

# CS156 Fall 2017 Sec2 Home Page/Syllabus

## Introduction to Artificial Intelligence

<p><b>Instructor:</b> <a href="#">Chris Pollett</a> <b>Office:</b> MH 214 <b>Phone Number:</b> (408) 924 5145 <b>Email:</b> <a href="mailto:chris@pollett.org">chris@pollett.org</a> <b>Office Hours:</b> MW 5:45pm-7pm <b>Class Meets:</b> Sec2 MW 3:00pm-4:15pm in SCI 311</p>
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## Prerequisites

To take this class you must have taken: [CS146](#) and [CS151](#) with a grade of C- or better.

## Texts and Links

Required Texts:	<a href="#">Artificial Intelligence: A Modern Approach. 3rd Ed.</a> , Stuart Russell and Peter Norvig
Online References and Other Links:	<a href="#">Official Python Website.</a> <a href="#">Python Implementation of Code from the Book.</a>

## Description

Algorithms which allow computers to simulate various abilities of living organisms are used in many different areas of computer science. In computer gaming it is important to be able to create agents which behave intelligently in response to human players. In search engines it is important to be able to classify the types of queries which are arriving to better tailor search results. Question answering systems used in medicine have recently attracted attention after the defeat of the top Jeopardy champions by Watson, a computer program from IBM. Self-driving cars need to be able to plan as detect and classify objects in their environment. This course will survey the major areas of AI. The course will begin with problem solving algorithms. In particular, search space exploration strategies such as iterative deepening, A\*, and several local search algorithms will be considered. Techniques to solve constraint satisfaction problems will then be discussed. This will be followed by a description of the minimax algorithm and alpha-beta pruning which is used in games such as chess. The focus will then shift to representation schemes for knowledge, logical reasoning and theorem proving techniques. Then task planning algorithms will be considered. Finally, the semester will conclude with an introduction to neural nets, learning algorithms, and AI related to information retrieval.

## Course Learning Outcomes (CLOs)

By the end of this course, a student should be able to:

**CLO1** -- By code or by hand find solution nodes in a state space using the A\* algorithm.

**CLO2** -- By code or by hand translate sentences in first-order logic to conjunctive normal form (CNF).

**CLO3** -- By code or by hand find proofs by using resolution.

**CLO4** -- Students should be able to explain the advantages and disadvantages of breadth-first search, compared to depth-first search.

**CLO5** -- Students should be able to explain the advantages and disadvantages of informed search, compared to uninformed search.

**CLO6** -- Students should be able to explain the advantages and disadvantages of hill climbing.

**CLO7** -- Students should be able to explain the advantages and disadvantages of forward checking in constraint satisfaction.

**CLO8** -- Students should be able to explain the advantages and disadvantages of alpha-beta pruning.

**CLO9** -- Students should be able to explain the advantages and disadvantages of the PDDL representation for planning.

**CLO10** -- Students should be able to describe the frame problem.

**CLO11** -- Students should be able to describe default reasoning.

**CLO12** -- Students should be able to describe or implement at least one learning algorithm.

Below is a tentative time table for when we'll do things this quarter:

Week 1: Aug 23	Syllabus (I will be at CAIP 2017)
Week 2: Aug 28 , Aug 30	Finish Ch3, Start Python
Week 3: Sep 4 (No Class, Labor Day) , Sep 6	Finish Python, Read Ch 4 Beyond Classical Search
Week 4: Sep 9 , Sep 11 (HW1 due)	Read Ch 5 Adversarial Search
Week 5: Sep 16 , Sep 18	Ch 6 Constraint Satisfaction
Week 6: Sep 23 , Sep 25	Read Ch 7-8 Logical Agents and First-order Logic
Week 7: Oct 2 (HW2 due) , Oct 4 (Midterm)	Review, Midterm
Week 8: Oct 9 , Oct 11	Read Ch9 Inference in First-Order Logic
Week 9: Oct 16 , Oct 18	Finish First-Order Logic
Week 10: Oct 23 , Oct 25 (HW3 due)	Read Ch10 Classical Planning
Week 11: Oct 30 , Nov 1	Review, Midterm
Week 12: Nov 6 , Nov 8	Ch 10, Start Ch 12 Knowledge Representation
Week 13: Nov 13 (HW4 due) , Nov 15	Finish Ch12, Start Ch 13 Reasoning with Uncertainty

Week 14: Nov 20 , Nov 22 (No Class)	Finish Ch 13
Week 15: Nov 27 , Nov 29	Read Ch18 Learning from Examples
Week 16: Dec 4 , Dec 6 (Hw5 due)	Read Ch20 Learning Probabilistic Models
Week 17: Dec 11	Review
	The final will be 12:15pm-2:30pm, Wednesday, Dec 13

## Grading

Homeworks and Quizzes	50%
Midterm 1	15%
Midterm 2	15%
Final	20%
Total	100%

Grades will be calculated in the following manner: The person or persons with the highest aggregate score will receive an A+. A score of 55 will be the cut-off for a C-. The region between this high and low score will be divided into eight equal-sized regions. From the top region to the low region, a score falling within a region receives the grade: A, A-, B+, B, B-, C+, C, C-. If the boundary between an A and an A- is 85, then the score 85 counts as an A-. Scores below 55 but above 50 receive the grade D. Those below 50 receive the grade F.

