Peking University HSBC Business School

2015-16 Module 4

Bayesian Statistics

Instructor:

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Office hours/place: Tue 1:30-3:00pm, 757

Meeting time/Venue: Mon & Thur 8:30pm-10:20pm, 229

Credits: 3

TA: TBD Email:

Course objectives:

This course focuses on the basic concepts and theory of Bayesian Statistics and its applications in a variety of statistical problems in Economics and Finance. As a modern econometric methodology, Bayesian statistics and modeling is found to be fashionable in science and attracted explosion of interest since the development of increasingly access to powerful computers and the implementation of Markov chain Monte Carlo (MCMC) methods. This course discusses the flexibility of Bayesian modeling and computational statistics. Development of material will be rigorous, and comparisons will be drawn between different approaches to estimation and inference. After successfully completing this subject, students will

(a) understand the theory, concepts and methods of Bayesian Statistics;
(b) understand the differences between classical and Bayesian statistical inferences;
(c) be able to use contemporary computational methods of estimation and apply these methods in economics, business and finance;
(d) be able to carry out analysis using WinBUGS and Matlab;
(e) be well equipped for further studies in quantitative methods.

The lab sessions are essential for learning and understanding the software WinBUGS and will be used as a supplementary assessment of student's understanding of the theoretical aspects of Bayesian statistics and their ability to analyse real-life data using statistical packages and to draw valid conclusions.

Pre-requisite courses: Math, Advanced Econometrics I or II or Financial Econometrics.

Textbook:

Bayesian Methods in Finance, Rachev, Hsu, Bagasheva and Fabozzi, (2008), John Wiley & Sons, ISBN: 978-0-471-92083-0

Suggested Readings

(Lee) Lee, P.M. (2002) ***Bayesian Statistics: An Introduction***, 3rd Edition. Arnold. http://www-users.york.ac.uk/~pml1/bayes/book.htm

(GCSR) Gelman, A., Carlin, J.B., Stern, H.B. & Rubin, D.B. (2004) ***Bayesian Data Anlaysis***, 2rd Edition, Chapman & Hall.

Software

WinBUGS (free download from www.mrc-bsu.cam.ac.uk/bugs/welcome.shtml)

R (free download from http://cran.au.r-project.org/)

Assessment

Assessment task	Weighting
1. Assignments & Homeworks	30%
2. Lab Exercise	20%
3. Projects	20%
4. Seminars	20%
5. Quizzes	10%
Total	100%

Academic honesty:

Academic dishonesty will not be tolerated in this class. Students are expected to abide by the code of academic honesty of PHBS. Failure to abide the code will be prosecuted through the University's judiciary system. Ignorance of the code is not a defense against a charge of dishonesty.

Week-by-Week Topic Guide

Week	Topic	Lectures	Assignment
1	Review of Statistical distributions and introduction to Bayesian statistics;		Homework 1
2	Prior and posterior distribution; Conjugate prior; Predictive inference		Homework 2
3	Bayesian linear regression model		Homework 3
4	Monte Carlo Markov Chain algorithm; Gibbs sampling methods		Homework 4
5	Bayesian Computational methods; Introduction to Bayesian software: WinBUGS		Quizz
6	Bayesian decision theory and model selection;		Homework 5
7	Bayesian Inferences for volatility models, Time series analysis		Homework 6
8	Finite and in_nite mixture models		
9	Dependent in_nite mixture models		Project due