

Statistical Methodology I - STAT 613 (Revised Syllabus)
Spring 2020 (Monday / Wednesday: 12:45 – 2:00 pm)
Mode of Instruction: In-class in BLOC 411 until March 4, Online over zoom
from March 23 - April 28

Course description: Elements of likelihood inference; exponential family models; estimation and hypotheses testing; nonlinear regression models; conditional and marginal inferences; empirical likelihood; generalized estimating equations; multiple testing

Prerequisites: STAT 610 (Distribution theory) and STAT 611 (Statistical Inference) or equivalent.

Instructor Information: Dr. Debdeep Pati

- Email: debdeep@stat.tamu.edu (*When you send me an e-mail, use subject-line “[STAT613]”*)
- Office: Blocker 401C, Ph: (979) 845-3141
- Office Hours: Monday / Wednesday: 4:45 – 5:45 pm (*If you are unable to meet at these times, then schedule an appointment with the instructor for an alternative time.*) **Now online over zoom; refer to email for details**
- No Teaching Assistants are assigned for this course. Feel free to ask questions anytime by email or schedule appointment for meeting.

Course Webpage:

- **Class website:** http://stat.tamu.edu/~debdeep/613_s20.html.
- The class web site will have important information about the course.
- **Ecampus:** To access the blackboard site go to <http://ecampus.tamu.edu> and login using your NetID 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

- *Statistical models* by A.C. Davison.
- *In All Likelihood: Statistical Modeling and Inference using Likelihood* by Yudi Pawitan
- *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.
- *Empirical likelihood* by Art Owen.
- *Generalized Linear Models, no. 37 in Monograph on Statistics and Applied Probability* Peter McCullagh and James A. Nelder.
- *Large Scale inference* by Bradley Efron

Course objective: This course will cover advanced topics on statistical modeling and inference. Some homeworks will involve writing programs in R / MATLAB for data-analysis.

Course topics & calendar of activities: Tentatively, we will cover following topics.

- Review of point estimation and hypothesis testing (**Weeks 1-3**)
- Likelihood based inference (**Weeks 4-6**)
- Large sample tests (Wald’s tests, Wilk’s test, Score test) (**Week 7**)

- Empirical likelihood and non-linear regression models ([Week 8-11](#))
- Generalized estimating equations ([Week 12](#))
- Model Selection ([Week 13](#))
- EM Algorithm ([Week 14](#))

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 attendance (3%), in-class and take-home quizzes based on homeworks (20%), 2 mid-terms (25% each) and final (27%). 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. Note that all the exams will be closed book and closed notes. Refer below for details about homeworks and in-class and take-home quizzes.

Exam dates:

- Midterm 1: Feb 26 (Wed), in class.
- **Midterm 2 (Take-home): April 15 (Wed, 5 pm), due on April 17 (Friday, 5 pm) by email to me.**
- **Final exam: Online on May 1 (Friday), 10:30 am to 1:00 pm on ecampus**

Homeworks, in-class and take-home quizzes: There will be in-class and take-home quizzes *loosely* based on homework sets given out in class. Note that you are not required to submit the homework. The purpose of the in-class and take-home quizzes is to make sure you are well prepared for the exam. Homework sets will be distributed well in advance of the quizzes. The dates of these quizzes will also be communicated in advance. Students will be expected to work on the problems and be prepared with the solutions on the day of the quizzes. Typically an in-class quiz will constitute 25 minutes of the class time. A take-home quiz will typically consist of a numerical exercise to be submitted within a day.

Homework give out dates:

- Homework 0: Jan 13
- Homework 1: Jan 27
- Homework 2: Feb 10
- Homework 3: March 23
- Homework 4: April 13

Attendance: You will get the 3% 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. Regarding the university attendance policy, refer to <http://student-rules.tamu.edu/rule07>.

