

METU - DEPARTMENT OF AEROSPACE ENGINEERING
REGULATIONS FOR Ph.D. QUALIFYING EXAMINATION

The Ph.D. qualifying examination (a.k.a. Doctoral Comprehensive Examination) is composed of written and oral examinations, which are offered twice a year, in May and November. The examination is administered by the Ph.D. Qualifying Examination Committee and conducted by an examination jury consisting of 5 faculty members, formed separately for each applicant, all according to Part 5 of the METU "Graduate Education Regulations."

An applicant must choose his/her **major** field of study for the Ph.D. Qualifying Examination in his/her application. The major field for an applicant is defined as the field that is most compatible with his/her thesis studies. There are four fields of study in the Department of Aerospace Engineering. These are:

- 1. Aerodynamics,**
- 2. Aerothermodynamics and Propulsion,**
- 3. Aerospace Structures,**
- 4. Flight Mechanics and Control.**

Along with his/her major field of study, an applicant also indicates his/her specialization subjects, out of the lists provided below for these four aerospace fields of study (see EK/Appendix below).

Eligibility

- Ph.D. students on M.S. are required to take the Ph.D. qualifying examination within the first 5 academic semesters, while Ph.D. students on B.S. are required to take the examination within the first 7 academic semesters.
- The applicants must have completed their course work fully prior to their Ph.D. qualifying examination.
- The applicants who fail the examination for the first time, can take it once more in the following semester. Those who fail in both examinations are dismissed from the Ph.D. program.

Application

- A Ph.D. student who intends to take the qualifying examination must submit a petition (forms are provided at the end of this document - EK/Appendix-2A and 2B) to the Aerospace Engineering Department together with
 - the original copy of the document of English proficiency (KPDS, TOEFL etc.)
 - his/her major and minor fields of study, three major specialization subjects and one minor specialization subject. The study fields and specialization subjects are to be selected under the supervision of the applicant's advisor.
 - a list of suggested jury members (from major and minor fields of study, 2 members from other academic institutions).

- Once an applicant files an application and it is approved by the Ph.D. Qualifying Examination Committee, the applicant can no longer withdraw his/her application and therefore must take the exam. Otherwise (absence on the exam), the applicant is assumed to have failed the examination.

Examination

The Ph.D. qualifying examination consists of two main parts: written and oral examinations. Both are conducted in English.

- The written examination is given in two sittings;
 - 1st Sitting: (i) 2 questions from the core subjects of the major field of the applicant, (ii) 2 questions from the core subjects listed under two remaining separate aerospace fields of study, and 1 question from the undergraduate level mathematics course (a total of 5 questions to be answered in 2.5 hours).
 - 2nd Sitting: (i) 2 questions from the specialization subjects of the major field, (ii) 1 question from the specialization subjects from one remaining aerospace field of study, and (iii) 1 question from graduate level mathematics. (a total 4 questions to be answered in 2 hours)
- In the written examinations, applicants are required to answer only one out of two questions asked on each subject.
- The students who succeed in both parts of the written examination take an oral examination on the date determined by the applicant's jury. The oral exam covers the subjects in his/her major field of study. The examination starts with a presentation by the student of his/her research document prepared and submitted to the jury before the written part of the examination. The document must be prepared in an archivable journal article format and be 10 to 15 pages long. Following the presentation of the student, the jury members ask questions on his/her presentation as well as the subjects of the major field of study of the student.

The successful and unsuccessful applicants are finally announced by the Ph.D. Qualifying Examination Committee.

EK / Appendix
AEE Temel Alanları ve DYS Yazılı Konuları

Aerospace Fields of Study and Core and Specialization Subjects
for the Ph.D. Qualifying Examination

1. AERODYNAMICS

Core Subjects:

- Fluid Mechanics — AE244
- Aerodynamics I — AE341

Specialization Subjects:

- Computational Aerodynamics — AE443
- Hypersonic Flows — AE445
- Introduction to Helicopter Aerodynamics and Helicopter Design — AE446
- Wind Energy — AE495
- Turbulence Modeling for Engineering Flows — AE540
- Advanced Computational Fluid Dynamics — AE541
- Turbulent Boundary Layers — AE542
- Internal Fluid Mechanics — AE543
- Advanced Airfoil and Propeller Theory — AE544
- Advanced Fluid Mechanics — AE545
- Computational Fluid Dynamics on Unstructured Grids — AE546
- Experimental Aerodynamics — AE547
- Fundamentals of Aerodynamic Noise — AE548
- Linear Stability Theory and Laminar-Turbulent Boundary-Layer Trans. — AE549
- Aircraft Icing — AE572
- Unsteady Aerodynamics — AE728

2. AEROTHERMODYNAMICS and PROPULSION

Core Subjects:

- Thermodynamics — AE231
- Propulsion Systems I — AE334

Specialization Subjects:

- Aircraft Engine Design — AE438
- Introduction to Rocket Technology — AE442
- Hypersonic Flows — AE445
- Space Propulsion — AE477
- Advanced Engine and Process Thermodynamics — AE531
- Advanced Aircraft Engine Design — AE532
- Advanced Heat and Mass Transfer — AE534
- Combustion in Engines — AE538
- Advanced Combustion in Engines — AE539
- Advanced Computational Fluid Dynamics — AE541
- Internal Fluid Mechanics — AE543
- Computational Fluid Dynamics on Unstructured Grids — AE546
- Fundamentals of Aerodynamic Noise — AE548
- Theory and Measurement of Turbomachinery Flows — AE567
- Physics of Gases — AE577
- Non equilibrium Gas Dynamics — AE578

