

ACT 4340 Actuarial Modeling Methods 3

Course Outline

Class Time M/W 4 – 5:15 p.m.

Class Room 107 Drake Centre

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Office Hours W 3 – 3:30 p.m.; TH 9 – 9:30 p.m.

Learning Outcomes

- Bayesian Estimation & Credibility Analysis
 - Apply limited fluctuation (classical) credibility including criteria for both full and partial credibility.
 - Perform Bayesian analysis using both discrete and continuous models.
 - Apply Bühlmann and Bühlmann-Straub models and understand the relationship of these to the Bayesian model.
 - Apply conjugate priors in Bayesian analysis and in particular the Poisson-gamma model.
 - Apply empirical Bayesian methods in the nonparametric and semiparametric cases.
- Simulations
 - Simulate both discrete and continuous random variables using the inversion method.
 - Estimate the number of simulations needed to obtain an estimate with a given error and a given degree of confidence.
 - Use simulation to determine the p -value for a hypothesis test.
 - Use the bootstrap method to estimate the mean squared error of an estimator.
 - Apply simulation methods within the context of actuarial models.
 - Simulate lognormal stock prices.
 - Incorporate jumps in stock prices by mixing Poisson and lognormal random variables.
 - Use variance reduction techniques to accelerate convergence.
 - Use the Cholesky decomposition method for simulating correlated random variables.

Course Materials

- Loss Models: From Data to Decisions, (Second Edition), 2004, by Klugman, S.A., Panjer, H.H. and Willmot, G.E., 12.4, 16.3, 16.4, 16.5, 17.
- Derivatives Markets (Second Edition), 2006, by McDonald, R.L., Chapters 19.
- An Introduction to Risk Measures for Actuarial Applications, Section 5.
- See SOA website for the most recent information. (<http://www.soa.org/files/pdf/edu-2008-spring-exam-c.pdf>)

Tentative Schedule

- Introduction (1 lecture)
- Limited Fluctuation Credibility Theory (3 lectures)
- Bühlmann & Bühlmann-Straub Credibility Theory (4 lectures)
- Bayesian Estimations (2 lectures)
- Bayesian Credibility Theory (3 lectures)
- Empirical Credibility Estimation (3 lectures)
- Simulations (4 lectures)

Important Dates

- January 7: First Class
- January 30: Exam 1
- February 18 – 22: Mid-Term Break
- February 27: Exam 2
- March 19: Exam 3
- March 20: Last Date for Voluntary Withdrawal
- April 7: Teaching Evaluation
- April 9: Exam 4

Mark Breakdown

- Quizzes: 20%
- Exam 1: 20%
- Exam 2: 20%
- Exam 3: 20%
- Exam 4: 20%

WebCT

Solutions to the exams and other information are available on the course WebCT site. Follow the instructions below to log on WebCT:

- On the University of Manitoba home page (www.umanitoba.ca), click on “current students”.
- On the “current students” page, click on "WebCT".
- Log into WebCT using your ccu account. You must claim your university ccu account to log into WebCT. If you have not done so, claim your ccu account at “www.umanitoba.ca/claimid”.
- If you are having problems logging into your course visit the Accounts Office in Room 629 Engineering Building, call 474-9788 or e-mail “operacc@cc.umanitoba.ca”.
- On your "myWebCT" page, click on the ACT 4340 course title.

Important Issues

- All exams are cumulative.
- Success in the course and on the Society of Actuaries Exam C will depend on working a large number of exercises. Each student should work as many exercises as possible. This course is hard. Do not get behind. It is very important to read ahead of each lecture.
- *Academic dishonesty: Plagiarism, cheating and examination impersonation will not be tolerated.*