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# MAT 2572-D642 Probability and Statistics I (4 cr, 4 hr) Spring 2016

## **Course Meetings:** M, W 4:00 - 5:40 PM (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.

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

Although these topics will be reviewed as needed, it would be great if students knew how to:

1. Collect, organize and graph raw data.
2. Compute statistical parameters (e.g., mean, median, mode, variance, and standard deviation).
3. Create grouped frequencies and histograms and identify distribution shapes, including uniform, exponential, bell-shaped, multimodal and/or skewed.

**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. Given raw data, create a contingency table and use the chi-squared test to analyze for independence.
4. Use the chi-squared test as part of a goodness of fit analysis.
5. Use spreadsheet and other software to assist 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 0 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 failed the course at the end of the semester 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 or on vibrate* and place out of sight. If the instructor sees or hears a phone, he may ask that you hand it to him for the duration of class.

**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 4-6 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 and enable you to make a journal entry.
2. *Attempt at least some of the homework problems immediately after 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.

**Philosophy:** 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 develop the basic concepts and tools of statistics and learn to apply them to real life applications. While some part of class will be a small lecture on any new concepts, most of each class will be used to work on and discuss scenarios and examples from the books as well as homework.

**Grade components:**

* Daily quiz at the beginning of each class based on the reading for that day and any material discussed in the previous class. This will also serve as attendance. 15%
* Best 2 out of 3 midterm exams: 50% (allows for one miss as there are no makeups)
* Final exam: 35% (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-