

ISYE/CEE 3770 - Statistics and Applications (Draft by Dual Enrollment faculty)

Service Class for other STEM majors. No credit for BSIE students

Credit: 3-0-3

Coordinators Prof. Jing Li, Ethan Lee 2025

Prerequisite(s): MATH 2551 or MATH 2550 AND MATH 1554 or MATH 1553

Texts

1. Prob-Stat Goldsman, FREE PDF for teacher and students, on Canvas.
2. Probability with Applications, Free PDF, Canvas, Debankur Mukherjee

Reference

Applied Statistics and Probability for Engineers by Douglas C. Montgomery, George C. Runger, 7th Edition, 2020, John Wiley and Sons.

Catalog Description: Introduction to probability, probability distributions, point estimation, confidence intervals, hypothesis testing, linear regression, and analysis of variance. Cross-listed with CEE 3770.

Course description

Topical Outline:

Topics	Instructor	Weeks
Introduction to Probability, Statistics, Analytics, ML and AI	Williams	1
Random Variables	Willams	1
Discrete Distributions	Williams	1
Continuous Distributions (including Normal)	Williams	2
Descriptive Statistics with R	Ayer	1
Sampling Distributions	Huo	1
Point Estimation	Goldsman	1
Confidence Intervals	Goldsman	1
Linear Regression	Goldsman	1.5
Classification	Xie	1
Hypothesis Testing	Xie	1
Analysis of Variance, Experimental Design	Huo	1
Summary: Probability and Statistics for Analytics, ML, AI and Decision	Huo	1
SUM	Huo	14.5

Assessment

5 Mini-projects: Upload answers in videos 20%

Tests: $3 * 15\% = 45\%$
 Final: 35%

Outcomes and their relationships to ISyE Program Outcomes

At the end of this course, the students will be able to

- 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
- Understand the role of probability and statistics in analytics, ML and AI?

Student Outcome Assessment Plan

Course outcome \ Program Outcomes	1. identify, formulate solve engg prob by engg, sci & Math	2. produce solutions consider public health, safety, welfare, global, cultural, social, environ & economic	3 communicate with a range of audience	4 recognize ethical & professional responsibilities, make informed judgement consider resolutions in global, economic, environ and societal context.	5. effective on a team provide leadership, collaborative and inclusive environ, plan tasks & meet objectives	6. develop and conduct experiment, analyze and interpret data & use engineering judgement to draw conclusions.	7. acquire and apply new knowledge using appropriate learning strategies
1. Ability to collect, organize, summarize and present data graphically						M	
2. Demonstrate ability to use formal mathematical argument with basic probability concepts, including conditional	M						

probability distributions							
3. Understand how to characterize and assess probability in its role in experiments	M						
4. Use statistical tests and confidence intervals to assess mathematical uncertainty in statistical decisions	M						
5. Select proper statistical techniques for statistical decision making based on the type of data available						L	
6. Use statistical software to conduct data analyses and interpret output						L	
7. Draw sound statistical conclusions from experiments and observational studies						L	

Assessment of the important course outcomes

The course outcomes. This is a service course, not relevant to BSIE. If the other units want to assess the outcomes, those Ls can be assessed.