San José State University
Computer Science Department
CS/SE 156: Introduction To Artificial Intelligence
Section 02   Spring 2024

Course and Contact Information

Instructor:	Leonard Wesley
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Office Hours:	Tuesdays 7:00AM – 9:00AM and by appointment via Zoom at the following link https://sjsu.zoom.us/j/89278465240?pwd=OHpReEdlMG51cEx2RIZEb29WOGx6Zz09 PASSCODE: 265819
Class Days/Time:	Tuesdays and Thursdays 3:00 PM – 4:15 PM
Classroom:	DH 450
Prerequisites:	Prerequisite(s): CS 146 (with a grade of C- or better); Allowed Majors: Computer Science, Data Science, Computer Science & Linguistics, Applied and Computational Mathematics or Software Engineering; or instructor consent.

Course Description:

Basic concepts and techniques of artificial intelligence: problem solving, search, deduction, intelligent agents, knowledge representation. Topics chosen from logic programming, game playing, planning, machine learning, natural language, neural nets, robotics.

Learning Outcomes:

Upon successful completion of this course, students will be able to understand:
1. SLO-1: Python Review & History and state of the art in AI. Intelligent Agents
2. SLO-2: Solving Problems by Search.

3. SLO-3: Knowledge Representation

4. SLO-4: Knowledge Reasoning
5. SLO-5: Uncertain Knowledge and Reasoning
6. SLO-6: Machine Learning
7. SLO-7: APPLICATIONS: how to integrate and apply the above
techniques to real-world applications

Required Texts/Readings:

Textbook
Artificial Intelligence A Modern Approach *Fourth Edition* , by Stuart Russell and Peter Norvig, Pearson Education, Inc., 2010, ISBN-13: 9780134610993.

Other Readings
The instructor will likely provide additional study and exercise materials, or provide web-based links to relevant material.

Computational Resources:
Students are required to make sure that they have access to sufficient UNIX, Windows, or Mac based computational resources (e.g., computers and software) to carryout assignments in the course. An attempt to offer the course in a classroom with sufficient computation resources will be made by the department to support classroom instruction and demonstrations. However, students should be prepared to bring their portable laptops to class.

Course Requirements and Assignments:
Students will be assigned videos or related multi-media or electronic copies of course subject matter for reading and review. In situations where assignments involve programming, an alternative and equivalent non-programming assignment will be provided for non-computer science and non-software engineering students that lack the programming background and prefer not to complete and submit programming assignments.

Students will be expected and required to read the assigned material and complete all homework or programming tasks prior to the indicated next class meeting. In class instruction will, at times, consist of a short unannounced quizzes at the start of selected classes to test comprehension of assigned material. For "In-Class Exercise" classes, the class will be divided into groups of 2-4 students to work on the assigned in-class exercises.

Course Logistics:

Students should expect to spend approximately nine (9) hours per week (on average) completing the assigned course work. This includes viewing videos, homework, in-class lecture and in-class exercise time. The amount of time that a student actually spends depends on their individual skills and the time allocated to the course. The nine (9) hours per week estimate is based on the previous experiences of the instructor and students. So please plan and schedule accordingly.

Previously, students have asked for special exception to policies and procedures for this course. An example includes asking the instructor for extra assignments or work to help improve a student's grade. Even if such a request is reasonable in the view of the instructor, no exception will be given to a student unless it can be made available to the entire class, AND does not constitute significant extra work on the part of students, instructors, graders and so forth. Students should have no concern that other students will receive special exceptions that will not be available to them to pursue.

NOTE: University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading." However, attendance will be required in order to complete and submit many in-class exercises, quizzes, and exams.

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Quizzes and Exams:

There will be three quizzes, one midterm and a final project all of which will count toward the final grad as specified in the "Grades" section below. During quizzes and exams, communication with other individuals via any means is strictly prohibited without the express permission of the instructor. Violations will be met with the full impact of SJSU's academic integrity policy and procedures.

Projects:

Several AI-related project topics will be described near the start of the course. Projects will involve applying the skills and knowledge learned in the course to the project. Teams of 3-4 students will be formed to work on a selected project topic. Teams will be required to submit a project proposal before starting on a project, and submit a project report along with working code at the end of the course. Individual student scores on a project will be determined by the content and quality of the contribution of each student toward the

project. The score on the course project and project presentation will count toward the final grad (percentage wise) as specified in the "Grades" section below.

