DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PhD QUALIFYING EXAM GUIDELINES

The PhD qualifying exam consists of two parts: a written exam and an oral exam. The written exam contributes 50% and the oral exam contributes 50% towards the PhD qualifying exam.

The Written Exam

The written exam consists of two parts: a classical exam and a research report. The weights of the classical exam and the research report on the written exam score are 70% and 30%, respectively.

The Classical Exam Part:

The duration of the classical exam is 4 hours and is held in class. In the exam, the student is allowed to use 10 pages of an A4-sized handwritten formula sheet prepared by herself/himself. The student is expected to answer a total of 5 questions related to his/her science discipline as follows:

a) 2 questions from the subjects of ***core courses***
b) 2 questions from the subjects of ***specialization courses***
c) 1 question from the subjects of ***advanced level courses***

where the above-mentioned courses are defined in the "Definitions" part of this document. The answers are evaluated by the faculty member(s) who prepared the question(s) and the results are reported to the Qualifying Exam Committee yielding the classical exam score (C).

The Research Report Part:

The student is given a research topic by his/her advisor during the semester when the PhD qualifying exam is taken. The student conducts studies on the given research topic and submits a research report to the Examination Jury on the day of the classical exam is being held. The research report is an important document serving as an account of the research process. Each member of the Examination Jury evaluates the research report and provides his/her evaluation result to the Qualification Exam Committee. The average of these scores constitutes the score of the research report (R).

For the student to be counted as successful, the written exam score (0.7*C + 0.3*R) of the student must be at least 70 points out of 100 points. This score is also verified by the Examination Jury. An oral exam is not conducted for a student who has failed the written exam.

The Oral Exam

The student who passed the written exam gives a 15-minute research plan presentation about his/her research topic. After the presentation, the Examination Jury asks questions to determine

1. The competence of the student on the given research topic,
2. Background adequacy of the student,
3. The breadth and depth of knowledge of the specialization field of the student,
4. Analysis, synthesis, and research capabilities of the student.

The above qualifications are evaluated and the oral exam score is determined. For the student to be counted as successful, the oral exam score of the student must be at least 70 points (out of 100).

These regulations for the PhD Qualifying Exam apply as of the Fall Semester of the 2021-2022 Academic Year.

DEFINITIONS

The PhD qualifying exam covers the current contents of the below listed courses. The contents of the courses can be obtained from the current catalogs.

1. Kontrol ve Kumanda Sistemleri Bilim Dalı

a) Core courses: MAT 251 Linear Algebra, İST 244 Engineering Probability, EEM 301 Signals and Systems, EEM 342 Fundamentals of Control Systems
b) Specialization courses: EEM 491 Linear Control Systems, EEM 504 Random Variables and Stochastic Processes, EEM 541 Linear Systems Theory I, EEM 551 Control Design Methods, EEM 553 Digital Control Theory
c) Advanced level courses: EEM 608 Advanced Linear Control Design, EEM 645 System Identification, EEM 652 Optimal Control, EEM 660 Discrete Event Systems

2. Elektrik Makineleri Bilim Dalı

a) Core courses: MAT 219 Differential Equations, EEM 208 Electromagnetic Fields and Waves, EEM 209 Circuit Analysis I, EEM 311 Principles of Energy Conversion
b) Specialization courses: EEM 471 Electrical Machinery I, EEM 501 Advanced Power System Analysis and Smart Grids, EEM 504 Random Variables and Stochastic Processes, EEM 549 Advanced Electrical Machinery
c) Advanced level courses: EEM 604 Optimization in Power Systems, EEM 605 Power Systems Stability, EEM 618 Power Quality Analysis

3. Telekomünikasyon Bilim Dalı

a) Core courses: MAT 219 Differential Equations, İST 244 Engineering Probability, EEM 301 Signals and Systems, EEM 308 Introduction to Communications
b) Specialization courses: (EEM 467 Digital Communications or EEM 477 Digital Signal Processing), EEM 504 Random Variables and Stochastic Processes, EEM 547 Fundamentals of Detection and Estimation, EEM 562 Signal Coding, EEM565 Image Processing, EEM534 Data-Communication Networks
c) Advanced level courses: EEM 619 Wireless Communication, EEM 623 Advanced Digital Signal Processing, EEM 641 Sensor Array Signal Processing, EEM 651 Signal Transforms

4. Elektrik Tesisleri Bilim Dalı

a) Core courses: MAT 251 Linear Algebra, EEM 208 Electromagnetic Fields and Waves, EEM 209 Circuit Analysis I, EEM 311 Principles of Energy Conversion

b) Specialization courses: EEM 473 Power Systems Analysis I, EEM 501 Advanced Power System Analysis and Smart Grids, EEM 547 Fundamentals of Detection and Estimation, EEM 549 Advanced Electrical Machinery
c) Advanced level courses: EEM 604 Optimization in Power Systems, EEM 605 Power Systems Stability

5. Elektronik Bilim Dalı

a) Core courses: MAT 219 Differential Equations, EEM 208 Electromagnetic Fields and Waves, EEM 209 Circuit Analysis I, EEM 210 Fundamentals of Semiconductor Devices, EEM 321 Electronics I
b) Specialization courses: EEM 403 Fundamentals of Optoelectronics and Nanophotonics, EEM 507 Integrated Optical Waveguides, EEM 547 Fundamentals of Detection and Estimation, EEM 552 Micro-Nanodevices and Thin Film Applications, EEM 509 Radio Frequency and Microwave Circuits, EEM 502 Antenna Engineering
c) Advanced level courses: EEM 621 Nano and Micro-Fabrication Techniques, EEM 641 Sensor Array Signal Processing

6. Devreler ve Sistemler Teorisi Bilim Dalı

a) Core courses: MAT 251 Linear Algebra, EEM 209 Circuit Analysis I, EEM 232 Digital Systems I, EEM 336 Microprocessors I
b) Specialization courses: EEM 480 Algorithms and Complexity, EEM 504 Random Variables and Stochastic Processes, EEM 567 Advanced Computer Architecture, EEM 511 Introduction to Machine Learning, EEM 528 GPU Computing, EEM 564 Artificial Neural Networks
c) Advanced level courses: EEM 606 Parallel Computer Architecture, EEM 607 Parallel Computing, EEM 624 Advanced Topics in Deep Learning, EEM 625 Advanced Topics in Digital Systems I

7. Elektromanyetik Alanlar ve Mikrodalga Tekniği Bilim Dalı

a) Core courses: MAT 219 Differential Equations, EEM 208 Electromagnetic Fields and Waves, EEM 210 Fundamentals of Semiconductor Devices, EEM 321 Electronics I
b) Specialization courses: EEM 470 Microwaves and Antenna, EEM 507 Integrated Optical Waveguides, EEM 509 Radio Frequency and Microwave Circuits, EEM 502 Antenna Engineering
c) Advanced level courses: EEM 621 Nano and Micro-Fabrication Techniques, EEM 641 Sensor Array Signal Processing