If you do better than an A- in this class and want me to write you a letter of recommendation, I will generally be willing provided you ask me within two years of taking my course. Be advised that I write better letters if I know you to some degree.

## Homework and Project Info

This semester we will have five homeworks, weekly quizzes, and weekly in-class exercises.

Every Monday this semester, except the first day of class, the Midterm Review Day, and holidays, there will be a quiz on the previous week's material. The answer to the quiz will either be multiple choice, true-false, or a simple numeric answer that does not require a calculator. Each quiz is worth a maximum of 1pt with no partial credit being given. Out of the total of twelve quizzes this semester, I will keep your ten best scores.

On Wednesday's, we will spend 15-20 minutes of class on an in-class exercise. You will be asked to post your solution to these exercises to the class discussion board. I will set you up with an account before the first exercise. Posting your solution is worth 1 "pre-point" towards your grade. A "pre-point" can be used to get one missed point back on a midterm or final, up to half of that test's total score. For example, if you scored 0 on a midterm and have 10 pre-points, you can use 7.5 of your 10 prepoints, so that your midterm score is a 7.5. On the other hand, if you score 13/15 on the midterm, you can use at most 1 pre-point since half of what you missed (2pts) on the midterm is 1pt. Your prepoints for the whole semester will be distributed among all three tests (2 midterms and final), so as to maximize your score.

Links to the current list of homeworks and quizzes can be found on the left hand frame of the class homepage. After an assignment has been returned, a link to its solution (based on the best student solutions) will be placed off the assignment page. Material from assignments may appear on midterms and finals. For homeworks you are encouraged to work in groups of up to three people. Only one person out of this group needs to submit the homework assignment; however, the members of the group need to be clearly identified in all submitted files.

Homeworks for this class will be submitted and returned completely electronically. To submit an assignment click on the submit homework link for your section on the left hand side of the homepage and filling out the on-line form. Hardcopies or e-mail versions of your assignments will be rejected and not receive credit. Homeworks will always be due by the start of class on the day their due. Late homeworks will not be accepted and missed quizzes cannot be made up; however, your lowest score amongst the five homeworks and your quiz total will be dropped.

For this class, I expect each student to have available a laptop with recent version of Python installed (either 2.7.x or 3.x branch). Your laptop will be used whenever you want to show me something in my office concerning one of your projects.

When doing the programming part of an assignment please make sure to adhere to the specification given as closely as possible. Names of files should be as given, etc. Failure to follow the specification may result in your homework not being graded and you receiving a zero for your work.

## Exams

The midterms will be during class time on: Oct 4 and Nov 1.

The final will be: 12:15pm-2:30pm, Wednesday, Dec 13.

All exams are closed book, closed notes and in this classroom. You will be allowed only the test and your pen or pencil on your desk during these exams. Beeper or cell-phone interruptions will result in immediate excusal from the test. The final will cover material from the whole quarter although there will be an emphasis on material after the last midterm. No make ups will be given. The final exam may be scaled to replace a midterm grade if it was missed under provably legitimate circumstances. These exams will test whether or not you have mastered the material both presented in class or assigned as homework during the quarter. My exams usually consist of a series of essay style questions. I try to avoid making tricky problems. The week before each exam I will give out a list of problems representative of the level of difficulty of problems the student will be expected to answer on the exam. Any disputes concerning grades on exams should be directed to me, Professor Pollett.

## Regrades

If you believe an error was made in the grading of your program or exam, you may request **in person** a regrade from me, Professor Pollett, during my office hours. **I do not accept e-mail requests for regrades.** A request for a regrade must be made no more than a week after the homework or a midterm is returned. If you cannot find me before the end of the semester and you would like to request a regrade of your final, you may see me **in person** at the start of the immediately following semester.

## University Policies and Procedures

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at <http://www.sjsu.edu/gup/syllabusinfo/>. Below are some brief comments on some of these policies as they pertain to this class.

## **Academic Integrity**

For this class, you should obviously not cheat on tests. For homeworks, you should not discuss or share code or problem solutions between groups! At a minimum a 0 on the assignment or test will be given. A student caught using resources like Rent-a-coder will receive an F for the course. Faculty members are required to report all infractions to the Office of Student Conduct and Ethical Development.

## **Accommodations**

If you need a classroom accommodation for this class, and have registered with the [Accessible Education Center](#), please come see me earlier rather than later in the semester to give me a heads up on how to be of assistance.