

**CS 7375/W01– Artificial Intelligence**

**Spring 2022**

**SYLLABUS**

**Faculty and Course Information**

**Faculty Instructor:** Xinyue Zhang

**Faculty Rank:** Assistant Professor of Computer Science

**Instructor Contact Information:** [xzhang48@kennesaw.edu](mailto:xzhang48@kennesaw.edu)

**Class Location and Meeting Times:**

Online, lecture videos will be uploaded every Tuesday and Thursday.

**Course Communication and Office Hours:**

**Office:** R2:311, Norton Hall, Marietta Campus

**Office Hours:** 15:30 – 17:00 on Tuesday and Thursday, or by appointment.

**Electronic Communications:**

* The University provides all KSU students with an ‘official’ email account with the address ‘students.kennesaw.edu.’ As a result of federal laws protecting educational information and other data, **this is the sole email account you should use to communicate with your instructor or other University officials.**
* It is recommended to use D2L email accounts (netid@kennesaw.view.usg.edu) to send to the instructor.

**Required Texts or Other Resources:**

Required Texts:

Russel S., Norvig P.: Artificical Intelligence, A Modern Approach, Third Edition, Prentice Hall, 2010. ISBN-13: 978-0136042594, ISBN-10: 0136042597

Recommended Texts for your references:

1. Artificial Intelligence Illuminated by Ben Coppin, Jones and Bartlett, 2004, ISBN 0-7637-3230-3.

2. Paul Graham, *ANSI Common Lisp*, Prentice Hall.

3. S. Tanimoto, The Elements of Artificial Intelligence Using LISP, Computer Science Press, 1987.

4. George F. Luger and William A. Stubblefield, Artificial Intelligence (and the design of Expert Systems) The Benjamin/Cummings Publishing, 1989.

**Teaching Assistant – N/A**

**Course Description, Credit Hours, and Prerequisites**

**CS 7375:** Artificial Intelligence

**3 Class Hours 0 Laboratory Hours 3 Credit Hours**

***Prerequisite*:** CS 5040 or equivalent

This course is about the theory and practice of Artificial Intelligence (AI). We will study modern AI techniques for computers to represent task-relevant information and make intelligent (i.e. satisficing or optimal) decisions towards the achievement of goals. We will investigate questions about AI systems such as how to represent knowledge, how to effectively generate appropriate sequences of actions and how to search among alternatives to find optimal or near-optimal solutions. We expect that by the end of the course students will have a thorough understanding of the algorithmic foundations of AI and how automated agents learn. Other topics will include intelligent agents, natural language processing, computer vision, machine learning, artificial neural networks and nature-inspired algorithms.

**Course Learning Outcomes**

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

1. demonstrate the understanding of basic concepts in artificial intelligence, including problem solving, knowledge representation, reasoning, decision making, planning, perception and action, and learning -- and their applications

2. Demonstrate understanding of a variety of artificial intelligence techniques for design and implement key components of intelligent agents.

3. Be capable of implementing different algorithms mentioned above with Lisp/Prolog/C/C++ or Java.

4. Demonstrate the knowledge of applications of artificial intelligence.

5. Research and critique computing literature, and utilize it for proposing solutions

**Teaching Philosophy and Instruction Methods**

I believe that the primary goal of teaching is to help students develop critical thinking skills, build the knowledge and skills, foster their interest, train the capability of applying their knowledge to tackle real-world problems, and eventually form their own knowledge system. To attain this goal, I always try to give intuitive and motivational examples during the classes. Since the relevance of course materials to the real world are important to keep students motivated in what they are learning, intuitive and motivational examples will be a key factor in my course preparation and teaching. I will introduce the latest research into the classroom so that students can be kept informed of cutting-edge technology, which can help students grasp the knowledge at a deeper level. Moreover, I believe that students should be encouraged to actively engage in the learning process and to challenge the ideas given in the textbook or by the instructor. I will always encourage students to actively engage in discussion, search for answers among themselves, and ask thought-provoking questions. It also aids students in discovering their strengths and interests, providing them with motivations, confidence, and skills to pursue a career in either academia or industry. Furthermore, it is essential to gather timely and accurate feedback from the students through various ways such as homework, weekly in-class quizzes, and the course web forum. Based on the feedback, I will adaptively deliver the main concepts in a variety of ways that are suitable for students with different backgrounds and capabilities. In addition, I will carefully design team projects involving simplified implementations that are close to real applications and highlight the knowledge learned from the courses. I would exemplify how theoretical analysis is used to guide the implementation of projects, and how implementable projects stimulate the investigation of the theoretical knowledge. Through the experiment and project implementations, I try to ensure that students get a complete understanding and appreciation of the subject being taught. This is particularly important for experiment-oriented courses and research projects.

