



Mechanical Engineering Department

Quals Info Session

November 18, 2008

Sponsored by MEGA Women, in association with GAME

Agenda

- Structure of quals
- Notes from GAME 2005 quals survey
- General advice and resources
- Brief summary of exams by professors

- Q&A and time to talk to students who've passed in your subject areas

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 16 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)

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 qualls 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)

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
 - Use the board
- Walk the professors thru your thought process:
 - For example: “My system is the black box. For the black box to remain stationary, the sum of the forces acting on the box must be zero. The forces acting on the box are ...”

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

- Dynamics (2.032) *[2.003]* or Acoustics (2.066)
- 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) or Signal Processing (6.003) or Probability & Random Processes (6.431 & 2.22)
- Biological Engineering (2.795J & 2.798J)
- Optics (2.710)
- Manufacturing (2.810) *[2.008]*
- Design *[2.75, 2.72, 2.007, 2.009]*

Resources

- **Faculty**
 - your ME advisor
 - professors from the disciplines & classes you're taking
- **GAME:** web.mit.edu/game/www/quals/index.html
 - past exams
 - advice from previous quals sessions, details about exam formats
 - unofficial guide to quals
- **Students**
 - senior students in your lab & classes
- **Course materials**
 - notes, exams

Brief, Exam-Specific Summaries

- Solid Mechanics, Prof. Anand
- Hydrodynamics, Prof. Sclavounos
- Thermodynamics, Prof. Cheng
- Heat & Mass Transfer, Prof. Mikic
- System Dynamics & Control, Prof. Youcef-Toumi
- Biological Engineering, Prof. Kamm
- Manufacturing, Prof. Gutowski
- Design, Prof. Culpepper
- Probability, Prof. Leonard
- Optics, Prof. So



Questions & Discussion



Thank you!