



# **Mechanical Engineering Department**

## **Quals Info Session**

November 17, 2006

Sponsored by MEGA Women, in association with GAME

# Agenda

- Quals guidelines, from ME Graduate Guide & past quals sessions
- GAME quals survey results
- General Advice
- Brief summary of exams by professors
  
- Open discussion

# The Purpose of the Quals

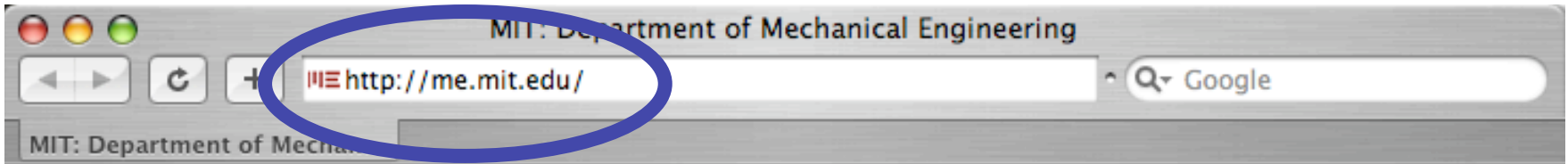
From the MechE Graduate Guide:

“The purpose of the qualifying examinations is to determine whether the applicant possesses the attributes of a doctoral candidate: **mastery of the mechanical/ocean engineering disciplines** and ingenuity and skill in **identifying and solving unfamiliar problems.**”

*(emphasis added)*

# Quals Overview

- Two parts
  - Three subject area exams (choose three out of 14 subject areas)
    - New subjects may be added w/ one term's notice; existing subjects may be discontinued with two year's notice
  - Original research presented as a 45-min. thesis-area exam (usually previous SM thesis or initial doctoral work)
- Must take the exams (the first time) within three regular terms after admission to the PhD program
- Offered every May and January
- If the student fails the first time, s/he **may** be offered a second chance (not a guarantee, no more than two attempts, second attempt must be the following semester)



School of Engineering

## The Department of Mechanical Engineering

Thursday November 17, 2005

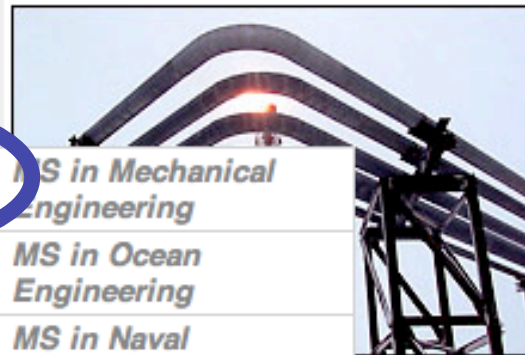
Contact Information

- Home
- About ME
- Undergraduate Programs
- Graduate Programs**
- Research
- Calendar
- Announcements
- Employment
- People
- Administration
- Resources

Search:

ME  MIT

Search



MS in Mechanical Engineering

MS in Ocean Engineering

MS in Naval Architecture & Marine Engineering

MS in Oceanographic Engineering

MS without specification

MEng in Manufacturing

Mechanical Engineer degree

Naval Engineer degree

**PhD/ScD**

### How Soon Will World's Oil Supplies Peak?

Conservation efforts - such as gas-electric hybrid cars - cannot save the day, according to **Professor John Heywood**, director of Sloan Automotive Laboratory. Autos and trucks last an average of 15 years, so it would take more than a decade to bring down fuel consumption on a large scale with new technology.

*The Christian Science Monitor, November 9, 2005*

### The 10 Most Influential Executives

Many brilliant, creative, ambitious and idealistic people have made the electronics industry what it is today. In this article, *Electronic Business* magazine spotlights 10 of these luminaries, whose contributions during the magazine's 30 years have had broad impact and lasting influence on the industry. They include **Chung Morris Chang (SB 1952, SM 1953, ME 1955)** (left), Chairman of the Board of Taiwan Semiconductor Manufacturing Co. Ltd.

