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# MAT 2572-D650 Probability and Statistics I (4 cr, 4 hr) Fall 2015

## **Course Meetings:** T, Th 4:05 - 5:45 PM (N923)

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

## **Office Hours (in N726):** MW 2:00-3:00 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.

**Sketch of a typical class:** Informally begins at 3:55. Questions for journal work will be displayed on the board. Please pick up your notebook (that I will provide) and make a journal entry. During this time, I will be setting up for class but may be available for a short question as well. This journal entry time will continue for the first 10 minutes of class.

The next 30 minutes will be devoted to homework review done by an assigned group. To get credit, the group must meet with me prior to the presentation, either in person, via skype or some combination of the two. You should decide who presents what depending on each individual’s strengths and depth of understanding. However, one reason for this component is to provide oral speaking experience. Hence, the presentation must be organized so that each student presents for roughly an equal amount of time.

**Group project:** most of you are applied math majors. As such, you are expected to be able to use computers to simulate phenomena. Over the course of the semester, topics will come up which lend themselves to simulation. I will point these out, ask which groups are interested and then randomly select from those interested. By session 20, ALL groups should have a project they are working on.

**Index cards:** As part of study time at home write down any key words and concepts that will be developed in the next lesson on the lined part of the card. On the other side, write down 2 questions or comments that you have about the section. Insert the card into your journal so that I can quickly find your most current entry.

**Grade components:**

* Daily index cards and journal entries: 15% (a few misses and/or lates will be taken into account)
* 2 Group homework presentations: 10% (if you miss one, then participate more subsequently)
* Best 2 out of 3 midterm exams: 35% (allows for one miss as there are no makeups)
* Group Project: 15% (groups should consist of at least 3 but no more than 4)
* 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-