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
Undergraduate: Yes
Postgraduate Taught: No
Postgraduate Research: No

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

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<tr>
<th>Course Code</th>
<th>Level</th>
<th>Title</th>
<th>School</th>
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<td>F78AB</td>
<td>8</td>
<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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| Y   | Y   | Y   |     |       |     |      |     |     | Examination | 70 | 120 | Assessment | Semester 2 |

| Y   | Y   | Y   |     |       |     |      |     |     | Examination | 100 | 120 | Reassessment | Semester 3 |