2022 SISG Module 13: Bayesian Statistics for Genetics
Introduction and Overview

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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:

Course Details

- Course will be taught remotely over July 20–July 22.
- Break out rooms for exercises/R sessions.
- Class website:
  `http://faculty.washington.edu/kenrice/sisgbayes/`

Course Outline

DAY 1: Wed 20 July

- Wed 11:30–12:20 Lecture 1 (Rice): Why Bayes? Introduction. Review of probability
- Wed 12:20–12:50 R-Demo/Exercises/Solutions
- Wed 12:50–1:10 Break
- Wed 1:10–14:00 Lecture 2 (Wakefield): Probability theory; Binomial Sampling 1
- Wed 2.00–14.30 R-Demos and Practice Sessions

Course Outline

DAY 2: Thurs 21 July

- Thurs 8:00–8:50 Lecture 3 (Wakefield): Binomial Sampling 2
- Thurs 8:50–9:20 R-Demos and Practice Sessions
- Thurs 9:20–9:40 Break
- Thurs 9:40–10:30 Lecture 4 (Wakefield) Multinomial Sampling
- Thurs 10:30–11:00 Demo/Exercises/Solutions
- Thurs 11.00–11.30 Lunch Break
- Thurs 11.30–12.20 Lecture 5 (Rice): Continuous sampling. Linear regression. MCMC
- Thurs 12:20–12.50 R-Demos and Practice Sessions
- Thurs 12.50–13:20 Break
- Thurs 13.20–14:00 Lecture 6 (Rice): Model selection and averaging
- Thurs 14:00–14:30 R-Demos and Practice Sessions

Course Outline

DAY 3: Fri 22 July

- Fri 8.00–8.50 Lecture 7 (Wakefield): Generalized linear modeling and mixed modeling
- Fri 8.50–9.20 R-Demos and Practice Sessions
- Fri 9.20–9.40 Break
- Fri 9.40–10.30 Lecture 8 (Rice): Meta analysis.
- Fri 10.30–11.00 R-Demos and Practice Sessions
- Fri 11.00–11.30 Lunch Break
- Fri 11.30–12.20 Lecture 9 (Wakefield): Bayesian and frequentist testing: Single tests and multiple tests
- Fri 12.20–12.50 R-Demos and Practice Sessions
- Fri 12.50–13.10 Break
- Fri 13:10–14:00 Lecture 10 (Rice): Software (WinBUGS/JAGS/INLA/Stan)
- Fri 14:00–14:30 Demo/Exercises/Solutions