GOOD MORNING

BON JOUR !
GUTEN MORGEN !
O HAYO GOZAIMASU!
SELAMAT DATANG!
G’DAY, MATES !
¡BUENOS DIAS!
КАЛН МЕРА!
NI HAO MA !
BOA DIA !
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

- Tao Wang, Konstantinos Kalligeros, Lara Greden
  - Teaching Assistants
  - Doctoral students doing dissertations in Real Options

- Sgouris Sgouridis, Maggie Tsui
  - Graders
  - 3rd, 2nd year students
Introduction of Students

- Please fill out sign-up sheets being passed around

- Please indicate if you are
  - taking course
  - shopping around

ENGINEERING SYSTEMS ANALYSIS FOR DESIGN

- Central Idea: Using Analysis to Configure Engineering Systems for best long-term performance

- Means: “Real Options”, i.e., physical things that system managers and designers can do to add flexibility
  - To avoid bad outcomes (acts like insurance)
  - To seize opportunities for improvement
  - Overall, to maximize expected performance in uncertain world

- MIT School-Wide Elective, with many numbers:
  ESD 71, 1.146, 2.192, 3.56, 13.62, 16.861, 22.821

Choose what meets your course requirements
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**

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New Material

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

- **Revolutionary possibilities**
  - Explicit consideration of flexibility, not possible earlier
  - => savings (or increase in performance) of order of 30% !

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

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

- **Idea is to develop coherent road-map for design**
New Course Structure

- Field is moving rapidly...

- ... So 2004 has big changes in organization of class

- The hope is to make it much better for everyone

- But your help is needed – please provide feedback on your experience
  - Too fast? Or too slow?
  - Something missing? Errors on Slides?
  - Better examples needed?

- You are partners in this cutting-edge learning

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Structure of Material – 5 Parts

1. Benchmark: Analysis Assuming Certainty
   -- this is the traditional standard

2. Analysis Recognizing Uncertainty
   -- this shift alone leads to different solutions

3. Decision Analysis Approach
   -- A naïve, practical approach to uncertainty

4. Real Options Analysis: Theory
   -- The sophisticated approach

5. Real Options Analysis: Models for Engineering
   -- Adapting theory to practice – current examples
Prerequisites

- Syllabus assumes comfort with basis calculus, probability, statistics

- Also assumes familiarity with some advanced concepts of Excel used in course

- To test if you are on top of this material, please take self-assessment test posted on course site. If this is too difficult for you, sign up for:

  - ESD 70 – this Thurs; Fri; Mon; Wed 4-6, Rm 4-370
  - Listener is fine, 3 units of credit possible

Course Materials

- Many lectures refer to chapters from my text, Applied Systems Analysis (out of print). These can be downloaded in pdf from course web site.

- Web: http/arudent.mit.edu/Real_Options

- Detailed Syllabus, etc, on this site. Note carefully: It will be updated almost weekly!

- Bulletin Board: under web site. Will be used to make announcements, respond to questions. CONSULT REGULARLY !!
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 avoid possible confusion resulting from expectations elsewhere, note the standards that apply in this subject.

- Anyone found cheating will get ZERO for quiz or exam.

- Do graded Assignments individually. We expect students to discuss the problem sets. However, they should then prepare their own reports for each assignment, 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 Software
- 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
- Prof. de Neufville “office hours” after class; “office” in café outside of classroom. Appointments Tuesdays and Thursdays for specific issues.
QUESTIONS?

- THANK YOU FOR YOUR ATTENTION
- WE ARE NOW AVAILABLE FOR DISCUSSIONS

Times for Recitations?

- Wednesday 9........
- Thursday 9........
- Thursday 3........
- Thursday 4........
- Friday 2.......
- Friday 3.......

- Other possibilities
  - Wednesday 10.....
  - Wednesday 4.30.....