**Course Content and Requirements/Grading Scale**

**Course Topics and Outline**

Final Exam: Online Quiz, TBD, as per final exam schedule

|  |  |  |  |
| --- | --- | --- | --- |
| Week # | Topic | Chapters in Textbook | Assignments |
| 1 | Introductory concepts and AI history | Chapter 1 + 2 |  |
| 2 | Intelligent Agents | Chapter 2 |  |
| 3 | Intelligent Agents  Solving Problems by Searching | Chapter 3  Chapter 4 | #1 |
| 4 | Informed Search Methods | Chapter 4 |  |
| 5 | Beyond Classical Search | Chapter 4 |  |
| 6 | Adversarial Search (Game Playing) | Chapter 5 |  |
| 7 | Adversarial Search (Game Playing) | Chapter 5 | #2 |
| 8 | Perceptron and ANN | PPT Notes |  |
| 9 | Holidays |  |  |
| 10 | Machine Learning | Chapter 18, 24 |  |
| 11 | Machine Learning | Chapter 18, 24 |  |
| 12 | Knowledge Logic | Chapter 7 + 8 | #3 |
| 13 | Perception | PPT Notes |  |
| 14 | Perception | PPT Notes |  |
| 15 | Deep Learning | PPT Notes |  |
| 16 | Natural Language Processing | Chapter 22 | Research Project Due |

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.

**Grading Scale and Course Policies**

**Grading Scale:**

* Midterm Exam: 20%
* Final exam: 20%
* Assignment: 30%
* Research Project and Demo: 30%

|  |  |
| --- | --- |
| Assignment | Points, percentage or measurement |
| Homework 1 –  Intelligent Agents | 100 points, 10% |
| Homework 2 –  Search Methods | 100 points, 10% |
| Homework 3 –  Neural Network | 100 points, 10% |

**Course Policies:**

**Attendance Policy:**

Attendance at all classes is highly encouraged. Concepts and ideas discussed in one class are used as building blocks for more concepts and ideas in the next class. In being successful in this subject matter, a good rule-of-thumb is to study at least 3 hours per one hour of lecture. *Any class sessions missed by the student are the student's responsibility to make up, not the Professor's.* Makeup exams will NOT be given; instead, the final exam will count in place of the missed exam; if the final exam is missed, an average of the other exams will be used. No finals will be given outside of the University finals schedule. Project assignments MUST be turned in on time to receive full credit. Students will not be allowed to makeup missed project assignments or labs. Students are expected to read the text and any other supporting documentation the Professor distributes. If the student requires additional materials to read or additional problems to solve in better understanding the topics and concepts, the Professor expects the student to take the initiative in locating additional materials or problems. The Professor expects students to take advantage of office hours when needing clarification or help.

**Feedback in a Timely Manner:**

* The instructor and the TA will reply to email within 48 hours (does not include holidays and weekends) or during the office hours (as per KSU policy).
* The instructor and the TA will grade all submitted work within a week.

**Quiz/Exam Policy:**

* No make-up exam will be provided. All students must take the exam during the designated time periods.

**Grading:**

* Each homework/project is due at the set deadline. Late assignments will be accepted up to 24 hours after the due date for 50% credit. Assignments submitted more than 24 hours late will not be accepted for credit.
* Students must submit their deliverables to an assignments folder in D2L. No email submissions will be accepted.
* All homework/project are individual assignments, and thus, students must work out the assignments for themselves. Detection of plagiarism will result in assigning the failing grade (The final grade will be “F”).

