San José State University
College of Science, Department of Computer Science
CS 256, Topics in Artificial Intelligence, Section 2, Fall 2017

Course and Contact Information

Instructor: Dr. Natalia Khuri

Office Location: DH 282

Telephone: Not Available

Email: natalia.khuri@sjsu.edu

Office Hours: TTH 10:30 – 11:30 AM and by appointment (in-person or electronically) at mutually convenient times to a reasonable extent

Class Days/Time: TTH 9:00 – 10:15 AM

Classroom: SCIENCE 311

Prerequisites: CS 156 or instructor consent. To receive instructor's consent, students should have taken the following classes (or their equivalents): Programming (CS 46A, CS 46B, CS151), Data Structures and Algorithms (CS 146), Discrete mathematics (Math 42), Applied Probability and Statistics (Math 161A).

Course Format

Technology Intensive

This course is technology intensive and students are expected to install Python 2.7 and various libraries to develop their code. It is recommend that students use a UNIX environment (e.g., Linux, OS X, or CygWin).

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignments, project description, etc. can be found on Canvas Leaning Management System course login website at http://sjsu.instructure.com. Students are responsible for regularly checking the announcements to learn of any updates. In exceptional circumstances, students may be notified of updates through MySJSU at http://my.sjsu.edu, therefore, students should ensure that their email addresses in MySJSU are current.

Course Description

Introduction to topics in artificial intelligence such as problem solving methods, game playing, understanding natural languages, pattern recognition, computer vision and the general problem of representing knowledge. Students will be expected to use LISP. Prerequisite: CS 156 or instructor consent.

NOTE: In this section of the course, students will be using Python (not LISP).

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. Describe fundamental principles and applications of artificial intelligence (AI)

2. Prototype and implement several algorithms that are widely used in AI applications
3. Propose creative technical AI solutions to real world problems
4. Communicate in written and oral form about the technical, legal, ethical and business issues in AI

Required Texts/Readings

Textbook

There is no required textbook for this course. Online reading materials will be provided in Canvas.

Other Readings

The following is a list of recommended textbooks. Some of these books are available online.

1. *Artificial Intelligence: A Modern Approach* by Stuart Russell and Peter Norvig. ISBN: 0136042597
2. *Probabilistic Graphical Models* by Daphne Koller and Nir Friedman. ISBN: 9780262013192
3. *Reinforcement Learning: An Introduction* by Richard Sutton. ISBN: 9781461536185
4. *The Elements of Statistical Learning* by Trevor Hastie, Robert Tibshirani and Jerome Friedman. ISBN: 0387848576
5. *Introduction to Data Mining* by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, ISBN: 9780321321367
6. *Pattern Classification* by Richard Duda, Peter Hart, and David Stork. ISBN: 0471056693

Other technology requirements / equipment / material

Students are expected to install and use Python 2.7 to develop their programs. It is recommended that students use a UNIX environment (e.g., Linux, OS X, or CygWin). In class, students will often practice various brainstorming / ideation / collaborative intelligence techniques and the instructor will provide basic supplies. However, it is recommended that students have the following supplies on hand: blank paper and pens/pencils.

Library Liaison

Megwalu, Anamika, Phone: 408-808-2089, Email: anamika.megwalu@sjsu.edu

Course Requirements and Assignments

Success in this course is based on the expectation that students will spend, for each unit of credit, between 45 to 90 hours over the length of the course (normally 3 to 6 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Homework

The five graded homework assignments consist of programming and written parts. Every homework assignment has been carefully crafted to help students achieve Course Learning Outcomes and acquire knowledge, skills and attitudes for becoming professional computer scientists. Each assignment will be equally weighted at 100 points and will contribute 10% toward the final score. The programming part of every homework assignment will be focused on prototyping and/or testing a widely used AI algorithm, such as k-nearest Neighbors (kNN), for example. Python 2.7 should be used to develop the code and homework grading will be done on OS X. The submitted code will not be graded if it has one of the following issues:

- The code does not run. In particular, programs use Python packages outside the standard library.
- The code quits unexpectedly.
- The code reads external files other than the files given in the assignment.

