

CS 550 Artificial Intelligence

Fall 2020

Schedule N° 21187

COURSE INFORMATION

Class Days: Tu Th

Phone: NA during pandemic

Class Times: 4 PM – 5:15 PM

Email: marie.roch@sdsu.edu

Class Location: virtual

Office location: NA during pandemic

Mode of Delivery: online

Office hours: Tu 1-1:50, We 2-2:50

Instructor: Professor Roch

The preferred method to handle questions is via office hours as interaction frequently results in better understanding both of your question and of the answer. You are welcome to contact me by e-mail. When writing, please remember that this is a formal conversation, not a text message. Start with a salutation, e.g. Dear Professor Roch, and be sure to sign your name. Remember that you may ask a professor to write a letter of recommendation for you in the future. Part of how your faculty evaluate you is based on your ability to communicate effectively and in an appropriate manner. Email is usually responded to within 1-3 days. If you do not receive a reply after that, please feel free to send a gentle nudge. I receive a high volume of e-mail and messages occasionally scroll off the screen and are missed.

COURSE MATERIALS

Required: Russell, Stuart J., and Peter Norvig. Artificial Intelligence : A Modern Approach. Prentice Hall Series in Artificial Intelligence. 4th ed. Upper Saddle River: Prentice Hall, 2021. Available at the SDSU book store or through online vendors.

Optional: Programming in this course is in Python 3. While we will briefly introduce Python in class, we will not be devoting much time to how to program in Python as upper division computer scientists should have the skills to learn new languages without an extraordinary effort. See the course web site for recommendations on optional books and videos on Python that are freely available to students online through the University's Safari subscription. See the course web site <https://roch.sdsu.edu> for suggestions on books. This course also uses Canvas (<https://canvas.sdsu.edu>) for grade management, submissions, etc.

COURSE DESIGN AND GRADING POLICIES

Due to the COVID-19 pandemic and difficulty in proctoring large number of students in online settings, there are no exams in this course. Exams are replaced with frequent short answer quizzes that account for 20% of your grade. Quizzes are designed to reinforce recent lecture materials and you are welcome to review your notes while

taking them. At the end of the semester, your quiz grade will be based on the number of points earned divided by the total number of points in the quizzes.

Assignments account for 80% of your grade. Assignments consist of questions and programming projects. Questions may be numerical, textual, or require a small amount of programming and must always be done individually. Numerical questions require you to show your work. Programming projects may be done alone or with no more than one other person and you must use pair programming techniques. Programs must be well structured and commented. Frequently, students make their lives more difficult by simply writing the program without thinking first. The use of good program design will make your life significantly easier. In addition, an emphasis should be made on making your programs readable. Use meaningful variable names and comment as you write the program rather than adding comments at the end. If you encounter difficulties in your projects, I will assist you provided that you have made a good-faith effort to resolve the problems first. Functionality may be evaluated automatically, be sure to follow specified interfaces and naming conventions.

Good design and structure are expected; programs are not assessed as excellent or good simply because they work. You are not expected to comment every line nor to comment obvious lines of code (e.g. `counter = counter + 1`), but you must provide enough documentation such that a reasonable programmer can easily follow your code. Failure to do so will result in the program earning a lower number of points.

There are typically about 5-6 programming projects per semester. 80% of your programming grade is based on functionality. Does your program run correctly? 10% of your grade is based on structure. Did you use appropriate levels of abstraction? Were large blocks of code repeated when they could have been factored into a subroutine? The final 10% of the program is based on your commenting. Would a reasonable programmer be able to follow this clearly? Are your interfaces well documented, is the functionality of distinct blocks clear?

In general, it is very difficult to justly and systematically determine that one answer is worth N points, and another is worth $N \pm \epsilon$. Consequently, points are assigned based upon broad categories that indicate your mastery of the concept:

A+ - Excellent
A - Good

B – Mostly right
C – Right track

VE – Valiant effort
F – Unacceptable

SCHEDULE

A week-by-week schedule of materials can be found on the course web site.

Quizzes will be given on a regular schedule, with short quizzes approximately every week or two.

Depending on the difficulty of the homework assignments, you will typically be given a week and a half to two weeks. There are typically five to seven assignments per semester, and the due date for each assignment will be posted on the course calendar and the assignment will be announced in class.

STUDENT LEARNING OUTCOMES

This is an elective course for computer scientists that teaches you the fundamentals of artificial intelligence. We will touch on a broad array of topics such as learning how an agent can search a problem space for sequences of actions that solve a problem (e.g. how to maneuver an autonomous vehicle), how certain problem configurations and actions can constrain the what can be done next (e.g. solving crossword puzzles), how to reason logically, and how machines can learn to predict categories from data.

