COURSE DETAILS
Course Code: F79SU
Full Course Title: Survival Models
SCQF Level: 9
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL
Undergraduate: Yes
Postgraduate Taught: No
Postgraduate Research: No

COURSE 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

LEARNING OUTCOMES – SUBJECT MASTERY
After studying this module, 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
- To apply a range of appropriate tests to check for 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
- Use the stochastic mortality models to obtain forecasts for future mortality rates

LEARNING OUTCOMES – PERSONAL ABILITIES
At the end of the module, 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

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
• Projecting Mortality Rates

LOCATION AND ASSESSMENT METHODS

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