

Syllabus – STOR 757
Spring 2022 (January 9 – April 28)
TuTh 11:00am – 12:15pm
Hanes 130

Instructor: Jan Hannig	Phone: (919) 962-7511
Office: 330 Hanes	E-mail: jan.hannig@unc.edu
Office Hours: Tu 1:00 -2:00pm and by appointment	Course home page on https://hannig.cloudapps.unc.edu/STOR757B https://uncch.instructure.com/courses/21082
Zoom link for Office hours (if needed) https://unc.zoom.us/j/99627403569?pwd=VWVHRm9ZaTJOTWRlVnlhb2dnaXMyZz09	Zoom link for lectures (if needed) https://unc.zoom.us/j/98933076791?pwd=RnhiZWJ3RHlOakJmWnVta1RWL2lidz09
Meeting ID: 996 2740 3569	Meeting ID: 989 3307 6791
Passcode: Hanes330	Passcode: Hanes130

Required Text: Gelman, et al (2013), *Bayesian Data Analysis*, 3rd Edition CRC Press (additional resources related to the book are available at <http://www.stat.columbia.edu/~gelman/book/>)

Optional Text:

- Robert CP, *The Bayesian Choice*, 2nd edition, Springer
- Bernardo JM and Smith AFM, *Bayesian Theory*, Wiley
- Gilks WR, Richardson S and Spiegelhalter DJ, *Markov Chain Monte Carlo in Practice*, Chapman & Hall/CRC
- Albert J, *Bayesian Computation with R*, Springer

Course Objective:

Introduction of both basic and modern aspects of Bayesian methodology.

Covered Topics (in chronological order)

- Philosophical ideas behind Bayesian statistics
- Basic ideas and examples
 - conjugate priors, Jeffreys prior
 - Multivariate distributions

- Hierarchical Models and basic Gibbs sampler
- Model Selection
 - Model averaging and Bayes factors
 - Jeffreys-Lindley's paradox
 - Zellner prior
- Mathematical theory of improper priors
- Theory of Markov Chain Monte Carlo
 - Review of theory of Markov chain
 - Metropolis-Hastings and Gibbs Sampler
 - Hamiltonian-MC
 - Monitoring convergence
- Fiducial inference and inferential models (time permitting)

Assessment: Your grade will be based on homework (30%), two short class presentations (30%) and a project report (40%).

Important dates:

Final Exam: There will be no final exam.

The final project should be uploaded to Gradescope by 12noon on April 28.

Homework: Several homework sets will be assigned on Gradescope during the semester.

Class Presentations: February 9 and April 25

Project:

You will be asked to select a modern paper (no older than 5 years) concerning Bayesian statistics and replicate the results in the paper (simulations, theory, etc). You will also be asked to extend the paper in some way, e.g. theoretical extension or additional simulation study. The final report will be typed using LaTeX using the `ims-template.tex` format. The report should include an appropriate title, introduction, verification, conclusions sections. The final report will be no longer than 10 pages (excluding references). All references must be in refereed journals or books and must be cited appropriately in the body of the text. The final document is due by 12noon, April 28.

Presentations:

You will be asked to give two seminars: The first (February 9) is a short presentation introducing the selected paper and proposing what will be replicated. The second (April 25 or 27) will present the results of your work both on the replication and extensions of the material in the paper. Each student is **required** to come to office hours at least once prior to the first presentation to discuss the selection of the paper.

Delivery Method This course is classified as “in person”. While I expect you to come in class, I am also planning to accommodate students who are unable to do so by recording and streaming the lectures. The office hours will be held in-person or if requested virtually on zoom.

Etiquette for Zoom These are my five expectations of you on Zoom:

- Have your camera turned on.
- Mute your microphone unless answering or asking a question.
- Communicate by unmuting yourself or using the chat feature.
- Be mindful of background noise when not muted.
- Limit your distractions and avoid multi-tasking.

UNC Attendance Policy No right or privilege exists that permits a student to be absent from any class meetings, even online classes, except for these university approved absences: authorized university activities, and disability/religious observance/pregnancy, as required by law and approved by Accessibility Resources and Service and/or the Equal Opportunity and Compliance Office (EOC). Significant health condition and/or personal/family emergency as approved by the Office of the Dean of Students, Gender Violence Service Coordinators, and/or the Equal Opportunity and Compliance Office (EOC).

Diversity Statement I value the perspectives of individuals from all backgrounds reflecting the diversity of our students. I broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. I strive to make this classroom an inclusive space for all students. Please let me know if there is anything I can do to improve, I appreciate suggestions.

Accessibility Resources UNC-Chapel Hill facilitates the implementation of reasonable accommodations for students with learning disabilities, physical disabilities,

mental health struggles, chronic medical conditions, temporary disability, or pregnancy complications, all of which can impair student success. See the ARS website for contact and registration information: <https://ars.unc.edu/about-ars/contact-us>

Counseling and Psychological Services CAPS is strongly committed to addressing the mental health needs of a diverse student body through timely access to consultation and connection to clinically appropriate services, whether for short or long-term needs. Go to their website: <https://caps.unc.edu/> or visit their facilities on the third floor of the Campus Health Services building for a walk-in evaluation to learn more.

Title IX Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Please contact the Director of Title IX Compliance (Adrienne Allison - Adrienne.allison@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvsc@unc.edu; confidential) to discuss your specific needs. Additional resources are available at <https://safe.unc.edu>

Honor Code Statement Students are bound by UNC's honor code (<https://studentconduct.unc.edu/information/policies>) in taking exams and in written work, and the submission of said work signifies understanding and acceptance of those requirements. Plagiarism will not be tolerated. Please consult with me if you have any questions about the honor code.

Legal The instructor reserves the right to make any changes he considers academically advisable. It is your responsibility to attend classes and keep track of the proceedings.