

# STAT 431/511: STATISTICAL INFERENCE

## COURSE INFORMATION AND SYLLABUS

**Lectures.** Lectures will be held at F65 JMHH (Jon M. Hunstman Hall). There are two sections:

- Section 401: Monday and Wednesday, 1:30 PM–3:00 PM
- Section 402: Monday and Wednesday, 3:00 PM–4:30 PM

**Instructor.** Bhaswar B. Bhattacharya

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Office Hours: TBD

**Course Description and Syllabus.** This course offers an advanced undergraduate level exploration of statistical techniques and their theoretical justifications. The following is a list of topics that will be covered in the class:

- Collecting, summarizing and visualizing data
- Distribution of sampling statistics
- Point estimation and Confidence intervals
- Hypothesis Testing
- Inference with two populations
- Goodness of fit
- Regression (Simple Linear Regression, Multiple Regression, Anova, Logistic Regression)
- Maximum Likelihood
- Non-parametric methods

**Prerequisites.** STAT 430. Students are expected to be fluent with quantitative probabilistic reasoning and analysis (for example, probability distributions and densities, jointly distributed random variables, conditional probability, independence, correlation and covariance, normal and binomial distributions, central limit theorems). Prior programming experience is not required.

**Text.** *Statistics and Data Analysis*, Ajit C. Tamhane & Dorothy D. Dunlop. We will cover selected topics from Chapters 3-15. We will not have time to cover all details and examples. The students should read along in the textbook to gain most from the class. Exams will only cover topics discussed in class; however, students are responsible for keeping track of which topics are covered and which are not.

**Homework.** There will be six homework, assigned approximately biweekly. Homework will be due on Wednesdays and must be handed in during class or in BBB's mailbox (located on the 4th floor of JMHH) by 5:00 PM on the date the assignment is due. *No late homework will be accepted, but the lowest score will be dropped.*

**Exams.** There will be a midterm and a final exam, scheduled for the following dates:

- Midterm:
  - Date: Wednesday, October 19
  - Time: In class
  - Place: F65 JMHH
- Final:
  - Date: Wednesday, December 21
  - Time: 6:00 PM-8:00 PM
  - Place: TBD

Students are expected to show up for both exams at the times specified above. In the case of a medical emergency (requiring a doctor's note), a make-up midterm may be provided. *Both exams will be closed book with a small number of "cheat sheets" allowed, and each student should also bring a personal calculator.*

**Grading.** The course grade will be based on the homework, the midterm, and the final.

- Homework: 30% (lowest score dropped)
- Midterm: 30%
- Final: 40%

**Collaboration policy.** Working together on homework is allowed and encouraged. However, students must write up their homework solutions by themselves. Names of collaborating students should be provided on the front page of each homework write-up.

**Statistical computing.** Few homework assignments will involve coding and statistical analysis on datasets provided. It is recommended that students download and use R for this purpose. Other software such as Excel or Matlab may also be used for data analysis on homework sets. Knowledge of R will not be tested on the midterm and the final. However, R will be the language referred to in class, so students who choose to use another statistical computing platform will need to figure out the equivalent commands on their own.