

Advanced Probability and Inference II - STA 6448 Spring 2017

Prerequisite: Distribution Theory (STA 5326) and Statistical Inference (STA5327) or equivalent.

Classes: Tuesday/Thursday 12:30 PM – 1:45 PM, **OSB 0110**

Instructor: Dr. Debdeep Pati

- Email: debdeep@stat.fsu.edu (*When you send me an e-mail, use subject-line “[STA6448]”*)
- Office: OSB 201D
- Office Hours: Tuesday/ Thursday: 3:00 – 4:00 pm (*If you are unable to meet at these times, then schedule an appointment with the instructor for an alternative time.*)
- Mailbox location: 214 OSB (accessible during 8:00am-5:00pm on working days only)

Teaching Assistant: Kumaresh Dhara

- Email: k.dhara@stat.fsu.edu
- Office: OSB 201G
- Office Hours: Monday/ Wednesday: 2:00 – 3:00 pm (*If you are unable to meet at these times, then schedule an appointment with the instructor for an alternative time.*)

Course Webpage:

- **Class website:** http://ani.stat.fsu.edu/~debdeep/6448_s17.html. The class web site will have important information about the course.
- **Blackboard class website:** To access the blackboard site go to <http://campus.fsu.edu/> and login using your FSUID and password. Only grades will be posted on that site and you can access it. All the important information will be posted on the course webpage.

Textbooks (Recommended): The material taught in the class will be based on

- *Probability: Theory and Examples* by R. Durrett.
- *Christian Robert, The Bayesian choice: from decision-theoretic foundations to computational implementation. Springer Science & Business Media, 2007.*
- *Peter Hoff, A first course in Bayesian statistical methods. Springer Science & Business Media, 2009.*
- *Andrew Gelman, John Carlin, Hal Stern, David Dunson, Aki Vehtari, and Donald Rubin, Bayesian Data Analysis, 3rd Edition*
- *Peter Müller and Abel Rodriguez, Nonparametric Bayesian Inference, NSF-CBMS Conference Series in Probability and Statistics, 2013.*
- *Theory of Point Estimation* by E.L. Lehmann and G. Casella.
- *Testing Statistical Hypotheses*, 2nd Edition by E.L. Lehmann.
- *Mathematical Statistics vol. I, 2nd Edition* by P. J. Bickel and K.A Doksum.
- *A Distribution-Free Theory of Nonparametric Regression* by E.L. Györfi, M. Kohler, A. Krzyżak, H. Walk.
- *A Course in Large Sample Theory* by T.S. Ferguson.
- *Asymptotic Statistics* by A.W. van der Vaart.
- *Concentration inequalities: A non asymptotic theory of independence* by S. Boucheron, G. Lugosi, P. Massart.

Course objective: This course will cover advanced probability and methods (both frequentist and Bayesian) for statistical inference.

Syllabus: Tentatively, we will cover following topics.

- Martingales
- Empirical Estimators
- M-Estimators
- Nonparametric maximum likelihood
- Generalized estimating equations, profile likelihood.
- Empirical likelihood
- U Statistics
- Bootstrap
- Large sample tests (Walds tests, Wilks test)
- Bayesian methods (review of parametric inference, testing)
- An introduction to nonparametric Bayes (Dirichlet process and extensions)
- Introduction to concentration of measure

Software: We will primarily use R and MATLAB for data analysis. Refer to <http://cran.r-project.org/doc/manuals/R-intro.pdf> for an R introduction. You are free to use whichever software you prefer.

Grading policies: Your grade will be based on homeworks (50%), a mid-term (45%) and attendance (5%). The grade cutoffs are 90.0% for the lowest A-, 80.0% for the lowest B-, and 70.0% for the lowest C-. However, these grade cutoffs may be adjusted downward at my discretion.

Attendance: You will get the 5% points for attendance and class participation if you do not miss more than four classes. Please note that if you miss more, except in very special cases, you will get 0% on attendance. You are strongly encouraged to attend all classes.

Homeworks:

- There will be assigned homework exercises. Solution sketches may be provided. To receive credit for the homework you must show **all** work neatly, write in blue or black pen or pencil (never in red), clearly **label** each problem, **circle** your final answers, **STAPLE** your entire assignment together in the correct order with your **FULL NAME PRINTED** (as appeared in the blackboard) on the first page. Assignments written in latex are also acceptable. Any homework violating any of these rules will receive a grade of **ZERO** for the entire assignment.
- Each homework carries equal weight.
- You are allowed to work with other students on the homework problems, however, verbatim copying of homework is absolutely forbidden and constitutes a violation of the Honor Code. Therefore, each student must ultimately produce his or her own homework to be turned in and graded.

Add/drop dates: See http://registrar.fsu.edu/dir_class/fall/acad_cal.htm

Homework/exam regrade: You have one week to request a regrade of a homework or exam from the date on which the graded homework/exam is available to the students of the class. Submit a written request detailing the nature of the grading error to the grader or instructor along with the relevant homework or exam.

Exam policies: No student is exempt from any exams. If you have a medical or some other situation that prevents you from appearing at the exam, you have to talk to me in advance and obtain permission.

“The Academic Honour System of The Florida State University is based on the premise that each student has the responsibility to uphold the highest standards of academic integrity in the students work, refuse to tolerate violations of academic integrity in the academic community, and foster a high sense

of integrity and social responsibility on the part of University community.” Please note that violations of this Academic Honor System will not be tolerated in this class. Specifically, incidents of plagiarism of any type or referring to any unauthorized material during examinations will be rigorously pursued by this instructor. Before submitting any work for this class, please read the Academic Honor System in its entirety (as found in the FSU General Bulletin and in the FSU Student Handbook) and ask the instructor to clarify any of its expectations that you do not understand.

Disability policy: Students with disabilities needing academic accommodation should:

1. register with and provide documentation to the Student Disability Resource Center; and
2. bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class.

This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center 874 Traditions Way

108 Student Services Building

Florida State University

Tallahassee, FL 32306-4167

(850) 644-9566 (voice)

(850) 644-8504 (TDD)

sdrc@admin.fsu.edu

<http://www.disabilitycenter.fsu.edu/>

Free Tutoring from FSU: On-campus tutoring and writing assistance is available for many courses at Florida State University. For more information, visit the Academic Center for Excellence (ACE) Tutoring Services comprehensive list of on-campus tutoring options - see <http://ace.fsu.edu/tutoring> or contact tutor@fsu.edu. High-quality tutoring is available by appointment and on a walk-in basis. These services are offered by tutors trained to encourage the highest level of individual academic success while upholding personal academic integrity.

Syllabus Change Policy: Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.