The written part will consist of the descriptions of experimental results of validating and testing the prototype on specific problem instances. Written parts should be written clearly and succinctly; you may lose points if your answers are unclear or unnecessarily complicated. The grading rubric for every assignment will be posted on Canvas. Here are the due dates and times for homework assignments:

Assignment #1: 9/12/17 8:59AM
Homework #2: 9/28/17 8:59AM
Homework #3: 10/17/17 8:59AM
Homework #4: 11/2/17 8:59AM
Homework #5: 11/21/17 8:59AM

Examinations

There will be two examinations (one midterm and a final) that will test your knowledge and problem-solving skills on all preceding lectures and homework assignments. No external aids will be allowable with the exception of a single double-sided page of notes. Some exam questions will be designed for assessment purposes only (i.e. to quantitatively measure students' performance in the course) and, hence, will not be counted toward the exam score. These questions will be revealed after the examination. Here are the dates of the examinations:

Midterm Exam:	10/12/17 9AM – 10:30 AM in SCI 311
Final Exam:	12/19/17 7:15 – 9:30 AM in SCI 311

Project

The final project provides an opportunity for students to unleash their creativity and use the tools from class to build something interesting and innovative of their choice. Specifically, students will build a system to solve a well-defined task. Since it will take several iterations to find the right task, students are advised to be patient during ideation and not wait until the last minute. Projects will be done in groups of one, two or three students. Students will work on the project throughout the course while completing four milestones. Groups will be formed after the drop deadline on 9/7/17. Regardless of the group size, all groups must submit the same basic amount of work as detailed in each milestone and each group member is expected to contribute to the completion of each milestone. Teams will present their projects during their assigned time on either 12/5/17 and will submit a final report in a manuscript format by 8:59AM on 12/7/17. Detailed guidelines for the project will be posted on Canvas by the first day of class (8/24/17, 9AM). The schedule for project presentations and peer review assignments will be announced on Canvas on 11/9/17. Each milestone completion will contribute a varied number of points toward the overall score for the project. The following are project milestone due dates and number of points allocated for each milestone:

Milestone #1 (Team Formation)	9/7/17	1 point
Milestone #2 (Project Proposal):	10/3/17	19 points
Milestone #3 (Project Progress Report):	11/9/17	25 points
Milestone #4 (Project Peer Review):	12/5/17	5 points
Milestone #5 (Project Final Report):	12/7/17	50 points

Final Examination

The final examination will be a comprehensive test of your knowledge and problem-solving skills from all lectures, homework assignments and in class activities. No external aids will be allowed with the exception of a single double-sided page of notes. If you have a major conflict in the final exam schedule (i.e. two or more

final examinations on the same day), submit a request to take it at an earlier time. Your request must be submitted by 11/12/17 in writing.

Grading Information

Note that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

Homework Assignment 1	10%
Homework Assignment 2	10%
Homework Assignment 3	10%
Homework Assignment 4	10%
Homework Assignment 5	10%
Midterm Exam	15%
Final Exam	15%
Project	20%

Extra Points

Students are encouraged to prepare for every class by completing extra-credit assignments posted in Canvas. These assignments range from paper-pencil exercises to essays and making short videos. Students may earn extra credit points by completing some or all these assignments up to 2% of the final grade.

Penalties

A homework assignment is considered N days late if it was not turned in within $24(N-1)$ hours of the deadline. A 10% penalty will be applied for each late day up to 8 days (hard deadline). After the hard deadline you will receive a grade of zero for the late assignment.

Late project milestone deliverables will receive zero points.

Determination of Grades

The final grade will be computed as follows:

$$Score = 0.1 \times Homework1 + 0.1 \times Homework2 + 0.1 \times Homework3 + 0.1 \times Homework4 + 0.1 \times Homework5 + 0.15 \times Midterm + 0.2 \times (Milestone1 + Milestone2 + Milestone3 + Milestone4 + Milestone5) + 0.15 \times Final$$

$$Total\ Score = Score + min(0.02 \times Score, Extra\ Points)$$

The following conversion scale will be used to assign letter grades:

[97, 100]	A+
[93, 97)	A
[90, 93)	A-
[87, 90)	B+
[82, 87)	B
[80, 82)	B-
[77, 80)	C+
[72, 77)	C
[70, 72)	C-
[67, 70)	D+
[62, 67)	D

[60, 62) D-
[0, 60) F

Re-grades

If you believe that the instructor made an error in grading, then you may submit a re-grade request. To do this, you must come in person to the instructor's office (DH 282) during office hours or schedule a meeting at mutually convenient time. Any requests submitted over email or on Canvas will be ignored. Remember that even if the grading seems harsh to you, the same rubric was used for everyone for fairness, so this is not sufficient justification for a re-grade. If the re-grade request is valid, the instructor will process it.