Reading, Homework, Programming, In-Class Exercises, Participation Assignments

Graded reading, homework, programming, and class participation and brief course feedback assignments will be given almost weekly, and will count toward the final grade. There will be 4 In-class Exercise sessions. These will typically involve forming teams of 2-3 students that work on assigned programming or non-programming-like exercises in the classroom. They provide an opportunity to get started on homework assignments that are to be submitted on a designated due date. Participation is mandatory, and scores will count toward final grade.

Any questions or concerns about scores/marks that students receive on assignments must be presented to the instructor within two weeks from the date grading of the assignments is completed and presented/released to the class.

Tentative course calendar of assignment due dates & exam dates:

(Please note that course calendar below, and its content is "subject to change with fair notice")

Week and Class Mtg #	Tue	Thur	Module # & Name	TOPIC	Assignment See Canvas For Module & Weekly Assignment Details and Due Dates
Week 1	N/A	1/25		1/25: - Intro To Course: -Topics, learning objectives, course logistics, Instructor background - Syllabus - What really is AI?	Learning Module #1
Week 2	1/30	2/1	#1 Python Review	1/30: - Python Review 2/1: - Python Review	Learning Module #1

Week 3	2/6	2/8	#2 Solving Problems By Search	2/6: - History & State of The Art In AI - Search strategies and heuristics 2/8: - Heuristic search cont., e.g., A*.	Learning Module #2
Week 4	2/13	2/15	#2 Solving Problems By Search	2/13: - Search strategies and heuristics - Heuristic search cont., e.g., A*. 2/15: - **In-Class Exercise 1** - Topics Covered week 1 to week 4	Learning Module #2 Project Proposals Due See Canvas For Exact Due Date
Week 5	2/20	2/22	#2 Solving Problems By Search	2/20: - Reasoning & Search 2/22: - **Quiz 1 (~40 mins): Covers Topic Weeks 1 thru Week 4**	Learning Module #2 The deadline for students to Add or Drop classes via MySJSU with no petition is February 19 (per University Policy S22-6)
Week 6	2/27	2/29	#3 Knowledge Representation	2/27: - Knowledge-Based Agents - Logic - Propositional logic 2/29: - Propositional logic - First Order Logic	Learning Module #3

Week					
Week 7	3/5	3/7	#3 Knowledge Representation	3/5: - Proposition vs first order logic inference 3/7: - Midterm Review - Using & inference in first order logic	Learning Module #3
Week 8	3/12	3/14	#3 Knowledge Representation	3/12: - **In-Class Exercise 2** Topics Covered week 5 to week 7 3/14: - **Midterm (Full period): Covers Topic Weeks 1 thru Week 7**	Learning Module #3
Week 9	3/19	3/21	#3 Knowledge Representation	3/19: - Rule-based representation 3/21: - Rule-based representation	Learning Module #3
Week 10	3/26	3/28	#3 Knowledge Representation	3/26: - Frame-based Representation 3/28: Frame-based Representation	Learning Module #4
Week 11	4/2	4/4		**SPRING BREAK**	

Week 12	4/9	4/11	#4 Knowledge Reasoning	4/9: - Frame-based Representation - Semantic Networks 4/11: - **Quiz 2 (~40 mins): Covers Topic Weeks 6 thru Week 10**	Learning Module #4

Week 12	4/16	4/18	#4 Knowledge Reasoning & #5 Uncertain Knowledge and Reasoning	4/16: - Semantic Networks 4/18: - **In-Class Exercise 3** Topics Covered week 8 to week 11	Learning Module #4 Learning Module #5
Week 13	4/23	4/25	#4 Knowledge Reasoning & #5 Uncertain Knowledge and Reasoning	4/23: Machine Learning support vector machines 4/25: -	Learning Module #4 Learning Module #5
Week 14	4/30	5/2	#6 Machine Learning	4/30: - Machine Learning neural networks - Integrating ML and Intelligent Agents 5/2: - Integrating ML and Intelligent Agents - Applications	Learning Module #6 & Learning Module #7

