**Freshman Seminar**

**IEOR 24: Introduction to Industrial Engineering and Operations Research**

Prof. Ken Goldberg

**Notes on Week 5: Prof. Lee Schruben, by Sabina Del Rosso**

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ABOUT PROF. SCHRUBEN

-Has consulted in over 40 industries

-Taught for 23 years at Cornell before coming to UC Berkeley

-Recently became ORMS advisor

ABOUT THE ORMS MAJOR

-Major isn’t easy to describe

-Flexible major: variety in where you can work

-Designer major

* Not many required courses
* Self-directed: can name own concentration
* Like getting an engineering degree without engineering breadth requirements

-Small major: more people apply than are admitted (capped enrollment) but may expand

* Some people that are turned down have better GPA’s than some IEOR majors

-Great major at Berkeley: get advantages of a small college and resources of a large university

-Can lead to graduate school or to a job

* Most people go to graduate school: get MBA’s, or go pre-med/pre-law

WHAT DO YOU LEARN ABOUT IN ORMS MAJOR?

-Operations Research: decision analysis

-Can learn about finances, accounting and how to manage money

-Get a technical background: take math and science classes

-Structured way to think about problems: risk management

-When to use suboptimal solutions: need to be able to handle uncertainty

-Learn how to do computer simulations

-Locate and remove constraints 🡪 get better results

-Figure out where variability does not cause major backups in situations: run system at this point

-Learn about resource trade-offs, constraint trade-offs, and risk

-Find optimal design of a system (includes components made by other engineers)

-Look at reasons for why you want a particular result

WHAT IS THE DIFFERENCE BETWEEN IEOR AND ORMS?

-IEOR is an accredited engineering degree

-IEOR gives students a broad set of tools

* Go to graduate school or work for a couple of years to find specialty

-ORMS has a concentration: find what you are interested in

WHAT ARE SOME FIELDS ORMS IS USED IS?

1. Agriculture

-Has consulted at Gerber Foods and Burger King

2. Entertainment

-Fastpass system at Disneyland

-Scheduling monorail system at Disneyland

-Golf courses: Need to get people through the course quickly

* Achieve this by giving each hole a name instead of a number
* Golfers no longer feel a need to go in sequential order which decreases overall wait time

-TV commercial spots: Sell time slots to different companies by guaranteeing ratings

* Some time slots can be bid on up until the time the ad actually airs
* Involves a complicated optimization scheme

3. Factories

-General Mills: Factory in Buffalo, NY makes cheerios but was running out of cheerios

* Need to slow process down: made more by working slower
  + Bottlenecks and jams were occurring when machines went fast
  + Lines were getting built up and the oven making cheerios had to be shut down
  + Variability 🡪 congestion
  + Create overlap so cues build up on all machines and not just a few

4. Financial Systems

-Create ways to save time, manage cues, and make a profit

5. Hospitality

-Work in hotel industry

6. Quarantine

-Figure out how to run a quarantine while dealing with the ethical issues for societal systems

-Created a mathematical model to help with outbreak of hog cholera in Florida

* How many healthy pigs do you kill before you stop killing pigs?
  + To be 100% sure, you have to kill all pigs

-Mad cow disease: “England has made cow disease, Europe does not”

* Try to quarantine England but it didn’t work

7. Media

-Do simulations for video games and create animation

8. Transportation

-Scheduling for airlines: where each plane lands and which gates each plane goes to

-Facility design: baggage flow in airports