise in the study and practice of actuarial science
- demonstrate statistical skills of critically evaluating and modelling data, and reporting findings
- demonstrate that they have developed problem solving skills
- identify and analyse issues, at a professional level.

**LEARNING OUTCOMES – PERSONAL ABILITIES**

**Industrial, Commercial and Professional Practice**

On completion of the course, students will be in a strong position to move on to a professional environment, with sound knowledge and awareness of the nature of that environment and the demands it will make. They will also have the necessary background and experience to enable them to be ready and able to communicate on technical and general matters with peers and senior colleagues.

**Autonomy, Accountability and Working With Others**

On completion of the course students will be able to:

- Plan and organise their own learning through self management and time management
- Assess issues associated with working as part of a team
- Communicate effectively at all levels and using a range of media

**Communication, Numeracy & Information and Communications Technology**

On completion of the course, students will be able to:
F723-ACS Bachelor of Science in Actuarial Science

- Demonstrate high levels of numeracy as required by the actuarial profession
- Adopt a mature and professional attitude to the solution of technical problems.
- Demonstrate extensive IT skills and use of computer packages such as R, MATLAB, and Excel for solving actuarial problems
- Make presentations on specialised topics and communicate well with peers and other colleagues.

APPROACHES TO TEACHING AND LEARNING

Course learning outcomes derive from the requirements of the actuarial profession. Teaching on the course is student-focused, with students encouraged to take responsibility for their own learning and development. Teaching approaches and techniques include traditional lectures and tutorial sessions, and innovative computer demonstrations and computer lab sessions. In addition, students learn through structured group work, collaborative student presentations, and independent technical project work.

EDUCATIONAL AIMS OF THE PROGRAMME

The programme aims to provide an education in a wide range of subject areas in actuarial science, probability and statistics, and financial mathematics, supported by appropriate and relevant material in pure and applied mathematics. The programme also aims to offer education in economics and financial reporting. The programme provides courses that cover all the material in the "Core Technical series" of the education strategy of the Institute and Faculty of Actuaries, thus allowing exemptions to be gained from professional examinations.

The principal aims of the programme are to

- provide intensive and high-quality education in an undergraduate context in a wide range of subjects in contemporary actuarial science and statistics, and in economics and finance
- 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.
- enable students to develop detailed knowledge and critical understanding of central areas in actuarial science and statistics
- enable students to communicate and work effectively with peers and academic staff, demonstrating appropriate levels of autonomy, initiative, and responsibility
- provide students at the undergraduate level with the opportunity to plan and write a dissertation requiring detailed and critical understanding in an area of study related to actuarial science or statistics.

ASSESSMENT POLICIES

The assessment policy for the course incorporates a range of assessment types. Continuous assessment during some courses and summative assessment at the conclusion of courses both contribute to the overall assessment and are used to formally measure achievement in specified learning outcomes. Understanding, knowledge and subject-specific skills are assessed by coursework assignments and written examinations. Formative assessment is used, especially in Level 1 and Level 2, to provide feedback and to inform student learning.

Level 1 and 2 courses are assessed by end-of-term examinations and/or appropriate coursework (computer projects or assignments). Most Level 3 and 4 courses are synoptically linked and are assessed at the end of the year. In addition, appropriate formative assessment (e.g. assignments or other coursework) is used throughout Levels 3 and 4. Some Level 3 and 4 courses (Life Insurance Mathematics, Pensions, and Life Office Practice) also include computer project work.

Two Level 3 courses (Statistical Models A and B) are assessed by research informed project work (70%), which is carried
PROGRAMME STRUCTURE

Mandatory Courses

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# F723-ACS Bachelor of Science in Actuarial Science

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## ELECTIVES (UG)

### Stage 1

Any SCQF Level 7 course, which must be approved by the 1st year Director of Studies. C37FA Introduction to Accounting may be taken in semester 1.

### Stage 2

In Malaysia students may take one elective as agreed by the Second Year Director of Studies. This is because the option “Numerical Analysis” that is on the Edinburgh programme is not available in Malaysia. In normal circumstances, this will not be required as most students are expected to take “Finance and Financial Reporting”.

### Stage 3

None

### Stage 4

#### a. Edinburgh campus

**Semester 1**

Students can choose at most one of:
F723-ACS Bachelor of Science in Actuarial Science

- C39SM International Bond and Currency Markets (SCQF level 9) - HWU (15 credits).
- Any course approved by the 4th Year Director of Studies.