**Course Withdrawal**

The last day to withdraw without academic penalty is Tuesday (11:45pm), March 15, 2022

(<https://registrar.kennesaw.edu/academic-calendars/spring-2022-academic-calendar-1.php> )

A student may withdraw, using Owl Express, from one or more courses prior to one week before the last day of class. The student should consult the applicable academic calendar posted on the Office of Registrar website because the last day of class varies according to the part of the semester in which the student is enrolled.

A student who officially withdraws from a course by the end of the last day to withdraw without academic penalty will receive a grade of "W" and receive no credit. A student who officially withdraws from a course after the last day to withdraw without academic penalty and before the last week of classes during the semester will receive a grade of "WF," which will be counted as an "F" in the grade point average calculation.

For attendance verification, the applicable faculty member will submit the last known date of academically related activity and one of the following symbols for each student who stopped attending the course.

* "NA" (never attended) for a student who never attended the course, never attended the course after the applicable Drop-Add date, or did not complete any academically related activity
* "W" (withdrew) for a student who stopped attending before the last day to withdraw without academic penalty for the applicable semester and whose academically related activity was deemed passing
* "WF" (withdrew failing) for a student who stopped attending after the last day to withdraw without academic penalty for the applicable semester, or who stopped attending before the last day to withdraw without academic penalty for the applicable semester and whose academically related activity was deemed failing

The only exceptions to these withdrawal regulations will be for instances involving unusual circumstances, which must be fully documented, or military withdrawal (see below). A student may appeal to the Academic Standing Committee for consideration of unusual circumstances. Withdrawal dates are published in the official academic calendar. A student will receive a refund only when the student withdraws from ALL courses for the applicable semester and only by the schedule outlined in the University System refund policy.

**Grade Appeals and Student Complaints**

Grade appeal will follow the level of the course. Students' rights to grade appeals are defined in the university catalog. A key element in the grade appeal procedure is the faculty member's responsibility to publish a specific grading policy for each of his/her classes. Specifically, the grade appeal procedure states: "Each faculty member must specify his/her grading policy, at the first of the semester. He/she may change his/her grading policy for cause after that time, but he/she must do so uniformly, with ample notification to students, if at all possible."

Note that failure to publish the grading policy would mean that a faculty member would have great difficulty in sustaining his/her assigned grade if a student appealed with anything but a frivolous or irresponsible basis for his/her charge. The grading policy should be quite specific and should be distributed to each class in written form. Some departments may also require faculty members to file grading policy statements in the departmental office. Because the student can submit a grade appeal to the Department Chair within 20 business days after the first day of classes of the next academic term after the academic term in which the final grade was awarded to the student (see Grade Appeals Procedure, section B), it is strongly recommended that instructors retain any student papers, tests, projects, or other materials not returned to the student for 70 days after the end of a semester or if an appeal is filed until the appeal is resolved. Refer to the following section for specific grade appeal procedures.

Students can find more details regarding the appeal process here:

<http://catalog.kennesaw.edu/>

**General Expectations for Coursework in Graduate Programs**

Graduate study is markedly different from undergraduate study. This graduate course syllabus serves as a general description of goals and expectations in the course, as well as providing logistical and organizational information. It has been approved by the Faculty of your Academic Department to meet objectives in your discipline, as well as the University’s Graduate Faculty standards for graduate study. It contains a number of resources for and expectations of you as a student. Instructionally, it is a general “plan” for the course and not a contract - please know that the course instructor is permitted some departures from it. If you have questions regarding this, please contact the Chair of your Academic Department.

