Department of Aeronautics and Astronautics
School of Engineering
Massachusetts Institute of Technology

Graduate Program (S.M., Ph.D., Sc.D.)

Field: Autonomous Systems
Date: September 4, 2007

1. Introduction and Purpose

The graduate program in the Department of Aeronautics and Astronautics at M.I.T. provides educational opportunities in a wide variety of aerospace-related topics through academic subjects and research. The purpose of this document is to provide incoming masters and doctoral level students guidance in planning the subjects they will take during their graduate program. The suggestions outlined here are to be understood as guidance and not as a mandatory, rigid framework. The final decision as to which subjects are taken and in what sequence is to be decided between each student and their academic advisor and/or doctoral committee. In addition to these recommendations, the official S.M. and doctoral degree completion requirements must be taken into account during the design of a graduate program.[1]

2. Courses for Autonomy

Autonomy, Control and Estimation

16.413	Principles of Autonomy and Decision Making
16.412	Cognitive Robotics
16.31	Feedback Control Systems
16.323	Principles of Optimal Control
16.322	Stochastic Estimation and Control
6.433	Recursive Estimation
6.231	Dynamic Programming and Stochastic Control

Autonomy Specializations

6.867	Machine Learning
6.824	Distributed Algorithms
6.801 / 6.866	Machine Vision
16.400	Human Factors Engineering
16.36	Software Engineering

Discrete Mathematics, Probability and Statistics:

6.431	Probability Systems Analysis
16.391/6.434	Statistics for Engineers & Scientists
18.404J / 6.840J	Theory of Computation

[1] Refer to the S.M., Ph.D. and Sc.D. degree requirements in Aeronautics and Astronautics section of the MIT Bulletin, or to http://web.mit.edu/aeroastro/academics/grad/index.html

6.436/15.085	Fundamentals of Probability

Continuous Math, Algorithms and Optimization:

18.100B	Analysis
6.046J/18.410J	Introduction to Algorithms
6.852J/18.437J	Distributed Algorithm
6.854J/18.415J	Advanced Algorithms
6.856J/18.416J	Randomized Algorithms
6.255/2.098/15.093	Optimization Methods
6.252/15.084	Nonlinear Programming
6.253	Convex Analysis and Optimization
16.321/6.251	Mathematical Programming
6.859/15.083	Integer Programming and Combinatorial Optimization

Typical Program of Study in Autonomy

A typical program of study for a student in Autonomy would be 6 courses taken as a Master's student and 6 courses taken as a doctoral student, and might consist of:

M.Sc.: 2 Autonomy courses, 16.413 and 16.412
- 1 Control course, e.g., 16.31
- 1 Estimation course, e.g., 16. 322
- 1 Discrete Math and Probability course, e.g., 6.431
- 1 Continuous Math, Algorithms and Optimization course, e.g., 6.046

Ph. D.: 2 Autonomy courses in the specialization, 6.867 and 6.801
- 1 Control course, e.g., 16.323
- 1 Estimation course, e.g., 6.433
- 1 Discrete Math and Probability course, e.g., 18.100
- 1 Continuous Math, Algorithms and Optimization course, e.g., 6.252

Example specializations include (but are not limited to) Foundations of Decision Making, Adaptive Systems, Cooperative Systems, Human Robot Interaction and Hybrid Systems.