

# PhD Preliminary Exam

Mechanical Engineering, University of Colorado

## *Summary*

The Ph.D. Preliminary Examination in the Department of Mechanical Engineering is to assess a student's potential to successfully complete a Ph.D. It is designed to evaluate a student's analytical skills, to appraise their knowledge of mechanical engineering fundamentals, and to gauge their potential to do creative independent research. The exam requires the student to consolidate his/her grasp of the fundamentals of mechanical engineering and to demonstrate aptitude for conducting original research. The content of the examination reflects consensus across the department faculty. The examination is administered by the Graduate Committee, acting on behalf of the entire faculty.

## *What is the Preliminary Exam?*

The preliminary exam is a two-part exam that must be passed by students before they can continue in the Ph.D program. The first part of the exam is an *academic written exam*, and the second part of the exam is the *research oral exam*.

### **Academic Written Exam**

The academic written exam part of the preliminary exam consists of two written exams that cover graduate material in mechanical engineering. Typically the exams are linked to specific courses, but are written so that they are more comprehensive than the course's final exam. Content from course prerequisites can also appear on these exams. Students will select 2 exam topics from the available lists of topics. At least one of the 2 exams must be taken in a fundamental area. Students have the option of taking one exam in a technical area.

Instructors for the courses linked to the exams will work with two additional faculty, selected by the Graduate Committee, to write and grade the written exams. These three-faculty written exam committees will decide pass/fail for each student in that exam.

The academic written exam will be administered the week before the start of the spring semester. All students will take the exam at the same time. Over a six-hour period (with a lunch break), each student will have to complete both exams. The faculty groups will then grade within 3-4 days. The graduate committee will assemble the results and inform the students ASAP.

### **Research Oral Exam**

An oral exam will be administered towards the end of the spring semester by a three-member committee chosen by the student, preferably as part of the already existing Intro to Research experience. Typically the student will make a presentation summarizing their research progress to date. The committee will then ask the student research-related and disciplinary questions to further probe the student's ability to perform PhD caliber research in their chosen specialty. This committee will determine pass/fail. The committee can evaluate student knowledge in relation to the research, not just the research results.

## *What are the Topics for the 2009 Preliminary Exam?*

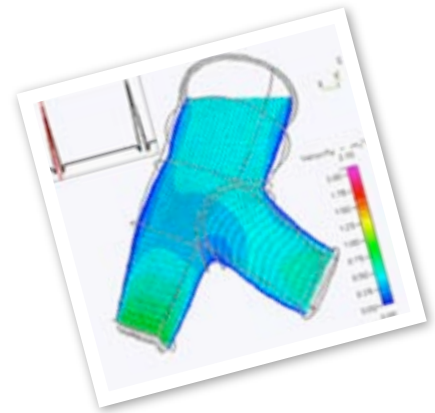
The topic area should have at least one exam taker (but is up to the discretion of the lead) and should reflect the department's research areas and graduate degree tracks. Students fill out a form that lists their exam choices and the form is signed by their advisor. This form must be submitted by Oct 21, 2009.

### **Fundamental Areas**

Methods of Engineering Analysis I  
Fluid Dynamics  
Solid Mechanics  
Materials Chemistry and Structure  
Heat Transfer (Spring 2010)

### **Technical Areas**

Aerosols  
MEMs I  
Anatomy and Physiology for Engineers



## *When is the Exam Administered?*

The academic written exam will take place on Jan 6, 2010, between 9-4 p.m. One exam will be in the morning, from 9-noon. There will then be a 1-hour break, and lunch will be provided. The second exam will be in the afternoon from 1-4 p.m. Proctors will be present all day. The exams will mostly be open book, per exam requirements, and no electronics are allowed. Calculators will be allowed, per exam requirements.

The research oral exam will be administered towards the end of the second semester (spring semester) of the first year of the Ph.D. program. Specific dates are TBD.

## *Who can take the Preliminary Exam?*

First year Ph.D. students are required to take the preliminary exam. For Fall 2009 only, students that have extenuating circumstances that do not allow them to take their exams in the above areas in the fall (e.g., need to take an exam in an area that is not taught in the fall like heat transfer), may petition the graduate committee to take one of their exams in the spring over material taught in the spring and must take one exam in the Fall. Only in extenuating circumstances, will the student be allowed to take both exams in the spring. These exceptions are for the 1-year implementation and are needed because the graduate curriculum has not yet been completely synched with the needs of the new preliminary exam system.



## *What happens if a Student Fails?*

### **Academic Written Exam**

If a student fails one written exam, they will be required to retake it at the end of their second semester, in the spring. If a student fails two subjects, then they are done at the M.S. Students will only be given one opportunity to retake, so by the end of May, every student's position will be determined. Departmental support of first-year PhD students will be maintained through their first academic year regardless of performance on the written exam. Successful completion of the prelim is required for subsequent support.

### **Research Oral Exam**

There will be no research exam retakes, unless a student can find a new research advisor willing to support him/her on a Research Assistantship, in which case that student must take a second research oral exam within the year.

## *What about Exam Retakes from Last Year's Exam?*

Students who need to retake the preliminary exam from last year (spring 2009) will be accommodated by allowing them to do their retake under the old system or the new system. Students must fill out a petition informing the graduate committee of their retake plan and this must be signed by their advisors. This form is due to Sharon Anderson by Oct 21, 2009. Specifically their options are to retake exams in the spring on undergraduate material, as described on the ME graduate program website, or in the fall on graduate material as described in this handout. They also must retake the same number of exams.

## *Assessment*

An assessment process will be undertaken after both the written and oral exam parts of the preliminary exam have been administered. The assessment process will be used to further refine and improve the preliminary exam process.

**If you have any question, please contact Prof. Shelly Miller, Chair of the Graduate Committee at [Shelly.Miller@Colorado.EDU](mailto:Shelly.Miller@Colorado.EDU)!**