Information on PhD Qualification Exam  
(2017-2018 Spring Semester)

The qualification exam has two parts. The first part (administered by the Department of Mechanical Engineering) is a general written exam (3 hours) covering the topics of undergraduate curriculum. Each student selects one of the following four fields for the general exam and receives 5 equally weighted questions from each topic listed under that field:

**A. Thermal-Fluids Systems and Energy**

Mathematics (Analytical and Numerical)  
Thermodynamics  
Heat Transfer  
Fluid Mechanics  
Any course from fields B, C and D except Mathematics.

**B. Dynamics, Control and Mechatronics**

Mathematics (Analytical and Numerical)  
System Dynamics and Control  
Dynamics  
Theory of Machines  
Any course from fields A, C and D except Mathematics.

**C. Solid Mechanics and Design**

Mathematics (Analytical and Numerical)  
Statics  
Mechanics of Materials  
Machine Design  
Any course from fields A, B and D except Mathematics and Mechanics of Materials.

**D. Materials and Manufacturing**

Mathematics (Analytical and Numerical)  
Materials Science  
Manufacturing  
Mechanics of Materials  
Any course from fields A, B and C except Mathematic and Mechanics of Materials.

-In the examination, there will be 2 questions from each of the topics under the field that has been chosen. Students should choose one question from each topic to solve. Additionally, there will be 1 question from Analytical part and 1 question from Numerical part of the Mathematic. Students also have to choose either the Analytical or the Numerical question. If they attempt to solve both of the question from each topic, only
one of them will be randomly graded by the lecturers. Therefore, please be sure to solve only one question from each topic.

-Students should write down and submit a petition about their request for taking a question from the field other than their preferred field.

The student must receive the general written exam to advance to the 2nd part of the qualification process. The general exams are held twice a year. If a student fails the general exam twice, he/she will be required to take 3 undergraduate courses and pass all of them with a minimum grade of B3 before he/she is allowed to take the exam for the third time.

In the 2nd part, a formal qualification exam committee is formed and the committee administers a written and an oral exam according to the regulations of Graduate School of Science and Engineering (Fen Bilimleri Enstitüsü). If the 1st part of the qualification exam is successfully passed Ph.D supervisors of the students will announce the details of the second part.

**Important Dates for 2017-2018 Ph. D Qualification Exam**

**The Exam Date:** 16th of April 2018 (The venue of the examination will be announced from the Department’s website)

**Last Day to Submit the Petition about the request to take a question from the field other that their preferred field:** 6th of April 2018

Below, the subjects and the undergraduate course information from each field are given as guidance to prepare for the 1st part of the qualification exam.

**Mathematic (For all students)**

The contents which are covered in MMÜ218 Applied Mathematics for Engineers and MMÜ202 Numerical Analysis courses.

**A. Thermal-Fluids Systems and Energy**

**Thermodynamics:**
• Energy and the First Law of Thermodynamics
• The Second Law of Thermodynamics
• Using Entropy
• Vapor and Gas Power Cycles
• Refrigeration and Heat Pump Cycles
• Gas Mixtures and Psychrometry
Heat Transfer:
• 1D and 2D Steady-State Conduction
• Transient Conduction
• Convection, External and Internal Flows
• Radiation Heat Transfer

Fluid Mechanics:
• Fluid Statics
• Elementary Fluid Dynamics – The Bernoulli Equation
• Fluid Kinematics
• Finite Control Volume Analysis
• Differential Analysis of Fluid Flow
• Dimensional Analysis, Similitude, and Modelling
• Viscous Flow in Pipes
• Flow Over Immersed Bodies

B. Dynamics, Control and Mechatronics
• System Dynamics and Control : MMÜ324 course contents
• Dynamics : MMÜ204 course contents
• Theory of Machines : MMÜ309 course contents
  Note: The contents and the textbooks of the courses can be accessed from the link:

C. Solid Mechanics and Design
• MMÜ 203 Statics course contents
• Mechanics of Materials: MMÜ 208 course contents.
• MMÜ 307 Design of Machine Elements course contents.
  Note: The contents and the textbooks of the courses can be accessed from the link:

D. Materials and Manufacturing
• Materials Science: MMÜ 209 course contents.
• Manufacturing: MMÜ 214 course contents.
• Mechanics of Materials: MMÜ 208 course contents.
  Note: The contents and the textbooks of the courses can be accessed from the link: