Statistics 3201: Introduction to Probability for Data Analytics
Autumn 2017 Course Syllabus

Instructor: Dr. Subhadeep Paul

Lectures: 9:10 am – 10:05 am on Mondays, Wednesdays, Fridays in Cockins Hall 240*.

*Exception: For the class on Friday, Nov 03, the class will meet in Dreese 264. The regular classroom will not be available on that day due to a state wide Board of Regents mathematics meeting.

Office Hours: 3:00 pm - 4:00 pm on Mondays and Wednesdays at 231 Cockins Hall. You are welcome to walk in anytime during the office hours. However, if you can't make it during the specified hours, you can email me to request an appointment at a different time. Please note such appointments will not be available on short notice.

Email: paul.963@osu.edu.

It is usually difficult to effectively communicate mathematical/statistical concepts through email. So please consider whether your question would be best answered in person in class or during office hours. You can, however ask a question through email for a discussion in the next class (See paragraph on Questions below). I will try my best to be prompt in responding to emails, however a quick response is not guaranteed.
To protect your privacy, all course email correspondence must be conducted using your valid OSU name.# email account.

Office: 231 Cockins Hall

Grader: Amartya Ghosh (ghosh.147@osu.edu)

Grader Tutor room hours: TBD

Course Description: An introduction to probability and its role in statistical methods for data analytics. Equal emphasis is placed on analytical and simulation-based methods for quantifying uncertainty. Approaches to assessing the accuracy of simulation methods are discussed. Students should have some prior knowledge of basic programming. Applications of probability and sampling to big-data settings are discussed.

Upon successful completion of the course, students will be able to

1. Quantify uncertainty about events using mathematical descriptions of probability
2. Quantify uncertainty about events using simulation methods

3. Assess the quality and accuracy of simulation-based descriptions of uncertainty
4. Update a description of uncertainty based on new information
5. Identify appropriate probability models for experiments/data and summarize expected outcomes from such models
6. Use correlation and conditional expectation to describe the relationship between two random variables.
7. Quantify uncertainty about summary statistics for large data sets

Prerequisites: Prerequisites: Math 1152 or 1161.xx or 1172 or 1181 or equivalent, and CSE Placement Level A or equivalent; or permission of the instructor.

Course Website: Important announcements, course materials and lecture notes, homework problems, computing references, and other information about the class are posted on Carmen (carmen.osu.edu, login with your web ID).

Textbook: The required textbook for this course is:

- *Mathematical Statistics with Applications* (7th edition) by Wackerly, Mendenhall and Sheaffer

Course material will be supplemented with the freely available textbook

- *Introduction to Probability and Statistics using R* by Kerns; available online at https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf

Course Materials: A reading list from the required textbook will be provided for each lecture. I will also post incomplete lecture notes in Carmen before each class, which will be interactively completed in class through annotation. You are **not** required to study the incomplete lecture notes beforehand.

Questions: Asking questions is one of the best ways to learn a new material. I will set aside a few minutes in each class for a discussion on any question you have on the entire course material covered up to that point. This is of-course in addition to any clarifying question during the lecture. If you would prefer to ask a question anonymously, you can send me an email with your question and I will discuss that in the next class.

Homework Assignments: Homework will be assigned biweekly. It will consist of numerical problems motivated by data analytics applications and small computer programming/simulation problems. You are encouraged to work together on the problems, but **each student must hand in his or her own work, written in his or her own words. Do not copy any part of another student's homework including computer output. Use of homework solutions distributed in previous offerings of the course or available on the web constitutes academic misconduct and will be handled according to university rules**. A hard copy of the homework solutions should be submitted at the beginning of class on the due date. The solutions may be handwritten or typed. Please be sure that the questions are clearly labeled, all supporting work (including computer code) can be easily identified, and that all figures/tables are referenced

and interpreted in the text. Electronic versions of homework solutions will not be accepted unless permission from the instructor is obtained in advance.

Exams: There will be three in-class exams. Coverage includes lecture material, assigned reading, and homework. Tentative dates are provided on the weekly lesson plan. Statistical tables will be provided as needed. Calculators may be used, but no communication devices are allowed (e.g. mobile phones). You may use one 8.5×11 inch handwritten sheet of paper (both sides) with formulas. Makeup exams require a valid excuse and official proof if I am notified in advance or as soon as possible. A make-up exam must be taken within a week of the missed exam. Exceptions to this policy are permitted only in extreme situations such as serious injury immediately prior to an exam or severe illness requiring hospitalization.

Project: A class project will consist of a combination of a written portion and oral presentation, and will require use of the R software. Suggested project topics will be provided in class.

Computing: We will be using the R statistical computing software. R may be downloaded for free from http://www.r-project.org/. Many students prefer to use the interface RStudio, available for free at http://www.rstudio.com.

Attendance: Regular attendance and class participation is required. To comply with Federal title IV regulations, an actual roll call to verify attendance will be conducted during the first 2 lectures.

Grading: In order to obtain full credit on homework and exam problems you need to show your justification for or full work. Answers without work will not receive full credit. The following is a breakdown of the final course grade:

Homework: 20%
Exam 1: 20%
Exam 2: 20%
Final Exam: 30%
Project: 10%

The following rubric will be used to compute the final letter grade: A: 93 – 100, A-: 90 – 92.9, B+: 87– 89.9: B: 83 – 86.9, B-: 80-82.9, C+: 77-79.9, C: 73 – 76.9, C-: 70–72.9, D+: 67 – 69.9, D: 60–66.9, E: below 60.

Special Considerations: If a situation exists or arises that you think may hinder your progress in this class, you must notify me as soon as possible.

Advising: For questions related to prerequisites and course suggestions, please contact the Statistics Department's Academic Planning Specialist, Brooke Raake (raake.5@osu.edu).

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of

Student Conduct http://studentlife.osu.edu/csc/.

Disability Services: Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.