F79SU Survival Models

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

COURSE RELATIONSHIPS

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LOCATION AND ASSESSMENT METHODS

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