Note that Direct Entrants to Stage 2 and Direct Entrants to Stage 3 who choose Introductory Economics as an option to allow them to gain the CT7 exemption, are not permitted also to take C39SM.

**Semester 2**
Students can choose at most one of:

- C37FF Finance and Financial Reporting (SCQF level 7) - HWU (15 credits). This is offered to Direct Entrants into Stage 3 at HWU to obtain the CT2 exemption.
- F19MO Ordinary Differential Equations (SCQF level 9) - HWU (15 credits).
- C39TA Taxation (Tax Law) (SCQF level 9) - HWU (15 credits).
- Any course approved by the 4th Year Director of Studies.

**b. Malaysia campus**

**Semester 1**
Students can choose at most one of:

- Any course approved by the 4th Year Director of Studies.

**Semester 2**
Students can choose at most one of:

- F19MO Ordinary Differential Equations (SCQF level 9) - HWUM (3.75 credits).
- Any course approved by the 4th Year Director of Studies.

**Stage 5**
N/A

**COMPOSITION AND STAGE NOTES (UG)**

**Stage 1**
8 taught courses (6 mandatory & 2 optional or elective)
Students wishing to choose an elective course in either Semester 1 or Semester 2 must have the elective course approved by the 1st year Director of Studies.

C37FA Introduction to Accounting may be taken in semester 1.

| Mandatory Credits 1 | 90 |
| Optional Credits 1 | 30 |
| Elective Credits 1 | |
Stage 2

9 taught courses (8 mandatory and 1 optional - note that 2 of the mandatory courses are half-courses).

Direct entrants to Stage 2: Direct entrants into Stage 2 may take C37FF Finance and Financial Reporting as an optional course at Stage 2 for CT2 exemption.

Exchange programmes for students on the Edinburgh campus (HWU)

Students at the Edinburgh campus (HWU) who are performing well on the programme can be selected to participate in an established exchange programme with either University of Melbourne, Australia, or University of Waterloo, Canada. The selection process normally takes place during Semester 2 of Stage 2.

An outline of each of the exchange programmes is given below.

Outline of the Melbourne Exchange Programme
1. Students on spend Semester 2 of Stage 3 and Semester 1 of Stage 4 at the University of Melbourne, Australia. They return to Heriot-Watt at the beginning of Semester 2 of Stage 4 and complete their final year of study at Heriot-Watt.
2. The programme of study for Heriot-Watt students in Melbourne is broadly equivalent in content and SCQF level to half of Stage 3 and half of Stage 4 on the BSc (Hons) Actuarial Science.
3. The programme of study in Melbourne has been designed to ensure that Heriot-Watt students cover material that is required by the Institute and Faculty of Actuaries for exemption from the latter's Core Technical examinations.
4. Upon successful completion of their course of study in Melbourne, students are awarded 120 credits (60 credits are awarded for each of the two semesters that the students spend in Melbourne).
5. In order to complete the UK Core Technical professional syllabus, returning Heriot-Watt students may take course F71AJ Financial Economics 2 in Semester 2 of Stage 4.

Outline of the Waterloo Exchange Programme
1. Students on this exchange spend all of Stage 3 at the University of Waterloo, Canada. They complete Stage 4 at Heriot-Watt.
2. The programme of study for Heriot-Watt students in Waterloo is broadly equivalent in terms of content and SCQF Level to Stage 3 of the BSc (Hons) Actuarial Science. It includes the equivalent of 30 credits of research-informed independent work.
3. The programme of study in Waterloo has been designed to ensure that Heriot-Watt students cover material that is required by the Institute and Faculty of Actuaries for exemption from the profession's Core Technical examinations.
4. Upon successful completion of their study in Waterloo, students are awarded 120 credits for Stage 3 of the programme.
5. Students must complete 4 courses at SCQF Level 10 or above in Stage 4.

Note:
In Stage 1 and Stage 2, the course choices are identical for all students on the programme.
### Stage 3

From Stage 3 onwards, there are four main pathways in the programme, namely:

- **a. Edinburgh campus**: study at the Edinburgh campus (HWU) only,
- **b. Malaysia campus**: study at the Malaysia campus (HWUM) only,
- **c. Melbourne exchange programme**: study at the Edinburgh campus (HWU) with one year exchange at Melbourne University,
- **d. Waterloo exchange programme**: study at the Edinburgh campus (HWU) with one year exchange at University of Waterloo.

There are no mandatory courses common to all pathways. To follow a particular pathway requires a specified combination of optional courses. Thus within each pathway there are mandatory courses. These mandatory courses are specified for each pathway in this section from Stage 3 onwards.

#### a. Edinburgh campus

8 taught courses (8 mandatory).

**Semester 1**

The 4 mandatory courses are:

- F79MA Statistical Models A,
- F79SP Stochastic Processes,
- F79PA Portfolio Theory and Asset Models,
- F70LA Life Insurance Mathematics A.

**Semester 2**

The 4 mandatory courses are:

- F79MB Statistical Models B,
- F79SU Survival Models,
- F79DF Derivative Markets and Discrete-time Finance,
- F70LB Life Insurance Mathematics B.

#### b. Malaysia campus
As for the Edinburgh campus.

c. Melbourne Exchange Programme

5 taught courses (5 mandatory, of which one is a 60-credit course).

Semester 1
The 4 mandatory courses are the same as Semester 1 of Stage 3 for the Edinburgh campus.

Semester 2
The 1 mandatory course is

- F79ML Year Abroad - Melbourne A.

d. Waterloo Exchange Programme

3 taught courses (1 mandatory 60-credit course at SCQF Level 9, 1 mandatory 30-credit course at SCQF Level 9 and 1 mandatory 30-credit course at SCQF Level 10).

Semester 1
The 1 mandatory course is

- F79WA Year Abroad - Waterloo A.

Semester 2
The 2 mandatory courses are

- F79WB Year Abroad - Waterloo B1, and F70WB Year Abroad - Waterloo B2

Additional Information on Optional courses

Stage 3:

The following courses are available except for Waterloo Exchange students:-

F79MA, F79SP, F79PA, F70LA.
The following courses are available except for Melbourne and Waterloo Exchange students:-

F79MB, F79SU, F79DF, F70LB.

The following courses are only available to Waterloo Exchange students:-

F79WA, F79WB, F70WB.

The following courses is only available to Melbourne Exchange students:-

F79ML.

<table>
<thead>
<tr>
<th>Mandatory Credits 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optional Credits 3</td>
</tr>
<tr>
<td>Elective Credits 3</td>
</tr>
<tr>
<td>Total 3</td>
</tr>
</tbody>
</table>

**Stage 4**

**a. Edinburgh campus**

8 taught courses (at least 6 optional & at most 2 elective).

**Semester 1**

In Semester 1, students must choose at least 3 optional courses, from:

- F79PS Statistics for Social Science
- F70PE Pensions
- F70CF Continuous-time Finance
- F10MM Optimisation
- F70SC Statistical Computing
- F20ML Statistical Machine Learning

Additionally, Direct Entrants to Stage 2 and Direct Entrants to Stage 3 are permitted to take C27IE Introductory Economics as an option provided they have sufficient courses at SCQF Levels 9 and 10. This is to allow them to gain the CT7 exemption.

Also, Direct Entrants to Stage 3 may choose as an optional course
• F71AB Financial Mathematics

in order to get the CT1 exemption

Students can choose at most 1 elective course in Semester 1, which must be approved by the 4th Year Director of Studies (see also Section 8). In most cases, an approved elective will be an SCQF Level 9 or 10 course in either mathematics or finance. However, students taking C27IE will not be allowed to also take C39SM.

**Semester 2**
In Semester 2, students must choose at least 3 optional courses, from:

• F79BI Bayesian Inference & Computational Methods
• F70RT Risk Theory
• F70TS Time Series Analysis
• F70LP Life Office Practice
• F71TT Risk Management: Techniques and Tools

Students can choose at most 1 elective course in Semester 2, which must be approved by the 4th Year Director of Studies (see also Section 8). In most cases, an approved elective will be an SCQF Level 9 or 10 course in either mathematics or finance.

However, Direct Entrants to Stage 3 and Direct Entrants to Stage 4 are permitted to take C37FF Finance and Financial Reporting as an elective provided they have sufficient courses at SCQF Levels 9 and 10. This is to allow them to gain the CT2 exemption.

Note: In all cases, the 4th Year Director of Studies will ensure that students are registered for a sufficient number of courses at SCQF level 10.

**b. Malaysia campus**
As for the Edinburgh campus except that the Semester 1 optional course

• F70SC Statistical Computing

Is not offered at the Malaysia campus.
c. Melbourne Exchange Programme
8 taught courses (1 mandatory 60-credit course, at least 3 optional & at most 1 elective).

**Semester 1**
In Semester 1, while in Melbourne, students must register for F70ML Year Abroad – Melbourne B.

**Semester 2**
In Semester 2, upon their return to Heriot-Watt, students must choose at least 3 of the optional courses

- F70LP Life Office Practice,
- F79BI Bayesian Inference & Computational Methods,
- F70RT Risk Theory,
- F70TS Time Series Analysis,
- F71AJ Financial Economics II (Note: taking in Stage 4 the course F71AJ Financial Economics II, in conjunction with the Stage 3 mandatory course F79PA Portfolio Theory and Asset Models, allows the student to get the CT8 exemption.).

Students can choose at most 1 elective course in Semester 2, which must be approved by the 4th Year Director of Studies (see also Section 8).

It must be checked by the 4th Year Director of Studies that the students do not register for Heriot-Watt courses that are equivalent to those taken for credit by the student while in Melbourne.

d. Waterloo Exchange Programme
8 taught courses (at least 6 optional & at most 2 elective).

The course choices are the same as for the Edinburgh campus except that

- F70CF Continuous-time Finance is excluded from the course choices due to excessive syllabus overlap with F71AJ Financial Economics II,

and with the addition of the optional courses:

- F79PA Portfolio Theory and Asset Models,
- F71AJ Financial Economics II.

(Note: taking F79PA Portfolio Theory and Asset Models and F71AJ Financial Economics II allows the student to get the CT8 exemption.)
It must be checked by the 4th Year Director of Studies that students:

1. do not register for Heriot-Watt courses that are equivalent to those taken for credit by the student while in Waterloo, and
2. choose at least 4 courses that are at SCQF Level 10 or above.

Additional Information on Optional courses

Stage 4:

The following courses are available except for Melbourne Exchange students:-

F79PS, F70PE, F10MM, F70SC.

The following course is available except for Melbourne and Waterloo Exchange students:-

F70CF.

The following course is only available to Melbourne and Waterloo Exchange students:-

F71AJ.

The following course is only available to Waterloo Exchange students:-

F79PA.

The following course is only available to Melbourne Exchange students:-

F70ML.

Note: F71AB is only for Direct Entrants to Stage 3.
Honours Degree

a. Edinburgh campus

The class of honours is determined by the average of the final marks obtained in all courses taken in Stages 3 and 4 that are rated SCQF level 9 or 10 or 11.

Direct entrants to Stage 4

Credit for prior learning is awarded for Stages 1, 2 and 3. The class of honours is determined by the average of the final marks obtained in all courses taken at Heriot-Watt in Stage 4 that are rated SCQF level 9 or 10 or 11.

b. Malaysia campus

As for the Edinburgh campus.

c. Melbourne Exchange Programme

The class of honours is determined by the average of the final marks obtained in all courses taken at Heriot-Watt University in Semester 1 of Stage 3 and Semester 2 of Stage 4 that are rated SCQF level 9 or 10 or 11.

d. Waterloo Exchange Programme

The class of honours is determined by the average of the final marks obtained in all courses taken at Heriot-Watt University in Stage 4 that are rated SCQF level 9 or 10 or 11.

<table>
<thead>
<tr>
<th>Mandatory Credits 4</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optional Credits 4</td>
<td>120</td>
</tr>
<tr>
<td>Elective Credits 4</td>
<td></td>
</tr>
<tr>
<td>Total 4</td>
<td>120</td>
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</table>

<table>
<thead>
<tr>
<th>Stage 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory Credits 5</td>
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<tr>
<td>Optional Credits 5</td>
</tr>
<tr>
<td>Elective Credits 5</td>
</tr>
<tr>
<td>Total 5</td>
</tr>
</tbody>
</table>
**ASSESSMENT AND PROGRESSION (UG)**

**Reassessment Opportunities**

1. A student who has been awarded a Grade E or a Grade F in a course may be re-assessed in that course.
2. A student shall be permitted only one re-assessment opportunity to be taken at the Resit diet of examination following the first assessment of the course.
3. A student shall not be re-assessed in any qualifying course taken in the final stage of a course of study.
4. The Progression Board may permit a student to be re-assessed in any qualifying course not taken in the final stage in order to gain credits for the course, provided that the mark or grade obtained in the first assessment of any such course is used in determining the classification of the degree to be awarded.

