Shih Chien University

STP Program (July 01-Aug 02)

STAT 230 Foundations of Bayesian Inference

Course Outline

Course Code: STAT 230

Instructor: TBA

Home Institution: TBA

Office Hours: TBA

Email: TBA

Credits: 4

Class Hours: This course will have 144 class hours, including 50 lecture hours, professor 30 office hours, 20-hour TA discussion sessions, 10-hour review sessions, 34-hour extra classes.

Prerequisites: N/A

Course Description：

This course provides a basic introduction to Bayesian concepts and methods. We will discuss topics including Bayes formula, single and multiple parameter models with conjugate priors, prior specification, posterior sampling using MCMC, Bayesian linear models, hierarchal Bayesian models, model choice and diagnosis. We will discuss computation using R.

Required Course Materials：

We will mainly use the following textbook:
A First Course in Bayesian Statistical Methods by Peter Hoff (2009)

Here are two other additional references (not required):

1. Bayesian Data Analysis by Gelman et al., 3rd Edition
2. Bayesian Ideas and Data Analysis, An Introduction for Scientists and Statisticians by Christensen et al.

Grading:

The course is online asynchronous. All lectures are pre-recorded. The homework assignments will also be released and submitted online. There will be a in-class exam and a take-home project exam. The in-class exam will be proctored via Zoom, where students are supposed to have a webcam with a wide view capturing the student and the entire desk.

Late homework will not be accepted unless arrangements are made well in advance. You are encouraged to discuss with other students for the homework, but the final work you submit must be your own, and each student must complete and submit their own assignment.

Grading Policies:

The final score will be based on Homework (30%), Midterm (30%), and Final exam (40%).

Grading System (1 ~ 100):

Quality Points	Grade	Percentage %
4	A	80-100
3	B	70-79
2	C	60-69
1	D	50-59
0	E	0-49

Course Schedule:

WEEK 1 Overview of Bayesian inference, likelihood, Bayes theorem, and conjugate models.

WEEK 2 Posterior summary, predictive distribution, introduction to Monte Carlo simulation and MCMC. Introduction to R and JAGS.

WEEK 3 More details on MCMC including Gibbs sampling and Metropolis-Hasting sampling. Choice of priors and Bayesian linear model.

WEEK 4 Bayesian hierarchical models, model diagnosis, and model selection.

WEEK 5 More examples about MCMC including random effect model, and generalized linear model. Bayesian central limit theorem.