

**DOCTORAL QUALIFYING EXAMINATION**  
**Department of Mechanical Engineering**  
**Columbia University**

**EXAM FORMAT:** The Qualifying Exam consists of a written test covering several areas of Mechanical Engineering.

Core subject areas are: (i) Control, (ii) Dynamics, (iii) Elasticity, (iv) Fluids, (v) Heat Transfer, (vi) Thermodynamics

Courses that will correlate with the CORE subject areas:

- (i) Control EEME E6601 Intro to Controls
- (ii) Dynamics - MECE E6400 Adv. Machine Dynamics
- (iii) Elasticity - MECE E6422 Elasticity I
- (iv) Fluids - MECE E6100 Advanced Mechanics of Fluids
- (v) Heat Transfer - MECE E6313 Advanced Heat transfer
- (vi) Thermodynamics - MECE E4302 Advanced Thermodynamics

Applied subject areas are: (i) Combustion, (ii) Energy, (iii) Manufacturing, (iv) Micro/Nano Engineering, (v) Robotics

Courses that correlate with the APPLIED subject areas:

- (i) Combustion - MECH E4320 Intro to Combustion
- (ii) Energy - MECE E4211 Energy Sources & Conversion
- (iii) Manufacturing - MECE E4610 Advanced Manufacturing Processes
- (iv) Micro/Nano Engineering - MECE E4212 MEMS
- (v) Robotics - MECE E4602 Intro to Robotics

The Exam contains **4 questions** from each subject area above.

Students are to answer a **total of 12 questions**.

**At most, 4 of those questions can come from the Applied Areas.**

Note that the department does not test Mathematics as a separate component of the exam. Instead, knowledge of mathematics is integrated and tested within the engineering subject tests. Since all doctoral students are expected to take courses in APMA, STAT, or MATH, you will be required to apply knowledge from such areas as: Ordinary Differential Equations, Partial Differential Equations, Linear Algebra, Complex Variables, Numerical Analysis, Advanced Calculus, Integral Transforms, Statistics, etc.

Consult with your advisor or other faculty members to determine what courses are available that can help you prepare for the exam.

**EXAM DURATION:** The exam starts at 8:00AM and finishes at 5:00PM

**EXAM DATE:** The Doctoral Qualifying Examination in Mechanical Engineering is offered annually in May on the day after university commencement.

**WHO MUST TAKE THE EXAM:** The Exam must be taken no later than the first time it is offered after you have spent 2 semesters in the graduate program as an MS/PhD or a PhD student.

**WHO CAN TAKE THE EXAM:** To be eligible to take the examination, you must be:

- A regular graduate student in the department for at least two semesters, prior to being admitted to the examination.
- Have a minimum grade point average of 3.2/4.0 in all graduate courses taken beyond the Bachelor's degree.

Exceptions to the above rules are made only under unusual circumstances. Except in cases of medically certified illness or an unforeseeable emergency, the student should petition in writing to the Department Graduate Committee no later than one month prior to the examination.

**SIGNING UP:** Anyone intending to take the exam should sign up as announced by the Mechanical Engineering Student Affairs Manager, no later than April 15.

**PREVIOUS EXAMS:** Copies of previous qualifying examinations are available from the Student Affairs Manager, or designee.

**EXAM ADMINISTRATION:** The exam starts at 8:00AM and finishes at 5:00PM. Breakfast and coffee will be available before and during the exam, and lunch will also be provided.

Non-programmable calculators will be supplied for your use. They will be given out before the exam begins. Backpacks, cell phones, and other calculators are not permitted into the exam room.

**GRADING & ASSESSMENT:** The results of the Exam are taken into consideration to determine a Pass or Fail grade. This decision is made by ALL faculty in the Department. No number grade is announced.

If you fail the examination, the department will indicate whether you will be allowed to take it the next time it is offered. In no case, are you allowed to take the examination more than twice.