**Progression Requirements**

**Part A.** The minimum number of credits required to progress through each stage are as follows

<table>
<thead>
<tr>
<th>Stage</th>
<th>Minimum Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 2</td>
<td>120 SCQF credits with a minimum of Grade D, at the first attempt, in all courses.</td>
</tr>
<tr>
<td>2 to 3</td>
<td>240 SCQF credits with a minimum of Grade D, at the first attempt, in all courses.</td>
</tr>
<tr>
<td>3 to 4</td>
<td>360 SCQF credits with a minimum of Grade D, at the first attempt, in all courses.</td>
</tr>
<tr>
<td>4 to 5</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Part B.** The minimum grade of D is required in the following courses

- **Stage 1**: All courses.
  - The Board of Examiners has discretion to allow progression at each stage with up to 2 Grade Es in non-continuing subjects.

- **Stage 2**: All courses.
  - The Board of Examiners has discretion to allow progression at each stage with up to 2 Grade Es in non-continuing subjects.

- **Stage 3**: All courses.
  - The Board of Examiners has discretion to allow progression at each stage with up to 2 Grade Es in non-continuing subjects.

- **Stage 4**: N/A

**AWARDS, CREDITS AND LEVEL (UG)**

**Part A. Credit Requirements**

<table>
<thead>
<tr>
<th>Award Type</th>
<th>Overall Credits</th>
<th>Specific Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Masters</td>
<td>600</td>
<td>600 SCQF credits including a minimum of 120 credit at Level 11</td>
</tr>
<tr>
<td>Honours Degree (inc.MA)</td>
<td>480</td>
<td>480 SCQF credits including a minimum of 180 credit at Level 9 and 10 of which at least 90 credits at Level 10</td>
</tr>
<tr>
<td>Ordinary or General Degree</td>
<td>360</td>
<td>360 SCQF credits including a minimum of 60 credit at Level 9</td>
</tr>
<tr>
<td>Diploma of Higher Education</td>
<td>240</td>
<td>240 SCQF credits including a minimum of 90 credit at Level 8</td>
</tr>
<tr>
<td>Certificate of Higher Education</td>
<td>120</td>
<td>120 SCQF credits including a minimum of 90 credit at Level 7</td>
</tr>
</tbody>
</table>

**Part B. Mark/Grade Requirements**
### F723-ACS Bachelor of Science in Actuarial Science

<table>
<thead>
<tr>
<th>Overall Mark</th>
<th>Overall Grade</th>
<th>Basis of Overall Mark/Grade</th>
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</thead>
<tbody>
<tr>
<td>&gt;=50%</td>
<td>C</td>
<td>Credit Weighted Average &gt;=50% over all qualifying courses at Grades A-D</td>
</tr>
<tr>
<td>&gt;=40%</td>
<td>D</td>
<td>1st: Credit Weighted Average &gt;=70% Over all qualifying courses at grades A-D. 2.1: Credit Weighted Average &gt;=60% Over all qualifying courses at grades A-D. 2.2: Credit Weighted Average &gt;=50% Over all qualifying courses at grades A-D. 3rd: Credit Weighted Average &gt;=40% Over all qualifying courses at grades A-D.</td>
</tr>
<tr>
<td>&gt;=40%</td>
<td>D</td>
<td>Minimum of grade D in all pre-requisite courses.</td>
</tr>
<tr>
<td>&gt;=40%</td>
<td>D</td>
<td>Minimum of grade D in all pre-requisite courses.</td>
</tr>
</tbody>
</table>

#### DURATION OF STUDY

<table>
<thead>
<tr>
<th>IN MONTHS</th>
<th>Full-time</th>
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</thead>
<tbody>
<tr>
<td>Integrated Masters</td>
<td>60</td>
</tr>
<tr>
<td>Honours Degree</td>
<td>48</td>
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<tr>
<td>Ordinary or General Degree</td>
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<tr>
<td>Diploma of Higher Education</td>
<td>24</td>
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<tr>
<td>Certificate of Higher Education</td>
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</tbody>
</table>