Syllabus for ISyE/CEE 3770 – Statistics and Applications

1. **Class Time and Location: Day #2 & #4, 1:30 – 3:25 am at GTE Assigned Classroom**
2. **Instructor:** Dr. Jye-Chyi (JC) Lu
3. **Email: JCLU@isye.gatech.edu (main communication method)**
4. **Office & Office Hours: GTL Room (TBA); Day #2 and #4, 12:20 – 1:20 pm**
5. **Course Description posted in GT Catalog:** Introduction to probability, probability distributions, point estimation, confidence intervals, hypothesis testing, linear regression, and analysis of variance. Cross-listed with CEE 3770.
6. **Prerequisite(s):** MATH 2401 or MATH 2411 or MATH 24X1 or MATH 2605
7. **Texts: I will use notes posted on Canvas.** The book below will serve as our main reference. Applied Statistics and Probability for Engineers by Douglas C. Montgomery, George C. Runger, 5th Edition, 2010, John Wiley and Sons.
8. **Course Contents:** See page 2 for topical outlines.
9. **Software:** Free statistical software package R will be used. It can be downloaded at http://cran.r-project.org/ This software is important for several courses and popular in many real-world applications.
10. **Grade Distribution (might be adjusted): Exam #1(a) (15%), Exam #1(b) (10%), Exam #2 (15%), Exam #3 (18%), Exam #4 (17%), Computer Projects (21% totally; 5% for CP1, 3% for CP2-P1, 5% for CP-2 P2, 8% for CP-3), Attendance (3% - GTE requires attendance check for every lecture – students are allowed to miss up to three attendances), Instructional Survey (1%). Note that there are past reports and R-codes for take-home exams, and computer and enrichment projects. Past in-class exams (with solutions) will also be available for students.**
11. **Final Grades:** Unless we made exams too difficult (or too easy), we will use the following letter grade assignments: A for [90 and above) semester scores, B for [80, 89.999), C for [70, 79.999), D for [60, 69.999), and F for (59.999 or below).
12. **Georgia Tech Honor Codes: Students are required to follow the Georgia tech honor code which may be found at: http://osi.gatech.edu/content/honor-code**

    Please pay attention to the following guidelines provided by Georgia Tech.

    1) What is not plagiarism? *Plagiarizing is defined by Webster's as "to steal and pass off (the ideas or words of another) as one's own : use (another's production) without crediting the source." If caught plagiarizing, you will be dealt with according to the GT Academic Honor Code.*

2) What is authorized collaboration and what is unauthorized collaboration? Regardless whether an exam is an in-class or take-home exam, solving exam problems together is an unauthorized collaboration. If an exam is a take-home exam and it is required to write computer codes to employ software packages to perform certain computation or data analysis, the following are authorized collaboration with fellow students:

(a) installing software systems onto your PC,

(b) downloading data into software systems,

(c) calling codes into your PC's software systems, and

(d) getting computer printouts from computer screens or downloadable files,

All other activities such as discussion of how to solve a problem, which software function to use, how to write codes or find sample codes to do computation or analyze data, and discussion of how to write solution reports to interpret computer printouts are unauthorized collaborations.

Topical Outline:

Topics	GTE Weeks
Probability Introduction	0.25
Random Variables	0.25
Discrete Distributions	0.25
Continuous Distributions (including Normal)	0.25
Descriptive Statistics	0.25
Sampling Distributions	0.25
Point Estimation	0.5
Confidence Intervals	1
Hypothesis Testing	1.5
Analysis of Variance, Experimental Design	2.0
Simple Linear Regression	1.5
Multiple Linear Regression	2.0

Outcomes and their relationships to ISyE Program Outcomes

- Ability to collect, organize, summarize and present data graphically
- Demonstrate ability to use formal mathematical argument with basic probability concepts, including conditional probability distributions
- Understand how to characterize and assess probability in its role in experiments
- Use statistical tests and confidence intervals to assess mathematical uncertainty in statistical decisions
- Select proper statistical techniques for statistical decision making based on the type of data available
- Use statistical software to conduct data analyses and interpret output
- Draw sound statistical conclusions from experiments and observational studies

Course outcome \ Program Outcomes	**a. apply math**	**b. Design, conduct experiment, analyze interpret data**	**c. Design system**	**d. team**	**e. problem solving**	**f. prof/ and ethical responsibilities**	**g. communication**	**h. global, eco, envi and soc context**	**i. Life-long learning**	**j. Contemporary issues**	**k. use tools for eng. practice**
Ability to collect, organize ...		High									Med
Demonstrate ability to use formal…	High				High						
Understand how to characterize …	High				High						
Use statistical tests…		High			High	Med	Med				High
Select proper statistical…			Med		High	High			High		High
Use statistical software		High									High
Draw sound statistical conclusions …					High	High			High		

- Team project are sometimes conducted

Evaluation of the important outcomes:
Three or more important outcomes will be evaluated from direct questions in the Final exam:

1. Demonstrate ability to use formal mathematical argument with basic probability concepts their role in interpreting experimental outcomes.
2. Students should be able to analyze, summarize and display sample data.
3. Students should be able to interpret experimental outcomes and draw conclusions about the larger population based on correctly designed experiments and the experimental data that accompanies them.
4. Students should be able to choose and apply proper statistical methods and to draw sound statistical conclusions for a large variety of experimental data

ISyE ABET Student Outcomes a - k

a) an ability to apply knowledge of mathematics, science, and engineering
b) an ability to design and conduct experiments, as well as to analyze and interpret data
c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d) an ability to function on multidisciplinary teams
e) an ability to identify, formulate, and solve engineering problems
f) an understanding of professional and ethical responsibility
g) an ability to communicate effectively
h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) a recognition of the need for, and an ability to engage in life-long learning
j) a knowledge of contemporary issues
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.