IE 231 - Introduction to Probability

Instructor: Berk Orbay

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Welcome to one of the most boring courses of the industrial engineering curriculum.

What's in it?

- Introductory concepts (definitions, axioms of probability)
- Counting (permutations)
- Bayes' theorem (conditional probability)
- Expectation (why the house always wins) and variance.
- Distributions (discrete, continuous)
- Joint probability

What's it good for? (in general)

- Assessing risks/options
- Making decisions

In this course you will learn to quantify and measure well defined uncertainties (e.g. tossing coins, rolling dice). You will not learn, however, how to assign probabilities to hard to measure events (e.g. the stock market tomorrow). You are expected to get a 'feeling' about it.

What's it good for? (IE related)

Many IE related problems are stochastic in nature, since we deal with the real world problems. You will need probability for the following undergrad topics at the very least.

- Statistics (distributions)
- Stochastic programming (Markov Chains, Queuing Theory)
- Simulation
- Quality control

What's it good for? (IE related)

Following topics are some of the challenges you will face uncertainty related to IE topics.

- Demand planning / forecasting (e.g. ice cream sales)
- Portfolio optimization (i.e. which stocks to invest in?)
- Risk analysis (i.e. probability of losing part of or total investment)
- Hiring decisions (i.e. is candidate A or B a better fit?)
- Digital marketing (e.g. A/B testing, campaign scenario evaluation etc.)

What's it good for? (short term)

- Better intuition about probability.
- You will become a better gambler (i.e. poker, dice game similar sort of stuff)
- Potentially better grades (if you can keep up).

Course Progress

Lectures

- Main textbook: Probability & Statistics for Engineers and Scientists 9th Edition, Walpole R.E., Myers R.H.
- One week theory, one week practice.
- Block hours (2 sessions each week).
- Groups of two (for most exercises)
- You will learn probability with R via online courses.
- Attendence (70% at least or fail - department requirement) Course will be intense anyway, don't miss any class.

Grading

- Attendence, participation, homeworks etc. (30%)
- Midterm (probably April 10.) (35%)
- Final (35%)

In Class Participation

- Attendence will make 5-10% of your grade.
- Almost everything will be done during class hours. Very few homeworks (perhaps only before exams).
- You will be watching online lectures and coding with R.

Ethics House Rules

- Collaboration is encouraged in most cases. Gather, discuss and learn from each other for homeworks, exercises etc.
- But! Your work should be your own. Don't be stupid by simply copy pasting other people's work.
- Avoid obvious cheating in exams. Don't be stupid (again).

Course Objectives

At the end, at the very least, you should...

- know your way around basic probability concepts and distributions.
- understand probability related processes and problems.
- have basic R proficiency. (You will thank me later.)
- topic based; bayes theorem plus binomial, poisson and normal distributions.

Communications

- Use bilgi.ie231@gmail.com email for queries and questions about the lecture.
- We will use Bilgi Learn for lecture notes and assignments. You can also check `https://berkorbay.github.io/bilgi-ie231/`
- There will be no office hours outside lecture hours. Use internet, lecture hours and each other efficiently. (Create a Whatsapp or Slack group for instance)