

IPE 205 Probability & Statistics

Course Outline

Course Code:	IPE 205
Name:	Probability & Statistics
Stage:	Level-2, Term-2
Duration:	4 hours per week
Prerequisite:	None
Credit Points:	4.00

Class Instructor

Tanmoy Das,
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Subject Introduction

With probability and statistics, Industrial & Production Engineers make intelligent decisions to develop and manage their processes and businesses by finding optimal solution of real world problems. In this class, we will learn powerful modeling and data analysis techniques for decision-making problems that are used by many successful companies.

Course Outcome

1. Perform statistics analysis to explore, visualize and predict situations from the data.
2. Understanding probability distributions and preparing data for further analysis.
3. Facility with mathematical and computational modeling of real decision-making problems, including the use of modeling tools and computational tools, as well as analytic skills to evaluate the problems.
4. Facility with the design, implementation, and analysis of computational experiments. Use mathematical software (e.g. Python) to solve the proposed models

Program Outcome

1. Engineering Knowledge,
3. Design/development of solutions,
4. Conduct investigations of complex Problems,
5. Modern tool usage,
10. Communication,
12. Life-long learning

Course Content

1. Introduction to Statistics, Data, Data Visualization (Box plot, Normal Probability Plot), Exploratory Data Analysis, Introduction to Data Science
2. Basic laws of probability, conditional probability, random variables, measures of central tendency and dispersion, mathematical expectation, probability distributions, transformation of variables, moments and moment generating functions, sampling
3. Correlation and regression analysis & other Machine Learning algorithms
4. Analysis of variance, Data Mining
5. Central limit theorem, chi-square distribution, t-distribution, f-distribution, estimation and confidence interval
6. Statistical hypothesis and testing, goodness-of-fit tests.
7. Experimental designs, randomized block design, factorial design, introduction to stochastic problems in engineering.
8. Python Projects based on Data Science

Assessment

Assignment/Attendance/Observation	10%
Class Test/Project	20%
Written Examination	70%

Assignment

There will be problem sets due approximately every 2 week.

Project

A real world problem has to be solved in the project. The problem of the project must be complex enough to deal with. 1-2 class tests can be waived upon course instructor's approval if the project has real life benefit, time consuming to solve, and direct affiliation with the companies. Class Test 2 & 4 will be project submissions. The class test 3 will be conducted by another instructor.

Reference book

1. Statistical techniques – Lind
2. Statistics for Big Data for DUMMIES – Alen Anderson
3. Pertinent reference materials can be found at <https://github.com/tanmoyie/Applied-Statistics>

Computing tool:

Python/R Programming Language