

STAT 8022 Advanced Bayesian Analysis

2022 Fall Semester

Mon/Wed/Fri 11:15 am – 12:10 pm, French Hall West 4211

Instructor: Dr. Xuan Cao, Assistant Professor
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Office Hours: Monday 12:15–2 pm and Wednesday 1–3 pm via Zoom <https://ucincinnati.zoom.us/j/9078641394>
Website: <http://homepages.uc.edu/~caox4/>

Course Description: This course will focus on introducing the popular Bayesian model selection methods and discussing the appropriate remedies in high dimensions, which will have widespread applications in genomics, environmental health and financial studies. Topics including but not limited to introduction to Bayesian analysis (prior specification, posterior inference), asymptotic approach (consistency, Bayesian CLT) and computational approaches (Laplace method, MCMC) for Bayesian inference, and Bayesian approaches for model selection (Bayesian Lasso, Bayes factor, BIC, hierarchical modeling).

Prerequisites: Students are assumed to have background knowledge of concepts of probability, mathematical statistics, applied statistics and advance calculus, introduction to Bayes etc.

Textbook: Lecture notes will be partially based on Bayesian Model Selection and Statistical Modeling by Tomohiro Ando. Mostly we will use lecture notes and journal articles.

Course Webpage: All course related information will be posted on UC canopy (<https://canopy.uc.edu/>), including course syllabus, reading assignments, lecture notes, handouts, homework assignments, codes, announcements, etc. Visit the Blackboard frequently.

Grade: Based on attendance, presentations and one final report. Students will be asked to make presentations, implement the algorithms, and report the findings based on selected papers. Course grade will be based on class participation, the number and quality of presentations. Tentatively there will be **two presentations** for paper overview and algorithm implementation respectively. Tentatively, **the first presentation will be in the weeks of Oct 3 and Oct 10, and the second presentation will be in the weeks of Nov 21 and Nov 28**. There will also be **one final report** detailing your findings, computational strategy (code) and conclusion. Your final course grade will be assigned based on the total points that you have accumulated from

Attendance and participation: 20 pts; Presentation I: 30 pts; Presentation II: 30 pts; Final report: 20 pts; out of the maximum possible 100 points. This grading scale is subject to change. students are expected to read the material and contribute with questions & answers to the presenting student.

About withdrawal: The last day to withdraw from the course is Friday, Nov 18. In case a withdrawal shall occur, the instructor will be required to affirm whether or not you minimally participated in the class. Although the instructors will do the best to answer accurately, in the absence of any evidence to the contrary the instructors will affirm that you did **not** minimally participate. Ways for you to provide clear evidence of your presence in the class include submitting a homework.

Academic Integrity Policy: The University Rules, including the Student Code of Conduct, and other documented policies of the department, college, and university related to academic integrity will be enforced. Any violation of these regulations, including acts of plagiarism or cheating, will be dealt with on an individual basis according to the severity of the misconduct. (http://www.uc.edu/conduct/Academic_Integrity.html)

Regarding Policy: If a student believes that a grading error has occurred, he/she should request for regarding within the next 5 days after the work is returned to the class. This will apply even if the student is absence in the class on the day the work is returned unless prior permission was obtained from the instructor.

Special Needs Policy: If you have any special needs related to your participation in this course, including identified visual impairment, hearing impairment, physical impairment, communication disorder, and/or specific learning disability that may influence your performance in this course, you should meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course. At the discretion of the instructor, some accommodations may require prior approval by Disability Services. In order to take advantage of those available accommodations, students may contact the Disability Services Office at 210 University Pavilion (513-556-6823).
(<http://www.uc.edu/aess/disability.html>)

Personal Devices Policy: **Cell phones must be either turned off or put on vibrate mode during class.** Additionally, please make all efforts **not to use laptops** during the class time. **Cell phone usage is strictly prohibited during exams.**

Email Communication Policy: All communications will be done via UCmail. The instructor will try her best to reply within 24 hours from receipt of emails.