IE 533: Industrial Application of Statistics
Spring, 2016

Instructor: Professor Hong Wan
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Tentative Office hours: TTh 1:30-2:30, through Piazza, and by appointment.

TA: TBA.

This semester we will use blackboard for material and grade posting, and Piazza, an online class communication system, as the major communication/Q & A tool. The class link is at https://piazza.com/purdue/spring2016/ie533/home. The website also have mobile apps. All students are required to register to the website and all questions should be posted on the Piazza first. Before you post the question, please conduct a quick search to see if someone else has asked the same/similar one. The teaching staff will check the website and answer the questions promptly (within 24 hours). During the exam review period, we will check even more frequently.

Prerequisite: An introductory statistic class covered basic probability, descriptive statistics, point estimator, hypothesis testing and simple regression. IE330 is sufficient.

Texts:
- Slides will be posted on blackboard.
- Textbook: Design and Analysis of Experiments by Montgomery, 8th edition. (For homework and background reading. This book can serves as a reference if you want to check DOE related topics).
- References:
  - Statistics for experimenters: design, innovation, and discovery by George E.P. Box, J. Stuart Hunter, William G. Hunter. (This book is old, but explain things well).
  - Stat Labs, Mathematical Statistics Through Applications by Deborah Nolan and Terry Speed (very interesting examples with real data)

Course Objective:
To help students understand the concepts of design of experiments and statistical analysis, and their applications in practical and industrial
problems. The emphasis will be on the implementation of methodologies, but some theories will be covered as well.

Materials tend to cover
- Brief review of basic statistics
- Simple Comparative Experiments
- ANOVA analysis
- Randomized Blocks, Latin Squares, and Related Designs.
- **Factorial designs.**
- **Fractional factorial designs.**
- **Regression**
- Nested and split-plot designs
- **Response surface methodology**
- Robust design

**Grade:** Homework and labs 20%; two Midterms 30% each; and Project 20% (5% of the proposal).

**Tentative Cutoff:**

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<th>Grade</th>
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**Homework and labs:** the homework will be posted on web with explicit due time. Generally speaking you will get 1-2 homework per topic. **There is NO CREDIT for late homework.** We will not grade the homework in detail since the answers are in the back of the book or will be given. However, you will not receive credit for problems where insufficient work is shown. **Labs will be finished in teams (as in project),** and each team needs to submit only one lab report. Similar to homework, labs will be posted on blackboard with explicit due time. There is NO CREDIT for late lab submission. **Your lowest homework/lab grade will be dropped.**

**Exams:** the exam will be close book, close notes. One A4/letter scribe sheet (double sided) is allowed.

Tentative midterm dates: March 10th (Thursday) and April 21st (Thursday) in class.

**Software:** The demonstration in class will be mainly in Minitab and SAS. The textbook uses SAS, Minitab, and JMP. You can pick whichever software you are most comfortable with. Please note that EXCEL is not adequate. You need to pick at least one statistic software.
Project: You will be required to finish a team project that applies the course materials, preferable related to your work/research. Each project team should contain no more than 3 students (all on-campus) or 4 students (including one or two off-campus students). I will present some sample projects in class. You can also choose to do the project alone. Each group needs to write a one-page proposal and I will decide whether the proposed project is relevant/appropriate. Specifically, the proposal should include:

- The title of the project.
- The objective.
- The proposed approach/methodologies and how it is relevant to the course.
- Data collection/availability.
- Expected challenges/limitations.

The proposal is due on March 29th.

If your group cannot find a project topic, then your group will design a paper helicopter that can fly a long time (Default project).

The requirement of the project presentation and report will be discussed later in class. The report will be due at the start of the final week.

Academic Integrity:

You are welcomed to discuss the homework with your classmates. However, you have to write the homework independently. And your group cannot copy other groups’ lab reports or data. Cite the name of the classmates with whom you discussed the homework. Students commit academic dishonesty will receive a failing grade for the course and be reported to the Dean of Student Office.