*Electronic Business, November 1, 2005*

### 'Anklebot' Helps Stroke Patients

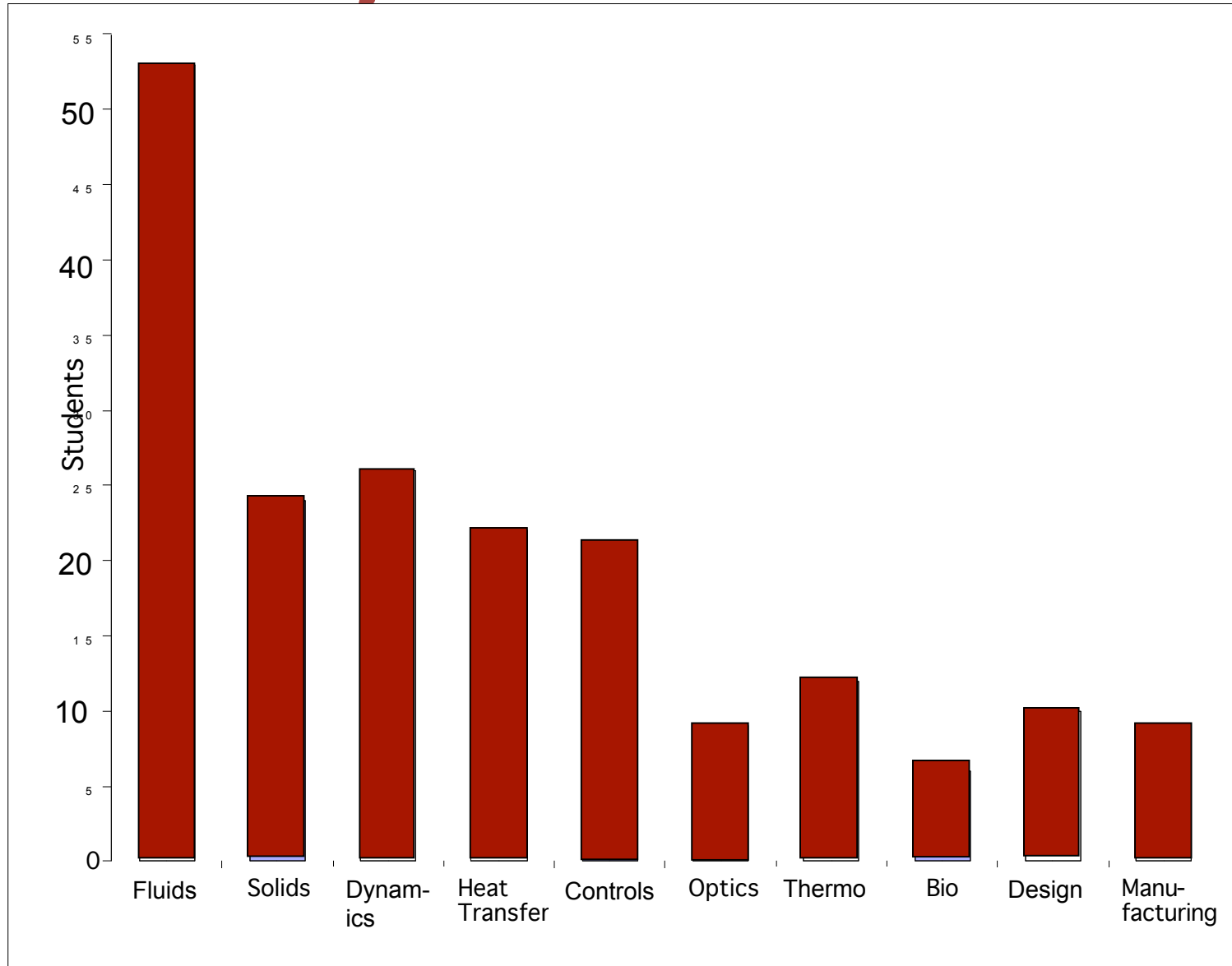
# Notes from Previous Sessions: Scoring, Passing, Results Meeting

