Graduate Mathematics Requirement
Department of Aeronautics and Astronautics
January 2022

The Department's policy regarding the math requirement is as follows. For SM students, 12 units of total credit are required, and for PhD students, 24 units of total credit are required.

The following subjects may be used to fulfill the graduate math requirement:

1) Any subject offered by the Department of Mathematics designated as graduate level (or as being graduate level for students who are not Mathematics majors). Typical classes taken include:
   18.0851: Comp Science & Engineering 1
   18.0651: Matrix Methods
   18.335: Intro: Numerical Methods
   18.1021: Intro to Functional Analysis
   18.408: Topics in Theoretical Comp Sci
   18.1002: Real Analysis
   18.6501: Fundamentals of Statistics
   18.657: Topics in Statistics

2) Selected subjects offered by departments other than Mathematics can also be used toward the math requirement. The list of acceptable subjects is as follows:

   A. Probability and Statistics
   6.7710 (6.262) Discrete Stochastic Processes
   6.7720J (6.265J)/15.070J Advanced Stochastic Processes
   6.3702 (6.431) Intro to Probability
   6.7770J (6.436J) /15.085J Fundamentals of Probability
   14.382 Econometrics I
   16.391 Statistics for Engineers and Scientists (formerly co-listed with 6.434)
   16.470J/ESD.756J Statistical Methods in Experimental Design
   IDS.147J/15.077J Statistical Learning and Data Mining
   IDS.700J/1.203J/15.073J Applied Probability and Stochastic Modeling

   B. Optimization
   6.7210J (6.251J/)15.081J/Intro to Mathematical Programming
   6.8160 (6.881) Advanced Topics in AI, when taught as Optimization for Machine Learning
   15.083J/6.8530J (6.859J) Interactive Data Visualization
   15.084J/6.7220J (6.252J) Nonlinear Optimization
   15.093J/6.7200J (6.255J) Optimization Methods
   15.094J/1.142J Robust Modeling, Optimization & Computation
   15.095 Machine Learning under a Modern Optimization Lens

   C. Numerical Methods
   16.858: Intro to Discrete Math and Systems Theory for Engineers
   16.920J/2.097J/6.7330J (6.339J) Numerical Methods for Partial Differential Equations
   16.940 Numerical Methods for Stochastic Modeling & Inference

The faculty acknowledge that mathematics is an integral part of all engineering curricula, but it is our experience that taking additional math subjects can add significantly to a student's problem-solving capabilities. Thus, the intent of this graduate math requirement is to give students exposure to new, advanced, mathematical concepts taught at the graduate level in a rigorous and mostly mathematical context, rather than as applied to aeronautics and astronautics problems.

In cases where a Course 16 subject is jointly listed, AeroAstro students would register under the Course 16 number. Also, please check the current MIT Course Catalogue for course descriptions and years offered.

The course list given above is a living document that will be frequently updated by the Graduate Committee. Student petitions to add courses will not be accepted. Faculty can ask to add a course to the list through a discussion within one of the three Sectors. After approval by the Sector, the petitions would then come to the Graduate Committee from the Sector Heads at least 2 weeks prior to the Fall registration date.

For PhD students, the subjects used to fulfill this math requirement may also be used in the student's major and minor program (subject to approval by the student's doctoral committee and, if appropriate, minor advisor). Further, subjects from an SM earned at MIT can be used to satisfy this PhD math requirement. Subjects from an SM earned outside MIT potentially can be used to satisfy the PhD requirement; in this case, the student can submit these subjects to the department's Graduate Committee for approval to waive ONE of TWO required classes (see attached form).

External Subject Request for PhD Mathematics Requirement
Department of Aeronautics & Astronautics

The purpose of this form is to request the use of a graduate-level mathematics subject from outside MIT towards the doctoral graduate mathematics requirement in Aero/Astro.

Subject name:

University at which subject was taken:

Subject number or identifier:

Grade received in subject:

Textbook(s):

MIT subject(s) that are similar:

Justification of why this course should be counted:

Please also attach to this request:

- ☐ **Official transcript from university at which subject was taken**
- ☐ **Syllabus of subject including list of topics covered**

Graduate Committee Response:

Reduction of Graduate Mathematics Requirement (in terms of units):