ST 740 (3 credits), FALL 2016
Bayesian Inference and Analysis
Prerequisite: ST 521 and 522
Instructor: Subhashis Ghosal
MW 10:15-11:30, SAS 1216

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Useful books:
(b) J. O. Berger, Statistical Decision Theory and Bayesian Analysis, Springer-Verlag, ISBN-0-387-96098-8
(d) P. D. Hoff, A First Course in Bayesian Statistical Methods, Springer-Verlag, ISBN-978-0-387-92299-7

Course content: Course materials will cover introduction to Bayesian ideas, posterior conjugacy, Bayesian point estimator, regression models, computation including MCMC techniques, objective Bayesian analysis, empirical and hierarchical Bayesian analysis, interval estimation, testing and model selection, decision theory, large sample properties, Bayesian testing and model selection, some special topics (if time permits).

Knowledge of basic probability theory and standard distributions (binomial, Poisson, geometric, negative binomial, uniform, normal, exponential,
gamma, Weibull etc.) and familiarity with principles of statistical inference are required. Familiarity with the material in Casella and Berger’s text on Statistical Inference will be adequate.

Examples will be occasionally illustrated using computer programming in R. Familiarity with R programming is required although numerical assignments can be done using any programming language or package.

1. Grading Policy: Your final grade is determined by a weighted combination of homework (15%), computer assignments (10%), mid-term 25%, and the final exam 50%. A part of the final exam will be a take home project. Plus/minus grading will be used. A rough guide for the grades (including plus/minus) is as follows: 90% for A, 80% for B, 70% for C, 60% for D, less than 60% is F.

2. Homework: These are theoretical exercises to be posted. Homework problems will be announced at least one week prior to the due date. Frequency will be about one set in two weeks. Assignments need to be submitted at class time on due dates. Late homework submission is not acceptable, but advance submission is accepted.

3. Computer based projects: These are simulation and numerical problems which can be solved only with the help of a computer. Due dates and problems will be announced at appropriate times. Frequency will be about one in two weeks. Please submit a hard copy of your analysis which include the proposed solution, output (tables and figures) and conclusion. The whole document will have to be typeset. No handwritten submission is allowed. Reproducibility of your result may be checked (simulation or data analysis). Do not submit your code unless requested by the TA. If requested, code should be e-mailed to the TA and must be ready to run and bug free. You may use any programming language/and or package.

4. Exams: There will be one mid-term and one final exam in this course:

Mid-term: Wednesday, October 12, 10:15–11:30.

Final exam: Written test Wednesday, December 14, 8–11. Submission deadline for take home project is Friday, December 9, 5pm.

Missing exam means automatic zero without documented medical reason plus prior permission except in extreme emergencies.

You may use the posted table of common distributions plus one formula sheet (letter size, two sides) in the exams.

6. Classroom instruction: Slides will be followed in the class. It will be helpful to bring a hard or soft copy of the slides and writing pads in the class.

7. Office hours: You may approach the instructor or the TA in the regular office hours. If you cannot meet the instructor or the TA in regular office hours, you can ask for an appointment.

8. Web and e-mail assistance: Course material including slides will be posted on Moodle; see http://wolfware.ncsu.edu/ and login to ST 779.
page. It will be helpful to keep a hard or soft copy of the slides and bring in the class.

E-mail is preferred mode of communication. Homework and other announcements will be posted on Moodle in due time.

9. **Course calendar:** First day of class, August 17; Mid-term October 12; No class September 5 (labor day), November 23 (thanksgiving), Last day of class November 30.

10. **Audit Policy:** Regular class attendance and doing homework, computer assignments and class problems are required for all students (at least 70% score in homework and computer assignments is required in aggregate for passing grade). Auditing students are exempted from taking the midterm and the final exams.

11. **Attendance:** You are required to attend the class, arrive in time and participate in activities such as in-class problem solving. If you are going to miss a class for a reasonable cause, notify the instructor in advance as a courtesy. See university’s Attendance Regulation (REG02.20.03) for the list of excused absences.

12. **Accommodation for disabilities:** Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State’s policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01).

13. **Honor pledge:** Submission of any test or assignment, take home or in class, automatically implies agreeing to the following honor "I have neither given nor received unauthorized aid on this test or assignment", although students will not have to explicitly sign the honor pledge every time they take a test or assignment.

14. **Integrity:** University regulations require that every course syllabus remind students that the Code of Student Conduct defines a university policy on academic integrity already pledged by each student. Instructors assume that the students’ names on their submitted work imply compliance with this policy. See [http://www.fis.ncsu.edu/ncsulegal/41.03-codeof.htm](http://www.fis.ncsu.edu/ncsulegal/41.03-codeof.htm)