Week 15	5/7	5/9	#6 Machine Learning #7 Applications	5/7: - **In-Class Exercise 4** (Work on Team Projects, Q&A) 5/9: - **Quiz 3 (~35 mins): Covers Topics Week 9 thru Week 12**	Learning Module #6 & Learning Module #7
			Final Project Code and Project Report Due To Canvas **Wednesday May 15, 2024 By 11:59PM** **No Final Exam.** **The Project Takes The Place Of The Final Exam**		

SCHEDULE FOOTNOTES:
NONE AS OF JANUARY 2024

Grades *
WRITTEN HOMEWORK (5 at 5 points each)   25 pts
QUIZZES (3 at 50pts each)   150 pts
MIDTERM   100 pts
IN-CLASS EXERCISES (4 at 50pts each)   200 pts
WEEKLY COURSE FEEDBACK (15 at 5 pts each)   75 pts
PROGRAMMING ASSIGNMENTS OR ALTERNATIVES
                                           (3 @ 50pts each)   150 pts
FINAL PROJECT REPORT   200 pts
- -
Total Course Points   =   900 pts Total

* The total points for each category might change depending on the number of project teams and assignments. The instructor reserves the right to adjust, with sufficient advanced notice,

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.

Classroom Protocol:
MH233is a dual-purpose room. It can be a regular lecture room or a computer laboratory. Please note that "or" in the last sentence is exclusive. In other words, MH233 is never a lecture room AND a computer lab at the same time.

Lecture Mode: This is when MH233 is used as a regular lecture room. Students are expected to listen and follow the Lecture. MH233 can be a noisy room because of the

large number of workstations and the server. Be considerate to your classmates and follow the Lecture. Do not use the computer (workstation) during lectures, and do not talk to your classmates during lectures. Do not open your laptops, or check email, web-chat, tweet, web-surf on the internet, and so forth. If you cannot follow these simple rules, please do not enroll in this class.

Lab Mode: This is when MH233 is used as a computer lab for in-class exercises, Canvas exams, and related assignments that involve the use of computers. Use the computers and share your ideas and solutions with your classmates except during exams or when otherwise instructed. For in-class exercises, the results of your work for that class session will need to be uploaded to an appropriate Canvas assignment for review and possible grading. We shall alternate between the two modes. A typical class will begin with a short lecture (Lecture Mode) to describe the in-class exercise that will reinforce the assignment. This will be followed by a hands-on (Lab Mode). There will be a number of in-class exercises or hands-on-exercises. The purpose of the in-class exercises and hands-on exercises is to develop your understanding of the course lectures, homework assignments, videos, and e-materials.

Grading Percentage Breakdown (NOTE: Ranges might change if point totals change)

Grading Percentage Breakdown		
Percent of Total Points	**Points**	**Letter Grade**
96.66%	≥ 870	A plus
93.33%	≥ 840	A
90.00%	≥ 810	A minus
86.66%	≥ 780	B plus
83.33%	≥ 750	B
80.00%	≥ 720	B minus
76.66%	≥ 690	C plus
73.33%	≥ 660	C
70.00%	≥ 630	C minus
66.66%	≥ 600	D plus
63.33%	≥ 570	D
60.00%	≥ 540	D minus
59.99%	< 540	F

HOW TO CALCULATE/ESTIMATE YOUR GRADE:
If students would like to calculate their numeric grade percentage, the formula is as follows: Numeric CS 123A Grade Percentage =

$$\frac{Total\ points\ from\ assignments}{Total\ course\ points}\ x\ 100\%$$

There is no guarantee that grades will be curved. If so, it will be done at the end of the semester. The instructor is already aware that graduate students need to maintain an overall GPA of B or better. Just because a student NEEDS a particular grade doesn't mean that the instructor will automatically GIVE the student that grade. Students must EARN a passing grade based on submitted and evaluated course work.

Extra credit options, if available:

There are no pre-planned extra credit assignments in this course. However, homework assignments and exams might, on occasion, contain extra credit options/questions. At times, the instructor might announce and give extra credit exercises or assignments in class or as work to be completed outside of classroom instruction. There is no guarantee that such extra credit exercises or assignments will be offered to the class. If, in the opinion of the instructor, offering such extra credit options will be significantly advantageous to the learning process, they might be offered.

Late Assignment Submission

Late assignments will receive a 25% point deduction of a graded assignment for each 24hr period after the submission deadline. For example, if an assignment is worth 10 points, and the grade for the assignment is 8/10, and the assignment is submitted one day late, then the point deduction equals 2.5, and the final grade for the assignment is MAX(0, 8 – 2.5) = MAX(0, 5.5) = 5.5 .

