16.410/13 Principles of Autonomy and Decision Making

Description: Survey of reasoning, learning, and optimal decision making methodologies for creating highly autonomous systems and decision support aids. Focus on principles, algorithms, and their application, taken from the disciplines of artificial intelligence, and operations research. Reasoning paradigms include uninformed, informed and game search, logic and deduction, constraint modeling, model-based diagnosis, planning and execution, and reasoning under uncertainty. Machine learning paradigms include decision tree learning, neural nets, genetic algorithms and reinforcement learning. Optimal decision making paradigms include linear and integer programming, dynamic programming and Markov decision processes.

16.413 meets with undergraduate subject 16.410, but requires more advanced programming and written assignments, including a Mars Rover project.

Prerequisites: 6.041 and 16.070

3-0-9 16.410 is U-LEVEL, 16.413 is H-LEVEL

Lecture: Monday & Wednesday
9:00 - 10:30 16.413
10:30 - 12:00 16.410

Location: Rm 33-418

Instructors: Brian Williams
Office (1): 33-330
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Office Hours: Brian Williams
Wed 2:00-3:00 (33-330)
Fri 2:00-3:00 (33-315)

Nick Roy
Joshua T Chang
Sun 3:00-5:00 (33-202)
Thu 3:00-5:00 (33-202)

Igor A Ganichev
Sun 4:00-6:00 (W20 5th floor)
Wed 3:00-5:00 (W20 5th floor)

Mailing lists: 16.410-students@mit.edu
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Readings:

- “AI a Modern Approach” by Russell and Norvig, noted as AIMA. (at coop)
- “Introduction to Operations Research” by Hiller and Lieberman (on reserve)
- Additional handouts
Assignments:
- Weekly, Due on Monday, unless otherwise indicated.
- Web-based assignments due by midnight of date assigned.
- Paper assignments due by 5pm to course secretary, Brian O’Conaill at 33-336, or in lecture.

Programming:
- Coding exercises in MIT Scheme (a dialect of Lisp) and AMPL/Matlab
- Computer lab located at 33-202

Evaluation: 16.410
- Mid Term (30pts), Final (40 pts), Homework/Participation (30 pts).
- Grade = Mid Term + Final + Homework/Participation

Evaluation: 16.413
- 16.413 Mid Term (30pts), Final (40pts), Project (30pts)
- Homework & class participation [0-1]
- Grade = (Mid-term + Final + Project) * (log homework & class participation)