Decision Methods and Industrial Applications

- **Office hours:** Tuesday 10:00 - 12:00

- **Instructor:** Cheng-Hung Wu

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    - **Lectures:** TBD
    - **Location:** TBD
    - **Course web page:**

- **Course description:** This is an application oriented course on dynamic decision making. We will emphasize the use of dynamic decision methods in theory and practice, especially when uncertainties and multiple decision makers are issues. These methods are widely used and covered in other courses, including decision analysis, stochastic optimization methods, and game theory. However, none of the previous courses emphasize on the dynamic interaction between decision makers and between decisions in different time periods. Different from other courses in decision making, this course will focus on the multiple period, multiple decision maker decision problems. We will also emphasize on the modeling of uncertainties in multi-period decision making problems.

    General knowledge of probability theory, stochastic processes, and operations research is assumed. Applications considered in this course include supply chain coordination, revenue management, and technology management. However, the topics discussed also have wide applications to many other financial and economic systems.

- **Readings:** There will be no required text book for the course; required reading materials will be distributed either in class or through the course website.

    There are many good textbooks on decision analysis, dynamic programming and game theory. However, most of them are much more extensive than what we could cover in one semester. These textbooks differ in their emphasis and presentation; I am providing references to some of them for you to use as reference materials: (Most of the course materials are developed from the books in this list.)

    - R. T. Clemen, Making Hard Decisions: An Introduction to Decision Analysis, 2nd edition, South-Western College Pub, 1997
    - E. Denardo, Dynamic Programming: Models and Applications, 1982 (out of print)
    - L. Pepall, D. Richards, and G. Morman, Industrial Organization: Contemporary Theory and Empirical Applications, 4th edition, Wiley-Blackwell, 2008

- **Course Objectives and Contents:**

    - Model problems in which decision making is an issue
    - Construct and solve multi-period decision making problems

- Know how to include randomness in multi-period decision-making problems

- Understand basic stochastic dynamic programming

- Understand basic game theory and its application to dynamic decision problems

- **Required background:** Background in college level calculus and mathematical analysis. In addition, the course homework will include some (small-scaled) computational problems. These computational problems will consist of implementing algorithms discussed in class and applying them to conduct analysis.

- **Grading:** Course grades are determined from performance on homework assignments, projects, in-class discussion, midterm, and final exam. Grading is base on:

  - 1st midterm exam. 25%,

  - 2nd midterm exam. 30%,

  - Term project 20%,

  - Quizzes, homework, in-class discussion, and reports 25%.

- **Midterm Exams:** time and place TBA. The exams are open notes, open textbook. However, you are only allowed to use your notes and textbook; none from previous classes and non borrowed or copied from other students.

- **Course Policies:** Notify me ASAP if you are unable to take an exam or meet a deadline for any reason. I must hear from you (either in person, or by email, or by voice mail) prior to the exam or the due date. Any excuses will need to be appropriately documented. In each instance, we will discuss how you will make up for the missed work.

- **Individual work policies:** You are allowed (indeed, encouraged) to consult with other students enrolled in the class during the conceptualization of a problem, or ask for technical support is accessing the necessary software. However, all submitted homework assignments (including computer codes and outputs, if relevant) should represent your own efforts. In particular, you are not allowed to obtain, look at, use, or in anyway attempt to derive advantage from the existence of solutions for this or other classes prepared in prior years, whether these solutions were produced by former students or had been made available by previous or current instructors or textbook publishers. You must observe the university rules with respect to examinations and all other aspects of this course. If any of the above policies, or other aspects of the university rule are unclear to you now, or in the future, please ask me to clarify them as soon as the issue arises.