Classroom Protocol

- Every class will start at 9AM sharp. Please, arrive shortly before 9AM to settle in for class and greet your classmates.
- Except for exceptional circumstances, no electronic devices should be used during class. Please, turn off your phones when in class. Also, make sure to bring a notebook/paper and pens/pencils to take notes. Lecture slides are used as prompts so it is expected that you will be taking notes during class. Lecture slides will be posted on Canvas after each lecture to avoid "spoiler alerts".
- Pre-assigned readings should be completed prior to class to better facilitate in class discussions and problem solving. Course assignments will be posted continuously during the course, please, login to Canvas regularly to keep updated.
- In class, we will often work in groups to brainstorm ideas, discuss open-ended questions, and solve exercises. It is expected that students will be courteous to each other, collaborative, and participatory.
- All submissions will be on Canvas LMS by 8:59AM on the due dates. Do not email submissions. Do not wait until the deadline to submit. If something goes wrong, please first ask a question on Canvas discussion board.

University Policies (Required)

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/

CS 256 Topics in Artificial Intelligence, Section 2, Fall 2017

Course Schedule

The schedule is subject to change with fair notice. Students will be notified of changes on Canvas LMS.

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/24/17	*Artificial Intelligence*: Past, Present and Future
2	8/29/17	*Introduction to CS256 Section 2*: Logistics and Policies
2	8/31/17	*Machine Learning*: Introduction and Practicalities
3	9/5/17	*Machine Learning*: Introduction to Classification
3	9/6/17	**Last day to Drop a Class without a "W" grade**
3	9/7/17	*Machine Learning*: Classifier Performance and Comparison; **Team Formation**
4	9/12/17	*Machine Learning*: Introduction to Clustering; **Homework 1 due 8:59AM**
4	9/13/17	**Last day to Add via MySJSU online and without a Petition & Late fee**
4	9/14/17	*Machine Learning*: Cluster Evaluation
5	9/19/17	*Machine Learning*: Association Analysis
5	9/21/17	*Data Mining*: Rough Sets
6	9/26/17	*Data Mining*: Rough Sets
6	9/28/17	*Neural Networks:* Principles **Homework 2 due 8:59AM**
7	10/3/17	*Neural Networks*: Applications **Project Proposal due 8:59AM**
7	10/5/17	*Search and Optimization*: Dynamic Programming
8	10/10/17	*Search and Optimization:* Dynamic Programming
8	10/12/17	**Midterm Exam**
9	10/17/17	*Search and Optimization:* Evolutionary Computation; **Homework 3 due 8:59AM**
9	10/19/17	*Search and Optimization:* Evolutionary Computation
10	10/24/17	*Decision Making*: Introduction and Practicalities
10	10/26/17	*Decision Making*: Decision Trees
11	10/31/17	*Decision Making*: Decision Trees
11	11/2/17	*Decision Making*: Bayesian Decision Theory; **Homework 4 due 8:59AM**

Week	Date	Topics, Readings, Assignments, Deadlines
12	11/7/17	*Decision Making*: Hidden Markov Models
12	11/9/17	*Decision Making*: Hidden Markov Models; **Project Progress Report due 8:59AM**
13	11/14/17	*Information Extraction*: Knowledge Representation
13	11/16/17	*Information Extraction*: Natural Language Processing
14	11/21/17	*Information Extraction*: Natural Language Processing; **Homework 5 due 8:59AM**
14	11/23/17	Thanksgiving Holiday; No Class
15	11/28/17	*Information Extraction*: Communication
15	11/30/17	*Information Extraction*: Perception
16	12/05/17	**Project Presentations** **Peer Review**
16	12/07/17	Conclusion **Final Project Report due by 8:59AM**
Final Exam	**12/19/17**	**7:15 – 9:30 AM in SCIENCE 311**