3. AEROSPACE STRUCTURES

Core Subjects:

- Mechanics of Materials — AE264
- Aerospace Structures — AE362

Specialization Subjects:

- Design of Aerospace Structures — AE462
- Mechanical Vibrations — AE463
- Finite Element Applications in Aerospace Structures — AE464
- Spacecraft Structures — AE466
- Theory of Plates — AE562
- Constitutive Modeling of Engineering Materials — AE563
- Wave Analysis and Wave Propagation in Structures — AE564
- Experimental Analysis of Vibrating Structures — AE568
- Mechanics of Composite Materials — AE569

- Aeroelastic Effects in Structures — AE 714
- Fatigue and Fracture of Aerospace Structures — AE718
- Aeroelasticity — AE566
- Micromechanics of Metallic Materials — AE725

4. FLIGHT MECHANICS and CONTROL

Core Subjects:

- Flight Mechanics — AE372
- System Dynamics — AE383

Specialization Subjects:

- Automatic Control Systems II — AE483
- Inertial Navigation Systems — AE484
- Spacecraft Dynamics — AE486
- Computer Assisted Analysis of Aircraft Performance, Stability and Control — AE489
- Applied Orbital Mechanics — AE554
- Automatic Flight Control Systems — AE581
- Robust Control in Aerospace Systems — AE582
- Helicopter Dynamics, Stability and Control — AE584

UNDERGRADUATE LEVEL MATHEMATICS

- ES202: Vector spaces, matrices, systems of linear equations, linear transformations, change of basis, eigenvalue problems, quadratic forms and diagonalization. Vector calculus, line, surface and volume integrals. Gradient, divergence, curl. Green, Gauss and Stokes' theorems.

GRADUATE LEVEL MATHEMATICS

- AE501: Matrix algebra. Tensors. Complex analysis. Calculus of variations.
- AE502: Power series solutions of ordinary differential equations. Eigen-value and boundary-value problems. Fourier and Laplace transforms. Green's functions. Partial differential equations.

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EK/Appendix-2A
HAVACILIK ve UZAY MÜHENDİSLİĞİ BÖLÜM BAŞKANLIĞINA
To the Department of Aerospace Engineering

Bölümünüzün numaralı Doktora programı öğrencisiyim. Gerekli dersleri tamamlamış bulunmaktayım. Mayıs / Kasım 2025 döneminde gerçekleştirilecek olan Doktora Yeterlik Sınavı'na alınabilmem için gereğini saygılarımla arz ederim.

I am a student enrolled in the doctoral program of your department (student id#:). I have fulfilled the course load requirements for the Doctoral Qualifying Examination. I would like to take the exam in the term of May / November 2025. Please proceed with the necessary arrangements for me.

Anadal Konusu (birini seçiniz) / Major Field of Study (circle one):

1. Aerodynamics
2. Aerothermodynamics and Propulsion
3. Aerospace Structures
4. Flight Mechanics and Control

Sınav Formatı / Qualifying Exam Format :

Etkin sınav yönerge ve formatı / the exam format and rules that are effective as of 2025 (bkz/see: www.ae.metu.edu.tr/grad/QualifyingExam_2025.html)

Uzmanlık Konuları / Specilization Subjects:

En az ikisi Anadal altında olmak üzere üç ders belirtiniz / choose three courses, at least two of which must be listed under the Main Field of Study:

1. ...
2. ...
3. ...

Öğrencinin Adı Soyadı / Name, Lastname : ...

Telefon / phone (work) : ...

Telefon / phone (mobile) : ...

E-posta / E-mail: : ...

İmza / Signature : ...

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EK/Appendix-2B
HAVACILIK ve UZAY MÜHENDİSLİĞİ BÖLÜM BAŞKANLIĞINA
To the Department of Aerospace Engineering

(Danışman ile birlikte doldurunuz / To Be Filled together with the Advisor)

Bölümünüzün numaralı Doktora programı öğrencisiyim. Mayıs / Kasım 2025 döneminde gerçekleştirilecek olan Doktora Yeterlik Sınavım için jüri üyesi önerilerim aşağıda listelenmiştir. Gereğini arz ederim.

I am a student enrolled in the doctoral program of your department (student id#:). I would like to provide the following list as my probable jury members for the Doctoral Qualification Examination that I will take in the term of May / November 2025. Please proceed with the necessary arrangements for me.

Danışman Adı Soyadı / Advisor Name, Last Name :

Danışman İmza / Advisor Signature :

Ana Dalı / Major Field of Study :

(önceki sayfaya bkz./ ref. to prev. page)

Öğretim üyesi adlarını ana çalışma alanından seçiniz. ODTÜ dışından en az 3 isim listelenmelidir

Please provide the names from your own main field of study, at least 3 from other institutions.

No.	Name, Last Name	Institution - Department	E-mail
1	Advisor	ODTÜ / METU -	
2		ODTÜ / METU -	
3		ODTÜ / METU -	
4		ODTÜ / METU -	
5		ODTÜ / METU -	
6		ODTÜ / METU -	
7			
8			
9			