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# MAT 2572-D650 Probability and Statistics I (4 cr, 4 hr) Fall 2017

## **Course Meetings:** TuTh 4:05PM - 5:45PM (N923)

## **Instructor:** Ezra Halleck **Phone:** (718) 260-5931

## **Office Hours (in N726):** MW 2:30-3:30 and by apt **Email:** ehalleck@citytech.cuny.edu

**Text:** *An Introduction to Mathematical Statistics and Its Applications, 5e, by* Larson and Marx,Prentice Hall

**Computer software:** We will make considerable use of MS Excel and R; please bring a USB memory stick to class or save your work on the cloud (e.g. Dropbox).

**Course Description:** Topics include sample spaces and probabilities, discrete distributions (Binomial, Negative Binomial, Geometric, Hypergeometric, Poisson, and Gamma), continuous distributions (Uniform, Normal, Chi-squared), expectation and variance, hypothesis testing, interval estimation and confidence intervals.Statistics is a language and set of concepts outside of mathematics. It is built on top of probability (which is part of mathematics) and we will explore how statistics makes use of this engine. The course will lay the probability foundation and then about half-way in, will introduce the basic concepts and tools of statistics. Class typically will include a small lecture, with the concepts and examples integrated.

**Prerequisite:** MAT 1575 Calculus II (in particular, integral substitution, integration by parts, sequences and infinite series as generating functions)

**Student Learning Outcomes Specific to the Course:** At the end of the semester, students will be able to

1. Describe the sample space of an experiment and assign probabilities to events using counting methods, and conditional probability and discrete distribution formulae.
2. Recognize the binomial, Poisson, hypergeometric, geometric, gamma, negative binomial, exponential, chi-squared and normal distributions and find, recognize and evaluate their moment generating functions, expected value and variance.
3. Collect, organize and graph raw data.
4. Compute statistical parameters (e.g., mean, median, mode, variance, and standard deviation).
5. Create grouped frequencies and histograms and identify distribution shapes, including uniform, exponential, bell-shaped, multimodal and/or skewed.
6. Given raw data, create a contingency table and use the chi-squared test to analyze for independence.
7. Use the chi-squared test as part of a goodness of fit analysis.
8. Use spreadsheet and other software to assist in all aspects of the course, including graphing distributions, calculating probabilities and running simulations.

**General Education Student Learning Outcomes:** During the semester, students will have many opportunities to develop skills needed to

1. Make meaningful connections between mathematics and other areas of study.
2. Employ scientific reasoning and logical thinking.
3. Communicate effectively using written and oral means.

**Attendance:** Daily quizzes at the beginning of class should motivate you to arrive on time. If you leave early without getting approval PRIOR to the start of class, your quiz score will not count & you will be marked as absent. If at any point, I observe you doing activities (email, texting, games, movies, assignments from other classes) not relevant to the class, your quiz score will not count & you may be asked to leave the classroom.

**Cell phones:** Please turn *off* orplace on *vibrate* and out of sight.

**Academic honesty:** You are encouraged to work in groups on homework, but be able to explain *anything* you turn in. During an exam, showing someone else your work is cheating; you will be treated in the same way as the person who copies. It is your responsibility to cover your work.

**Set enough time aside each week:** You are expected to spend 4-8 hours outside the classroom each week reading the text, working on projects, doing homework and preparing for exams.

***Time* problems?** Here is a **damage control priority list:**

1. *Read the section prior to the class in which it is covered.* This reading will facilitate your understanding and participation in class.
2. *Attempt at least some of the homework problems* within 24 hours of a class*,* so that you know how much of the class you understood.
3. *Take advantage of office hours:* If you are unable to attend the scheduled hours, make an appointment.
4. *Make use of the Atrium & Voorhees Learning Centers (approximately 9AM-8PM, M-Th, shorter hours on F & Sat):* While some of the tutors are advanced undergraduate students, many are adjunct faculty. The math department also typically has tutoring sessions run by advanced mathematics major.

**Grade components**

**Daily quiz (10%):** based on the reading for that day, any material discussed in the previous class and homework from the previous section. This will also serve as attendance.

**Book homework (10%):** You received separately a *list of problems*. Try to do most work directly in Excel/R, using a separate tab for each problem. During the daily quiz, I will come around and mark your homework.

 **0 (little done), 1 (1/4 done), 2 (1/2 done), 3 (3/4 done), 4 (completed), 5 (completed and correct).**

**Online participation (10%):** **Use first name, last initial for screen name, e.g. JimP, if your name is Jim Poe.** Your grade will be 2 for perfunctory, 3 for significant, 4 for deep thought & effort.

**NOTE, you will be making exactly TWO postings**; all other contributions are comments on other postings.

1. Join the openlab and make a posting by **Sa 9/23** explaining how statistics and probability relate to your career (include a photo of yourself with an aspect of mathematics and/or your career in the background).
2. Make a 2nd posting by **Sa 10/14** focusing on a graph which appears in a newspaper. You must include a short summary of the newspaper or magazine article, a reproduction of the graph and a description of how the graph was used in the article. Make sure that you have provided a link to the original article.
3. By **T 10/17**, you will be paired with another student. By **Sa** **11/4**, comment on and make suggestions for improvement on the other student’s posting as well as create a word problem based on his/her graph.
4. By **Sa 11/25**, respond to the comment by editing your original post (please acknowledge the change your edit). Solve the word problem that your partner has created.
5. Finally, by **Sa 12/19**, comment on your original posting on blackboard, summarizing your overall experience in the course and writing once again on how you think statistics relates to your career.

**Best 3 out of 4 midterm exams:** 45% (allows for one miss as there are no makeups)

**Final exam:** 25% (no student can pass the course without taking the final exam)

*For each homework problem you present, you may earn up to 5 points added to your next exam, depending on its level difficulty and how well you present. You can earn up to a max of 10 points each exam period.* ***You must put all your work on the board prior to the beginning of class.***

***Optional project****: you may do a* ***project*** *which can add up to* ***10 points towards your final average****. The project must involve* ***simulation*** *using either R or Excel. In addition to a small report, you must meet with me for a 30-minute consultation and make a presentation (10 minute). Deadlines: Project proposal via email, Th 10/19. Project report draft via email, T 11/14. One-on-one consultation, Th 11/30. Project presentation day is 12/12. Final version of the project, computer files and slides all must also be submitted by 12/12 on Blackboard.*



**Grade scale:**

93 – 100 A 77 – 79.9 C+

90 – 92.9 A- 70 – 76.9 C

87 – 89.9 B+ 60 – 69.9 D

83 – 86.9 B 0 – 59.9 F

80 – 82.9 B-