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

- Construct intelligent agents capable of interacting with their environments.
- Understand and implement heuristic searches for problem solving and game playing (adversarial search)
- Understand first-order logic and its application to theorem proving.
- Analyze constraint satisfaction problems and resolve them through search.
- Understand and apply machine learning algorithms for classification tasks
- CS 550 addresses the following CS Program course outcomes:
 - a) An ability to apply knowledge of computing and mathematics
 - b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
 - c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
 - d) An ability to function effectively on teams to accomplish a common goal
 - h) Recognition of the need for and an ability to engage in continuing professional development
 - i) An ability to use current techniques, skills, and tools necessary for computing practice
 - j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
 - k) An ability to apply design and development principles in the construction of software systems of varying complexity.

Topics Covered: intelligent agents, theorem proving, search, machine learning, constraint satisfaction problems

UNIVERSITY POLICIES

Accommodations: The learning environment should be accessible to all. SDSU provides reasonable accommodations for differently abled people. If you will need accommodations for this class, it is your responsibility to contact the Student Ability Success Center at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact the center as soon as possible. Accommodations are not retroactive.

Student Privacy and Intellectual Property: The [Family Educational Rights and Privacy Act](#) (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. Grades will be available on Canvas. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are working directly with the professor on a research project in which case a separate agreement will be signed. **Videos provided by Professor Roch are her intellectual property and are for your personal use only. They may not be shared or redistributed in any way.**

Religious observances: According to the University Policy File, students should notify the instructors of affected courses of planned absences for religious observances by the end of the second week of classes.

Academic Honesty: You are free to discuss ideas and strategies for approaching problems with others, but students must complete work on their own. Using other people's work in any form (i.e. the web, other students) will result in disciplinary action. **Plagiarism is unacceptable and will not be tolerated. You are responsible for understanding plagiarism;** the library has a tutorial (<https://sdsu.libwizard.com/f/Plagiarism-tutorial>). If you think that copying an answer from the web is okay, take the tutorial. If you think that paraphrasing with citations is okay, take the tutorial... ignorance is not a valid excuse. If you have any questions about plagiarism after taking the tutorial, I will be happy to assist you. Students who have plagiarized or cheated will be reported to the Center for Student Rights and Responsibilities. In addition to the academic penalty (0 on the assignment with no possibility of redemption on first offense, failing the course on the second), the university may decide upon additional sanctions such as expulsion.

Resources for students: A complete list of all academic support services--including the [Writing Center](#) and [Math Learning Center](#)--is available on the Student Affairs' [Academic Success](#) website. [Counseling and Psychological Services](#) (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

SDSU Economic Crisis Response Team: If you or a friend are experiencing food or housing insecurity, technology concerns, or any unforeseen financial crisis, it is easy to get help! Visit sdsu.edu/ecrt for more information or to submit a request for assistance.

SDSU's Economic Crisis Response Team (ECRT) aims to bridge the gap in resources for students experiencing immediate food, housing, or unforeseen financial crises that impacts student success. Using a holistic approach to well-being, ECRT supports students through crisis by leveraging a campus-wide collaboration that utilizes on and off-campus partnerships and provides direct referrals based on each student's unique circumstances. ECRT empowers students to identify and access long term, sustainable solutions in an effort to successfully graduate from SDSU. Within 24 to 72 hours of submitting a referral, students are contacted by the ECRT Coordinator and are quickly connected to the appropriate resources and services.

For students who need assistance accessing technology for their classes, visit our ECRT website (sdsu.edu/ecrt) to be connected with the SDSU library's technology checkout program. The technology checkout program is available to both SDSU and Imperial Valley students.

Sexual violence / Title IX mandated reporting: As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I am a mandated reporter in my role as an SDSU employee. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep the information you share private to the greatest extent possible. However, I am required to share information regarding sexual violence on SDSU's campus with the Title IX coordinator, Jessica Rentto 619-594-6017. She (or her designee) will contact you to let you know about accommodations and support services at SDSU and possibilities for holding accountable the person who harmed you. Know that you will not be forced to share information you do not wish to disclose and your level of involvement will be your choice. If you do not want the Title IX Officer notified, instead of disclosing this information to your instructor, you can speak confidentially with the following people on campus and in the community. They can connect you with support services and discuss options for pursuing a University or criminal investigation. Sexual Violence Victim Advocate 619-594-0210 or Counseling and Psychological Services 619-594-5220, psycserv@sdsu.edu. For more information regarding your university rights and options as a survivor of sexual misconduct or sexual violence, please visit titleix.sdsu.edu or sdsutalks.sdsu.edu.

Classroom Conduct Standards: SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Prohibited conduct includes:

- Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
 1. physical abuse, threats, intimidation, or harassment.
 2. sexual misconduct.

Violation of these standards will result in referral to appropriate campus authorities.

Medical-related absences: Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. [Student Health Services](#) (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the [Student Ability Success Center](#).