General Information

Location: Bill Hall 409
Times: Monday and Wednesday, 2:45-4:00pm.

Instructor: Martin Allen
Office: Strider House (ext. 5048)
Email: martin.allen@conncoll.edu
Office hours: TBD

Class web page: http://banyan.conncoll.edu/moodle/course/view.php?id=647
IMPORTANT: This is where class notes, announcements and homeworks are posted.

Course Description

Most of the time, when we make decisions about what to do, we are faced with a certain degree of uncertainty. We don't always know exactly what will happen when we take certain actions, and we usually don't have perfect information about every little detail of our environment. Of course, we have to act eventually, even when we're uncertain about what is going on, or what will happen.

The same thing applies to artificial intelligence systems. Robotic and software agents must often perform computations and put decisions into effect even with limited information about the world, and without clear-cut guarantees about the outcomes of their actions. The goal of AI designers is therefore to manage this uncertainty in the best possible way. To do so, we turn to some basic mathematical tools, namely probability and decision theory, which allow us both to model uncertain environments and to create systems that can handle those environments.

This course will introduce some of these tools and models. We will learn about probability and utility theory, and about various models and algorithms for dealing with them. The material will cover both planning, where we have a model and need to come up with a course of action, and learning, where we learn the model of the world, or the course of action, or both. Students taking this course will learn about some of the most interesting research going on in AI today.

Reference Materials
1. **Recommended textbooks** (available on short-term library reserve):

2. **Lecture notes**: available from the course web page.

3. **Additional materials**: will be distributed in class as needed.

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**Class Requirements**

The class grade will be based on the following components:

- Assignments (approx. 7) - 55%
- One in-class written midterm examination - 10%
- Class project - 20%
- Final examination - 15%.
- Participation in class discussions - up to 5% extra credit.

Any minor changes to this plan will be announced in class by Monday, 08 September.

Assignments will be a combination of written work (both technical and broader discussion questions) and some programming that involves the implementation of algorithms and techniques that we learn about and discuss in class. I assume that you can program in C/C++ or Java to produce code with basic text outputs and inputs as necessary. However, you can use any other language you desire, as long as the code is well-written (that is, it is easy enough for another person, namely me, to understand).

The class project will be composed of a programming part and a written paper. The exact details will be announced soon, but the basic idea will be to code a game-playing agent using some of the techniques covered in our course. Support code will be provided in at least one or two languages, and you will build upon it. The paper will describe what you did, and discuss why, as well as how well it worked. A type-written paper, along with a program that actually runs will be required to pass the course.

Both exams will be in written format. Example exams, to show the format and type of question, will be distributed and discussed in class before each one.

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**Homework & Attendance Policy**

Assignments should be submitted **in class** on the day when they are due. In addition, the code for programming parts must also be submitted electronically, using the Moodle, or by email to the instructor. No printouts of the code are necessary.

For late assignments, 10 points will be deducted from the grade for every late day, for the first 5 days. **No credit is given for assignments submitted more than 5 days late, unless you have a medical problem.**

Please note: While the class project will be done in small teams, all other assignments are to be done individually. While you should definitely discuss materials with one another, do the actual work yourself.

Class attendance is expected. Please let me know if you can't make it to class.
Topics of Discussion

- Probability and Bayesian methods.
- Bayesian and Markov network models.
- Inference and learning methods for networks.
- Temporal models.
- Utility and Decision theory.
- Markov Decision Processes (MDPs).
- Learning and planning methods for MDPs.

The exact schedule will be maintained and updated on the web-page.

Please Note

If you have a physical or mental disability, either hidden or visible, which may require classroom, test-taking, or other reasonable modifications, please see me as soon as possible. If you have not already done so, please be sure to register with Sherine A. Miller, Director of Student Disability Services, at Extension 5428.