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# MAT 2572-D650 Probability and Statistics I (4 cr, 4 hr) Fall 2016

## **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 largely separate from mathematics. It is built on top of probability (which is part of mathematics) and we will continuously explore how statistics makes use of this engine. However, the emphasis of the course is to lay the foundation of probability and introduce the basic concepts and tools of statistics. While some part of class will be a small lecture on any new concepts, most of each class will be used to discuss and write about scenarios, examples and homework from the book.

**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:** You may miss no more than 3 classes. Lateness between 5 and 40 minutes counts as 1/2 an absence. Once in class, stay for the full period; if you *leave early* without making prior arrangements, *you will be marked as absent or late (depending on how early you leave)*. Students who have been excessively absent and fail the course will receive a WU grade if they have attended the course at least once. This includes students who stop attending without officially withdrawing from the course.

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

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

**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:**

* Online participation (10%): To receive credit, you must provide a link in blackboard to each of your posts or comments in the appropriate content area. You will receive between 2 and 4 points for each item below (2 = perfunctory participation, 3 = significant thought & effort, 4 = deep thought & excellent effort). NOTE, you will be making a total of TWO postings, all other contributions are comments on other postings.
  + Join the openlab and make a posting by Sa 9/24 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).
  + Make a 2nd posting by Sa 10/15 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 so that students can easily find it.
  + You will be paired with another student. By Sa 11/5, 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.
  + By Sa 11/26, respond to the comment by editing your original post (please acknowledge the change as a comment to the comment). Solve the word problem that your partner has created.
  + Finally, by Sa 12/10, 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.
* Daily writing assignment based on the reading for that day and any material discussed in the previous class. This will also serve as attendance. It will be posted on the board 5 minutes prior to the beginning of each class. Each assignment will be scored on a 5-10 scale, 5 for a serious effort and 10 if all the aspects of the assignment are addressed: 10%
* Best 3 out of 4 midterm exams: 35% (allows for one miss as there are no makeups)
* Online (webwork) homework and/or class participation: 10%
* Descriptive Statistics Project: done as a group of 2 or 3, topics must be approved, data can be survey collected or internet derived: individual written, 5%; group presentation, 5%
* Final exam: 25% (no student can pass the course without taking the final exam)

**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-