

Department of Aeronautics and Astronautics

Graduate Field Evaluation Subjects

1. Aerospace Computational Engineering

Structure: Students must choose the two core subjects.

A. Core Subjects

16.920: Numerical Methods for Partial Differential Equations

18.335: Introduction to Numerical Methods

B. Probability and stochastic modeling

6.436: Fundamentals of Probability OR

16.940: Numerical Methods for Stochastic Modeling and Inference

B. Optimization methods

6.252: Nonlinear Optimization OR

6.255: Optimization Methods

C. Fluid mechanics

2.25: Fluid Mechanics OR

16.110: Flight Vehicle Aerodynamics OR

16.13: Aerodynamics of viscous fluids OR

16.540: Internal Flows in Turbomachines

D. Mechanics of solid materials

2.071: Mechanics of Solid Materials OR

16.225: Computational Mechanics of Materials

2. Aerospace, Energy and the Environment

Structure: Students must choose the core subject. Students must choose at most one subject from each category.

A. Core Subject

16.715: Aerospace, Energy, and the Environment

B. Air Transportation

16.72: Air Traffic Control OR

16.886: Air Transportation Systems Architecting OR

16.781: Planning and Design of Airport Systems

C. Energy and Fuels

2.28: Fundamentals and Applications of Combustion OR

2.62: Fundamentals of Advanced Energy Conversion OR

2.65: Sustainable Energy

D. Aircraft Design

16.110: Flight Vehicle Aerodynamics OR

16.885: Aircraft Systems Engineering

E. Environmental Science

12.806: Atmospheric Physics and Chemistry OR

1.84/10.817/12.807 Atmospheric Chemistry

F. Propulsion

16.511: Aircraft Engines and Gas Turbines

G. Energy and Environmental Policy

IDS.410: Modeling and Assessment for Policy

3. Air-breathing Propulsion

2.25: Advanced Fluid Mechanics

16.120: Compressible Flow

16.540: Internal Flows in Turbomachines

16.511: Aircraft Engines and Gas Turbines

4. Aircraft Systems Engineering

Structure: Students cannot choose 16.422 and 16.453 at the same time. Students cannot choose 16.885 and 16.886 at the same time.

16.110: Flight Vehicle Aerodynamics

16.511: Aircraft Engines and Gas Turbines

16.343: Spacecraft and Aircraft Sensors and Instrumentation

16.422: Human Supervisory Control of Automated Systems OR

16.453: Human Systems Engineering

16.885: Aircraft Systems Engineering OR

16.886: Air Transportation Systems Architecting

5. Air Transportation Systems

Structure: Students must choose the Core Subject.

Core Subject:

16.71: The Airline Industry

Additional Subjects:

16.72: Air Traffic Control

16.763: Air Transportation Operations Research

16.781: Planning and Design of Airport Systems

16.75: Airline Management

16.886: Air Transportation Systems Architecting

6. Autonomous Systems

Structure: Students must choose the Core Subject.

Core Subject:

16.413: Principles of Autonomy

Additional Subjects:

6.832: Underactuated Robotics

6.804J/9.660J: Computational Cognitive Science

16.32: Principles of Optimal Control and Estimation

16.412: Cognitive Robotics

16.420: Planning under Uncertainty

16.485: Visual Navigation for Autonomous Vehicles

7. Communications and Networking

Structure: Students must choose both of the two Core Subjects.

Core Subjects:

16.37: Data-Communication Networks

16.393 Statistical Communication and Localization Theory

Additional Subjects:

6.255 Optimization Methods

6.431: Introduction to Probability

6.441: Theory of Information
16.391: Statistics for Engineers and Scientists

8. Controls

Structure: Students must choose the Core Subject.

Core Subject:
16.31: Feedback Control Systems

Additional Subjects:
6.231: Dynamic Programming and Reinforcement Learning
6.241: Dynamic Systems and Control
6.832: Underactuated Robotics
16.32: Principles of Optimal Control and Estimation
16.420: Planning under uncertainty
16.485: Visual Navigation for Autonomous Vehicles

9. Engineering Systems (pending)

Structure: Students must choose at least two core subjects.

Core Subjects:
16.842: Fundamentals of Systems Engineering
16.863: System Safety
16.888: Multidisciplinary Design Optimization

Additional Subjects:
16.355/IDS.341: Concepts in the Engineering of Software-Intensive Systems
16.89/IDS.339: Space Systems Engineering
16.887/EM.427: Technology Roadmapping and Development Technology
16.895J: Engineering Apollo: The Moon Project as a Complex System
16.422: Human Supervisory Control of Automated Systems
16.851: Satellite Engineering

10. Humans in Aerospace

Structure: Students must choose at least two subjects from the list of Core Subjects.

Core Subjects:

16.453: Human Systems Engineering

16.423: Aerospace Biomedical and Life Support Engineering (alternate years)

16.422: Human Supervisory Control of Automated Systems (alternate years)

Additional Subjects:

HST.582 Biomedical Signal and Image Processing

2.183J/9.34J Neural Control of Movement

16.413: Principles of Autonomy

16.412: Cognitive Robotics

16.420: Planning under Uncertainty

16.89: Space Systems Engineering

16.895: Engineering Apollo: The Moon Project as a Complex System

TBD: Engineering the Space Shuttle

11. Materials and Structures

2.071: Mechanics of Solid Materials OR

ES240: Solid Mechanics (Harvard University)

16.221: Structural Dynamics

16.223: Mechanics of Heterogeneous Materials OR

16.225: Computational Mechanics of Materials

12. Space Propulsion and Plasmas

Structure: Students must choose at least one Core Subject.

Core Subjects:

16.522: Space Propulsion

16.55: Ionized Gases

Additional Subjects:

2.25: Fluid Mechanics

2.28: Fundamentals and Applications of Combustion

6.640: Electromagnetic Fields, Forces and Motion

8.311: Electromagnetic Theory I
16.346: Astrodynamics
16.512: Rocket Propulsion
22.611: Introduction to Plasma Physics I
22.612: Introduction to Plasma Physics II
22.67: Principles of Plasma Diagnostics

13. Space Systems

16.343: Spacecraft and Aircraft Sensors and Instrumentation
16.346: Astrodynamics
16.363: Communication Systems and Networks
16.842: Fundamentals of Systems Engineering
16.851: Satellite Engineering
16.861: Engineering Systems Analysis for Design
16.863: System Safety Concepts
16.89: Space Systems Engineering