## STAT511

# Statistical Methods

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Statistics, as a subject matter, is a set of scientific principles and techniques that are useful in reaching conclusions about populations and processes when the available information is both limited and variable; that is, statistics is the science of learning from data. The world is rapidly reaching the point where most things can be monitored or measured. The primary learning objective of this course is for students to develop the ability to make sense of the vast amount of data currently being generated from a myriad of sources.

## Topics to be covered:

- Descriptive statistics: Descriptive statistics are used to summarize numerically and display graphically data. At the end of the semester, students should be able to (1) summarize data numerically and understand the type of information provided by each of the different summaries (2) determine which numerical summaries are most appropriate for a given data set and why these are the best summaries.
- 2. Probability: Probability is the mathematical foundation of statistics. At the end of the semester, students should be able to calculate the probabilities related to a variety of random phenomena. They will be expected to understand how probability is used when interpreting the outcomes of a study.
- 3. Inferential statistics: The bulk of the course material is over inferential statistics. Statistical inference provides methods for drawing conclusions about a population from sample data. At the end of the semester, students should be able to decide which inferential statistical test is the most appropriate for a given data set, to perform the appropriate calculations and to interpret the results. At the conclusion of the course, student will understand the role both chance and sample size play in inferential statistics. They should have the skills required to critically analyze statistical inferences reported in the media and scientific papers.

#### **Recommended** texts/references:

1 Probability and Statistics for engineering and the sciences (8th Ed) by Jay Devore.

2 An Introduction to R, by the R Development Core Team.

## Software:

R (http://cran.r-project.org)

The course had been designed to be based on pencil-paper-calculator, but to facilitate the use in your future work of the techniques learned in the course, I will also introduce some simple utilities in R, an open-source programming environment for data analysis and graphics. You may consider the R materials somewhat optional as those will not appear in the quizzes and the exams, but in a long run those could be the most valuable tools you pick up in this course.

**Grading Rule**: Assignments: 20%; Midterm: 40%; Final examination: 40%. The percentage grades needed to achieve an A, B, C, or F will follow approximately the following scale: 90-100 = A, 80 - 89 = B, 70 - 79 = C, 60 - 69 = D, below 60 is F. **Lectures**: TR 4:30 pm - 5:45 pm classroom: REC 114 Office hours: Tuesday 1-2pm Midterm Examinations: Sep 20 & Nov 2 Final Examination: TBD

Statements on the Course:

- Class attendance is an important part of your success in the class. The syllabus, homework assignments, exam dates, etc. may be changed by in-class announcements.
- The homework will be assigned approximately one week before its due date and will also be posted on the class web page. The homework must be finished (written) independently. Discussion is okay, but identical copies are not acceptable since your homework must reflect YOUR understanding of the material. If identical solutions are found, all the parties involved will receive a 0 on that assignment. Homework must always be stapled if it is longer than one page.
- No late assignments will be graded. To allow for illness, family emergencies, etc., the lowest homework scores will be dropped at the end of the fall semester.

• A makeup examination will be only given to the students who could provide satisfactory evidence that the absences are due to some causes beyond their control. Contact me as soon as possible if you are unable to take an exam at the scheduled time. It is STUDENT'S responsibility to contact me IN ADVANCE to check if a make-up is possible. You may use a calculator during all exams if you wish.

### ADA, Plagiarism, and Academic Integrity Statement:

• STATEMENT ON DISABILITIES: 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 for their disabilities.

If you are a student registered with the Disability Resource Center and you are in need of academic accommodations, please see me during my office hours listed on the syllabus as soon as possible. If you have an Accommodation Letter from the Disability Resource Center, we need to meet during my office hours to discuss your needs.

- 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.
- ACADEMIC INTEGRITY STATEMENT: Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, University Regulations] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and

abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]