**COURSE DETAILS**

**Course Code:** F78AA  
**Full Course Title:** Actuarial and Financial Mathematics A  
**SCQF Level:** 8  
**SCAF Credits:** 15  
**Available as Elective:** No

**DELIVERY LEVEL**

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<th>Undergraduate:</th>
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<th>Postgraduate Taught:</th>
<th>No</th>
<th>Postgraduate Research:</th>
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**Additional Information:**

**COURSE AIMS**

To introduce the student to simple mathematical models of cashflows accumulated or discounted at interest, and to develop skill in applying these models to real financial contracts and transactions.

**LEARNING OUTCOMES – SUBJECT MASTERY**

On completion of this course the student should be able to:

- Describe the basic concepts of simple and compound interest.
- Calculate the present value or accumulation of any set of discrete-time cashflows, at constant or varying rates of interest.
- Derive and use simple formulae for values of level and increasing annuities-certain.
- Explain the concept of the yield on a series of cashflows, and its limitations.
- Calculate time-weighted, money-weighted and internal linked rates of return.
- Analyse loan schedules, including simple alterations.
- Describe basic fixed-interest securities, and calculate prices and yields allowing for tax.
- Understand the discounted cash flow model and know what are internal rates of return (IRR), net present values (NPV) and break-even durations.
- Explain the concept of a stochastic interest rate model.
- Calculate the mean value and the variance of the accumulated amount of a single premium for a stochastic interest rate model in which the annual rates of return are independently and identically distributed (and also do this for other simple models).
- Calculate the mean value and the variance of the accumulated amount of a level annual premium for a stochastic interest rate model in which the annual rates of return are independently and identically distributed.
- Understand how an appropriate inflation index (such as the RPI) may be used to measure changes in the value of money with time.
- Understand how an appropriate index may be used to increase the monetary amounts of the future cash flows associated with a given "index-linked" investment and, in particular, how the RPI is used to determine the future payments of interest and capital associated with index-linked government securities.
- Know, in relation to a given inflation index, what is meant by the "real yield" for a particular investment and be able to calculate such yields.
- Use an appropriate computer package to apply the methods introduced in this course.

**LEARNING OUTCOMES – PERSONAL ABILITIES**

- Interpreting problems from commercial practice in terms of relevant mathematical models
F78AA Actuarial and Financial Mathematics A

- Independently recognizing and applying appropriate mathematical techniques to solve problems
- Interpreting solutions expressed mathematically in terms of the original problem
- Communicating the solutions to complex problems in the financial services sector

SYLLABUS

- Simple interest
- Compound interest and discount
- Time units and effective rates of interest
- Accumulations and present values of discrete-time cashflows
- Varying rates of interest
- Annuities
- Yields
- Measuring rates of return
- Loan schedules
- Fixed-interest securities
- Discounted Cash Flows
- Stochastic interest rate models
- Inflation indexing and index-linked bond

COURSE RELATIONSHIPS

<table>
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<tr>
<th>Course Code</th>
<th>Level</th>
<th>Title</th>
<th>School</th>
<th>Type</th>
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<td>F78AB</td>
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<td>Actuarial and Financial Mathematics B</td>
<td>School of Math and Comp Sci.</td>
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LOCATION AND ASSESSMENT METHODS

The assessments are as follows:
F78AA (Semester 1): 25% Continuous assessments. No final exam at the end of the semester.
F78AB (Semester 2): 5% Continuous assessments. Final exam for F78AA and F78AB syllabus amounting to 70% of the total grade at the end of semester 2.

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<th>Diet</th>
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