

# Computer Science 3420: Optimization and Uncertainty

## Spring 2020

**Instructor:** Stephen Majercik

**Office:** Searles 222

**Email:** smajerci@bowdoin.edu

**Class Times:** Tuesday, Thursday: 2:50 – 4:15 pm, Searles 126

**Office Hours:** Monday, 6:00-8:00pm, Searles 223; Thursday, 11:30am-1:00pm, Searles 222

### **COURSE DESCRIPTION**

There are many views of what artificial intelligence is. In one view, artificial intelligence attempts to represent desires and goals in a way that can be "understood" by a computer and to design algorithms that help the computer avoid undesirable actions and achieve the desired goal. For many real-world tasks, this means solving optimization problems and coping with uncertainty. A numeric framework, rather than the symbolic one of traditional artificial intelligence, is useful for expressing and attacking such problems. We will explore a number of artificial intelligence topics in this numeric framework.

### **COURSE PREREQUISITE**

CSCI 2101 or permission of instructor

### **TEXTBOOK** (optional)

Artificial Intelligence: A Modern Approach (3<sup>rd</sup> Ed.)

S. Russell and P. Norvig

Prentice Hall Publishing, 2010

### **REQUIREMENTS**

90% Problem Sets and Programming Assignments

10% Ethical Issues Essay

Tiebreaker: Class Participation

### **ACADEMIC INTEGRITY POLICY**

You are expected to follow Bowdoin's Computer Use Policy and its Academic Honor Code, as well as the Computer Science Department's collaboration policy (<https://turing.bowdoin.edu/dept/collab.php>).

**SCHEDULE (SUBJECT TO CHANGE)**

Dates	Topic	Assignment Distributed	Assignment Due	Reading (optional except for handouts)
Jan 25	Introduction			NA
Jan 27, Feb 1	Planning and Reasoning			10.1-10.2
Feb 3, 8, 10, 15	Planning as Satisfiability	A1a (2/8) A1b (2/15)		10.4.1
Feb 17, 22, 24, 29	Planning as Graph Analysis	A2 (2/29)	A1 (2/29)	10.3
Mar 2, 7	Will an advanced artificial intelligence eliminate the human race?			Handouts
Mar 9	When?	A3	A2	Why bother....
Mar 28, 30, Apr 4, 6, 11, 13	Bayes Networks	A4a (4/4) A4b (4/13)	A3 (4/4)	13.1-13.5, 14.1-14.4
Apr 18, 20, 25, 27, May 2, 4	Markov Decision Processes	A5a (4/20) A5b (4/27) A5c (5/4)	A4 (4/20) A5a (4/27) A5b (5/4)	17.1-17.3, 21.1-21.3
May 9, 11	TBA	Project	A5c (5/11)	TBA
May 18	NA		Project	NA