

2018 SISG MODULE 20: Bayesian Statistics for Genetics

Introduction and Overview

Ken Rice and Jon Wakefield

Departments of Statistics and Biostatistics
University of Washington

Logistics

Background Text: P.D. Hoff (2009), *A First Course in Bayesian Statistical Methods*, Springer.

Supplementary Text: J.C. Wakefield (2013), *Bayesian and Frequentist Regression Methods*, Springer.

Demonstrations of methods via R implementations will be carried out in class. Students are encouraged to follow along.

Code and other materials (course notes, papers) are available at the course website:

<http://faculty.washington.edu/kenrice/sisgbayes/>

Course Outline

DAY 1:

- Lecture 1: Wed 1.30–3.00 (Rice): Why Bayes? Introduction.
- Lecture 2: Wed 3.30–5.00 (Wakefield): Review of probability.

DAY 2:

- Lecture 3: Thurs 8.30–10.00 (Wakefield) Binomial sampling.
- Lecture 4: Thurs 10.30–12.00 (Rice) Continuous sampling. Linear regression. MCMC.
- Lecture 5: Thurs 1.30–3.00 (Wakefield) Multinomial sampling.
- Lecture 6: Thurs 3.30–5.00 (Rice) Model selection and averaging.

DAY 3:

- Lecture 7: Fri 8.30–10.00 (Wakefield) Generalized linear modeling and mixed modeling.
- Lecture 8: Fri 10.30–12.00 (Rice) Meta analysis.
- Lecture 9: Fri 1.30–3.00 (Wakefield) Bayesian and frequentist testing: Single tests and multiple tests.
- Lecture 10: Fri 3.30–5.00 (Rice) Software (WinBUGS/JAGS/INLA/Stan).