

Econ533

Bayesian Statistics

Module 3, 2017

Course Information

Instructor:

Office: PHBS Building, Room 757

Phone: 86-755-2603-7541

Email: qianchen@phbs.pku.edu.cn

Office Hour: Tue 2:00-3:00pm

Teaching Assistant:

Phone:

Email:

Classes:

Lectures: Mon & Thur, 10:30-12:20

Venue: PHBS Building, Room 335

Course Website:

If any.

1. Course Description

1.1 Context

Course overview:

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. It discusses the flexibility of Bayesian modeling and contemporary computational methods. Implementation of the computational techniques will be carried out via analysis using WinBUGS. Development of material will be rigorous, and comparisons will be drawn between different approaches to estimation and inference.

Prerequisites: Math, and any Econometrics courses.

1.2 Textbooks and Reading Materials

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 Analysis*, 2nd Edition, Chapman & Hall.

2. Learning Outcomes

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.

Software

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

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

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.

2.1 Intended Learning Outcomes

Learning Goals	Objectives	Assessment
1. Our graduates will be effective communicators.	1.1. Our students will produce quality business and research-oriented documents.	Assignments and group project
	1.2. Students are able to professionally present their ideas and also logically explain and defend their argument.	Assignments, group project, quiz
2. Our graduates will be skilled in team work and leadership.	2.1. Students will be able to lead and participate in group for projects, discussion, and presentation.	Assignments, group project, group discussion
	2.2. Students will be able to apply leadership theories and related skills.	Assignments, group project, group discussion, quiz
3. Our graduates will be trained in ethics.	3.1. In a case setting, students will use appropriate techniques to analyze business problems and identify the ethical aspects, provide a solution and defend it.	Assignments, group project, group discussion, quiz
	3.2. Our students will practice ethics in the duration of the program.	
4. Our graduates will have a global perspective.	4.1. Students will have an international exposure.	Assignments, group project, group discussion, quiz
5. Our graduates will be skilled in problem-solving and critical thinking.	5.1. Our students will have a good understanding of fundamental theories in their fields.	Assignments, group project, group discussion, quiz
	5.2. Our students will be prepared to face	Assignments,

	problems in various business settings and find solutions.	group project, group discussion, quiz
	5.3. Our students will demonstrate competency in critical thinking.	

2.2 Course specific objectives

2.3 Assessment/Grading Details

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

2.4 Academic Honesty and Plagiarism

It is important for a student's effort and credit to be recognized through class assessment. Credits earned for a student work due to efforts done by others are clearly unfair. Deliberate dishonesty is considered academic misconducts, which include plagiarism; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis.

All assessments are subject to academic misconduct check. Misconduct check may include reproducing the assessment, providing a copy to another member of faculty, and/or communicate a copy of this assignment to the PHBS Discipline Committee. A suspected plagiarized document/assignment submitted to a plagiarism checking service may be kept in its database for future reference purpose.

Where violation is suspected, penalties will be implemented. The penalties for academic misconduct may include: deduction of honour points, a mark of zero on the assessment, a fail grade for the whole course, and reference of the matter to the Peking University Registrar.

For more information of plagiarism, please refer to *PHBS Student Handbook*.

3. Topics, Teaching and Assessment Schedule

4. 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		Homework 2

	inference		
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 infinite mixture models		
9	Dependent infinite mixture models		Project due

5. Miscellaneous