HACETTEPE UNIVERSITY
Department of Mechanical Engineering

Information on PhD Qualification Exam
(2019-2020 Fall Semester)

The qualification exam has two parts. The first part 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:

**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.

**FIELD 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.

**FIELD 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.

**FIELD 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 courses under the field that has been chosen. Students should choose one question from each course to solve. Additionally, there will be 1 question from Analytical part and 1 question from Numerical part of the Mathematics. Students also have to choose either the Analytical or the Numerical question. If they attempt to solve both
questions from each topic, only one of them will be randomly graded. Therefore, please be sure to solve only one question from each course.

- Only students who are registered for MMÜ 797 course are eligible for Ph.D. Qualifying Exam. They should also submit a written petition to the Department of Mechanical Engineering indicating their major field and the course subject for taking a question from the field other than their major field.

In the 2nd part, a qualification exam committee formed according to the regulations of Graduate School of Science and Engineering administers a special written and an oral exam covering the topics of the graduate curriculum. The final decision is based on the performance of the candidate in general and special written exams and special oral exam according to the regulations of Graduate School of Science and Engineering.

Important Dates for 2019-2020 Fall Semester Ph. D Qualification Exam

- **Last Day to Submit the Petition to the Department**: 23rd of December 2019

- **The Exam Date (1st part)**: 6th of January 2020, 10:00 am (The venue of the examination will be announced from the Department’s website)
Below, the subjects and the undergraduate course information from each field are given as guidance to prepare for the qualification exam:

**Mathematics (For all students)**

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

**FIELD 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

**FIELD 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: http://akts.hacettepe.edu.tr/ders_listesi.php?prg_ref=PRGRAM_000000000000000000000000125&birim_kod=439&submenuheader=2&prg_kod=439&dil_kod=2
FIELD C. Solid Mechanics and Design

- Statics: MMÜ 203 course contents
Note: The contents and the textbooks of the courses can be accessed from the link: http://akts.hacettepe.edu.tr/ders_listesi.php?prg_ref=PRGRAM_0000000000000000000000125&birim_kod=439&submenuheader=2&prg_kod=439&dil_kod=2

FIELD D. Materials and Manufacturing

- Materials Science: MMÜ 209 course contents.
- Manufacturing Engineering: MMÜ 214 course contents.

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