Welcome!

- It is a pleasure to be with you
- We will be covering much new material
- Looking forward to learning with you
- Hope to make some long-term friends
Introduction of Teachers

- Richard de Neufville
  - Prof. of Engineering Systems and of Civil and Environmental Engineering
  - Course Organizer

- Dr. Frank Field
  - Associate Director for Education, Technology and Policy Program; Principal Research Engineer

- Tao Wang
  - Teaching Assistant
  - Master’s from BU, 2nd year TPP student

Introduction of Students

- Please fill out sign-up sheets being passed around

- Please indicate if you are
  - taking course
  - are shopping around
New Title -- New Emphasis -- Same Number

- Previous Title: Dynamic Strategic Planning

- Emphasis
  - Use of Analysis to Configure Engineering Systems
  - "Real Options"

- MIT School-Wide Elective
- ESD 71, 1.146, 2.192, 3.56
- 13.62, 16.861, 22.821

Logic of the Course

- Engineering Systems exist in Uncertainty
  - Loads -- Physical and Market Size
  - Technical -- New Developments
  - Organizational -- New Regulations, Competitors

- Engineering Systems Need to Adapt
  - Take advantage of Opportunities
  - Avoid Hazards, Risks

- Flexibility is Essential Part of Design
  - How do we value flexibility?
  - How much is enough?

- "Real Options" provides Answers
New Material

- Brand-new Approach to Engineering Design
  - Use of “Real Options”

- Revolutionary possibilities
  - Explicit consideration of flexibility, not possible earlier

- Approach derived from “Options Theory”
  - Nobel Prize-winning development in finance

- Modified to fit engineering realities
  - Lack of historical data
  - Need for Approximate Procedures

Structure of Material

- 1. Engineering Systems Analysis -- Certainty
- 2. ESA for Uncertainty

- Part 1 Integrated Perspective on Basics
  - Evaluation over time -- Major projects
  - Concepts for Modeling Systems
  - Optimization -- Linear and Dynamic Programming

- Part 2 Systems Analysis under Uncertainty
  - Decision and Utility Analysis
  - Real Options Analysis
Approach to Learning

- **Part 1**
  - Assumes that all participants have had some of the material somewhere
  - Aims to provide a coherent view
  - Moves fairly rapidly

- **Part 2**
  - Crux of course
  - Emphasis on Understanding Applications
  - Many issues subject of ongoing research

Course Materials

- Xerox of Text -- $20
- Tree-Age Software -- $20
- Obtain after first and second class in E40-242

- Web:
  - http://msl1.mit.edu/mib/dsp/curricula.mit.edu/~dsplan
- Bulletin Board:  http://msl1.mit.edu/esd71bbs/

- Excel capability -- sessions on advanced topics (Data Tables; What’s Best) will be arranged
Assignments

- See Web site for details
- Problem Sets, Exercises throughout semester
- Best to do them as you go along
- However, only need to turn in on due date
- Mid-semester Quiz
- Final Exam

Academic Honesty

- To confusion that might result from different expectations elsewhere, note the standards that apply in this subject.
- Anyone found cheating in a quiz or examination will receive a zero for the event.
- Assignments turned in for grading are to be done individually. We expect that students will discuss the problem sets. However, students should ultimately prepare their own reports for each assignment individually, in their own format and words. Demonstrated evidence of copying will result in zeros for each paper with this evidence.
Weekly Recitation Sessions

- They will show how to solve problems
- Demonstrate Advanced Excel Sessions
- Review for Quiz and Final

Meeting with Instructors

- Use Bulletin Board at any time
  - Answers should be prompt
  - Share information with others
- Teaching Assistant office hours
  - To be arranged (TBA)
- Prof. de Neufville  after each class;
  “office” in Building 7, 4th floor coffee shop
  by appointment Tuesdays and Thursdays
Times for Recitations?

- Tuesday 2........
- Tuesday 3........
- Wednesday 9.....
- Wednesday 10...
- Wednesday 11...
- Wednesday 1.....
- Wednesday 2.....
- Wednesday 3.....
- Wednesday 4.....

Until next Tuesday...

- THANK YOU FOR YOUR ATTENTION

- WE ARE NOW AVAILABLE FOR DISCUSSIONS