Missed Assignments, In-Class Exercises, Quizzes, and Exams

A. QUIZZES:
   a. The grade for one missed quiz will be replaced with the average of the remaining two quizzes. The average is calculated as the sum of current quiz grades / the number of quizzes for the semester. For example, if quiz 1 = 85, quiz 2 = 95, and quiz 3 is missed, the quiz 3 grade will be replaced by (85+95)/3 = 60.
   b. More than one missed quiz will result in a grade of incomplete provided the total missed points for the semester is less than 20% of the total course points.

B. MIDTERM:
   a. The grade for a missed midterm exam will be 75% of the average score for quizzes, programming assignments, and homework assignments provided the total missed points for the semester is less than 20% of the total course points. Or, provide acceptable documentation of the reason for missing the midterm as described in version 1 of this course syllabus and a makeup exam will be provided.

C. HOMEWORK ASSIGNMENTS:
   a. The grade for one missed homework assignment will be replaced with the average of the remaining three homework assignments. The average is calculated as the sum of current homework grades / the number of homework assignments for the semester.
   b. The grade for the second missed homework assignments will be replaced with 75% of the average of the remaining two homework assignments.
   c. More than two missed homework assignments will result in a grade of incomplete provided the total missed points for the semester is less than 20% of the total course points. An

alternative is to accept zeros for the missed homework assignments, or if acceptable documentation of the reason for missing the homework assignments is provided, makeup assignments will be provided.

D. PROGRAMMING ASSIGNMENTS:
    a. The grade for one missed programming assignment will be replaced with 50% of the remaining programming assignment.
    b. Two missed programming assignments will result in a grade of incomplete provided the total missed points for the semester is less than 20% of the total course points. An alternative is to accept zeros for all missed programming assignments, or if acceptable documentation is provided, makeup assignments can be provided

E. IN-CLASS EXERCISES:
    a. The grade for one missed In-Class Exercise will be replaced with the average of the remaining three In-Class Exercises. The average is calculated as the sum of current in-class exercise grades / the number of in-class exercises for the semester.
    b. The grade for two missed In-Class Exercises will be replaced with 75% of the average of the remaining two In-Class Exercises.
    c. More than two missed In-Class Exercises will result in a grade of incomplete provided the total missed points for the semester is less than 20% of the total course points. An alternative is to accept zeros for all missed in-class exercises, or if acceptable documentation of the reason for missing the IN-Class Exercises is provided, a makeup assignment can be provided.

F. WEEKLY FEEDBACK:
    a. All missed weekly feedback assignments will receive zero points.

G. FINAL PROJECT REPORT & CODE:
    a. The grade for a missed final project report and code will be 75% of the average of all other course assignments, exams, and quizzes provided the total missed points for all other assignments is less than 5% of the total course points.
    b. If the total missed points for all other assignments is more than 5% but less than 20% of the total course points, a grade of incomplete will be given.

H. TOTAL MISSED POINTS MORE THAN 20% BUT LESS THAN 30% OF TOTAL COURSE POINTS AND TOTAL MISSED POINTS MORE THAN 30%.
    a. **Missed between 20% and 30% of total course points:** A course grade that equal to (100% - <missed points %>) * Average of remaining assignments, quizzes, exams, and programming assignments.
    b. **Missed more than 30% of total course points:** If the percentage of total missed points is greater than 30%, a course grade that is the result of assigning a zero grade for all missed assignments will be assigned. An alternative grade or options can be discussed with the instructor.

Receiving An Incomplete (I) Grade:

Receiving a grade of Incomplete (I) is not automatic. Students must complete at least 80% of course assignments by the end of the semester to be eligible to receive a grade of incomplete. Students must also provide documentation to support the reason for the request to receive an Incomplete grade. The instructor has the final decision to give an

Incomplete grade. If the instructor agrees to give a student an Incomplete grade, the instructor will enter the remaining work to be completed as part of the PeopleSoft grade submission process.

Grade Change Policy:
It is a university policy that course grade changes must be made within one semester from the end of the course. Requests for exceptions to this policy must be accompanied with a documented and compelling reason.

University Policies:
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/. Make sure to review these policies and resources