- Grading: 80 pts total
  - 20 each for each subject area & for thesis
  - Must pass 2 subject areas and thesis area
    - thesis is most important to some faculty: WILL NOT pass without it, but possible to have to re-exam ONLY on thesis
  - For subject areas, need to demonstrate a deep, thorough understanding of undergraduate-level concepts
- Results meeting
  - It IS important for at least one faculty member to KNOW YOU who can say something about you

## 2005 GAME Qualls Survey

- Surveyed ~50 students who passed quals in January and/or May 2005
- 25 responded
- 22 passed the first time
- 2 passed the second time
- 1 passed the second time (thesis only)

# Subjects Chosen in 2005



# Preparation & Study Groups

- “When did you start studying?”  $m=3.14$  months
- “How many hours/week did you study?”  $m=20$  hours
- Most had study groups in at least one subject
- 2 – 4 people, 3 – 4 hours per week per subject
- What they did:
  - Worked old problems
  - Presented solutions orally to each other
  - Sometimes had lab mates hold mock oral exams

## What to expect

- Tight time constraints
- 3 to 4+ profs in the room, sometimes fluctuating during your exam
- Last-minute time slot changes
- Faculty may interrupt you during orals (subject & research) to ask questions

## General Advice

- Don't stress too much
- Learn how your body reacts to stress
  - exercise, eating well, sleeping enough, etc.
- Form study groups early
- Study in advance
  - take the time to build confidence in your subject areas & research
  - don't burnout
  - set up a schedule, esp. during month prior
- Talk to your advisor!

# Research Exam Advice

- Intent is to evaluate whether you can complete an original body of work & demonstrate critical thinking
- Emphasize what your contribution is
- State up front how much time you have spent on the research
- Read up on relevant literature
- Typical research for presentations:
  - Masters: 18
  - Current work: 5
- Practice research presentation -- GAME seminars, in your lab, etc.
- Note: thesis advisors may not speak during presentation

# Subject Exam Advice

- Practice oral exam skills w/ study group
- Explain your conclusions:
  - instead of : “The answer is  $2\pi R$ ”
  - say: "When I try to figure out the perimeter of a circle, I first determine the important parameters of the system. For a circle, I use radius or diameter. For this example, the radius is not given so I will assume a value of one ..."

# Preparatory Classes (ME Guide) *[GAME Survey]*

- Dynamics (2.032) *[2.003]*
- Mechanics of Solid Materials (2.071), or Structural Mechanics (2.080J) *[2.083, 2.305, 2.001, 2.002, 3.22]*
- Fluid Mechanics (2.25), or Hydrodynamics (2.20), or Geophysical Fluid Mechanics (12.800)
- Thermodynamics (2.42) *[2.006]*
- Heat and Mass Transfer (2.52 or 2.55) *[2.51, 2.56]*
- System Dynamics and Control (2.140 & 2.151)
- Signal Processing (6.003)
- Biological Engineering (2.795J & 2.798J)
- Optics (2.710)
- Manufacturing (2.810) *[2.008]*
- Design *[2.75, 2.72, 2.007, 2.009]*
- Acoustics (2.066)
- Probability & Random Processes (6.431 & 2.22)



**Best Advice**

**RELAX!**



November 17, 2006

Quals Info Session

15

# Resources

- **Faculty**
  - your ME advisor
  - professors from the disciplines & classes you're taking
- **GAME:** [web.mit.edu/game/www/quals/index.html](http://web.mit.edu/game/www/quals/index.html)
  - past exams
  - advice from previous quals sessions
  - unofficial guide to quals
- **Students**
  - senior students in your lab & classes

# Brief, Exam-Specific Summaries

- Fluids, Prof. McKinley
- Biological Engineering, Prof. Kamm
- System Dynamics & Controls, Prof. Asada
- Probability & Random Processes, Prof. Triantafyllou
- Thermodynamics, Prof. Smith
- Acoustics, Prof. Schmidt
- Manufacturing, Prof. Chun
- Optics, Prof. So
- Design, Prof. Seering



# Questions & Discussion



**Thank you!**