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**		Email:	williams@mit.edu
	Office (1):	33-330	Phone (1):	(617) 253-1678
	Office (2):	32-273	Phone (2):	(617) 253-2739
	Nick Roy		Email:	nickroy@mit.edu
	Office (1):	33-315	Phone (1):	(617) 253-2517
	Office (2):	32-335	Phone (2):	(617) 253-2780
Course Secretary:	**Brían O'Conaill**		Email:	oconaill@mit.edu
	Office: Suite outside 33-330		Phone:	(617) 252-1536
TAs:	**Joshua T Chang**		Email:	jcpsm46@mit.edu
	Igor A Ganichev		Email:	igor2006@mit.edu

Office Hours:	**Brian Williams**	Wed	2:00-3:00	(33-330)
	Nick Roy	Fri	2:00-3:00	(33-315)
	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
16.413-students@mit.edu
16.410-instructors@mit.edu

16.413-instructors@mit.edu

Web: http://web.mit.edu/16.410/www/index.html

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, Brían 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)