Make up policy: If an absence is excused, the instructor will either provide the student an opportunity to make up any quiz, exam or other work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor. If the instructor has a regularly scheduled make up exam, students are expected to attend unless they have a university approved excuse. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence. The student is responsible for providing satisfactory evidence to the instructor to substantiate the reason for the absence. Among the reasons absences are considered excused by the university are the following (see Student Rule 7 for details <http://student-rules.tamu.edu/rule07>). The fact that these are university-excused absences does not relieve the student of responsibility for prior notification and documentation. Failure to notify and/or document properly may result in an unexcused absence and the student will get 0% on the attendance. Falsification of documentation is a violation of the Honor Code.

1. Participation in an activity that is required for a class and appears on the university authorized activity list at <https://stuactonline.tamu.edu/app/sponsauth/index>.

2. Death or major illness in a student's immediate family.
3. Illness of a dependent family member.
4. Participation in legal proceedings or administrative procedures that require a student's presence.
5. Religious holy day. NOTE: Prior notification is NOT required.
6. Injury or illness that is too severe or contagious for the student to attend class.
 - (a) Injury or illness of three or more class days: Student will provide a medical confirmation note from his or her medical provider within one week of the last date of the absence (see Student Rules 7.1.6.1)
 - (b) Injury or illness of less than three class days: Student will provide one or both of these (at instructor's discretion), within one week of the last date of the absence:
 - i. Texas A&M University Explanatory Statement for Absence from Class form available at <http://attendance.tamu.edu>.
 - ii. Confirmation of visit to a health care professional affirming date and time of visit.
 - (c) An absence for a non-acute medical service does not constitute an excused absence.
7. Required participation in military duties.
8. Mandatory admission interviews for professional or graduate school that cannot be rescheduled.
9. Mandatory participation as a student-athlete in NCAA-sanctioned competition.
10. In accordance with Title IX of the Educational Amendments of 1972, Texas A&M University shall treat pregnancy (childbirth, false pregnancy, termination of pregnancy and recovery therefrom) and related conditions as a justification for an excused absence for so long a period of time as is deemed medically necessary by the student's physician. Requests for excused absence related to pregnancy should be directed to the instructor.

Other absences may be excused at the discretion of the instructor with prior notification and proper documentation. In cases where prior notification is not feasible (e.g., accident or emergency) the student must provide notification by the end of the second working day after the absence, including an explanation of why notice could not be sent prior to the class. Accommodations sought for absences due to the observance of a religious holiday can be sought either prior or after the absence, but not later than two working days after the absence.

Inability to complete course due to COVID-19 situation: In light of the COVID-19 situation, incomplete grade will be given to students who are unable to complete the course due to physical or mental illness, including but not limited to anxiety and depression, either for yourself or family members you are taking care of, or inability to access the internet. It is strongly encouraged to simply stay home if you are sick, as long as you don't need professional medical care; no medical documentation is needed.

Disabilities Help: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Resources, located in the Student Services Building on the Main Campus, call 979-845-1637, or email disability@tamu.edu. For additional information, visit the Office of Disability Resources (<http://disability.tamu.edu/>).

Statement on Plagiarism: The handouts used in this course are copyrighted. By "handouts", I mean all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission. As commonly defined, plagiarism consists of passing off as one's own ideas, words, writing, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of

another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the Section “Honor System Rules.” Refer to <http://aggiehonor.tamu.edu> if you have questions or concerns.

Academic Honor System: “An Aggie does not lie, cheat, or steal or tolerate those who do”. Academic dishonesty cases will be handled in accordance the University’s policies. Please see <http://aggiehonor.tamu.edu> for the complete Honor Council Rules and Procedures.

Title IX and Statement on Limits to Confidentiality: Texas A&M University and the College of Science are committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws provide guidance for achieving such an environment. Although class materials are generally considered confidential pursuant to student record policies and laws, University employees, including instructors, cannot maintain confidentiality when it conflicts with their responsibility to report certain issues that jeopardize the health and safety of our community. As the instructor, I must report (per Texas A&M System Regulation 08.01.01) the following information to other University offices if you share it with me, even if you do not want the disclosed information to be shared: *Allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus.* These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In many cases, it will be your decision whether or not you wish to speak with that individual. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the Student Counseling Service (<https://scs.tamu.edu/>).

Students and faculty can report non-emergency behavior that causes them to be concerned at <http://tellsomebody.tamu.edu>.