**1. Roles and Responsibilities.** A graduate student should always remember that he or she is taking a particular graduate course to learn advanced content in an academic discipline. While graduate students are expected to think critically and ultimately be able to demonstrate mastery of advanced disciplinary knowledge, his or her instructor has already earned at least one – if not multiple – advanced degrees in the discipline, and spent (in some cases) decades studying it. A Graduate Faculty member may be regarded as a state or national authority in some aspect of the discipline being studied. Moreover, the instructor has an equal instructional obligation to all graduate students engaged in a particular learning activity. Consequently, the graduate instructor exercises discretion in framing instructional interactions about the discipline with graduate students, which may include decisions to terminate discussions or move the discussion to another topic.

**2. Responsibility for Demonstrating Mastery of Advanced Content.** Admission to a graduate program is both elective and selective. In graduate study, a graduate student bears primary responsibility for acquiring knowledge about the discipline he or she is studying. The primary role of a graduate instructor is to assist the student in appropriately applying that knowledge at an advanced level in the discipline. Ultimately, a graduate course provides a graduate student with the opportunity to demonstrate that she or he can master and apply advanced knowledge in an academic discipline. The burden of demonstrating this mastery and application to the satisfaction of the Graduate Faculty lies solely with the graduate student.

**3. Availability of Graduate Faculty Members.** Members of the Graduate Faculty are expected to be authorities in their academic disciplines. In addition to teaching, graduate faculty members serve in significant research, professional, and academic roles. Graduate students should be aware that, in any given semester, these other responsibilities may constitute between forty (40) and eighty (80) percent of a professor’s workload. Consequently, graduate students are advised to schedule meetings with their instructors well in advance, knowing that a Graduate Faculty member’s research and service obligations may result in him or her not being able to respond to the student for up to two (2) days during the academic week (M-F).

**4. Interactions with Graduate Faculty Members.** A graduate student should ensure that his or her interactions with her or his instructors are professional and appropriate. It is a relationship that is far more analogous to an employment relationship than a social friendship.

**Within the Classroom (or Analogous) Environment.** While graduate student thinking and discussion is expected to be far deeper, more challenging, and more critical about the advanced topic being studied than in undergraduate coursework, the context in which these discussions are framed should remain academically detached and appropriate. An element of graduate education – and particularly the application of advanced content – may require a graduate student to demonstrate the ability to think and analyze advanced knowledge in the discipline in a detached and clinical fashion.

This can be challenging when the topic under discussion relates to assumptions the student has never challenged previously. Neither graduate students nor members of the Graduate Faculty should “personalize” these discussions. A graduate student does not have the right to disrupt instruction in a learning activity. If a graduate student believes he or she cannot continue to engage in the discussion with appropriate academic detachment, she or he should disengage from the activity until the time that he or she believes he or she can appropriately resume. Simply put, in graduate study, thinking should be disruptive – conduct should never be.

**Outside the Traditional Classroom Environment.** While graduate students and their faculty members may have richer and less formal interactions outside of the classroom environment than those in undergraduate programming (for example, having coffee together to discuss a particular aspect of a study the student wishes to conduct or jointly working on research), it is important for both the faculty member and graduate student to remember that the “formal” instructor/student relationship that undergirds these interactions, and act consistently with that. If a graduate student believes that the faculty member’s interactions with him or her are inappropriate, the graduate student should contact the Department Chair of her or his academic department, or the appropriate University official.

**5. Intellectual Property Issues.** More than any other part of the University enterprise, graduate study may result in the creation of ideas and thinking that are legally recognized and protected as intellectual property. Consequently, graduate students should carefully monitor their conduct to ensure that they do not inadvertently misappropriate the intellectual property of a member of the Graduate Faculty or another graduate student. The Graduate College has prepared an overview of intellectual property issues

**6. Electronic Recording.** While graduate students may wish to electronically record a class session as a study aid, in graduate school, this requires a careful balancing of the interests of the student, her or his fellow students, and the graduate instructor. Consequently, a graduate student may not disseminate any electronically recorded class discussion unless given explicit permission by the graduate instructor in writing. Irrespective of whether the student disseminates it, a graduate student should ask permission of his or her graduate instructor before electronically recording the instructor’s lectures.

A University generates ideas, and ideas can become intellectual property irrespective of whether they are written in a book or paper. As a recognized authority in her or his academic discipline who has spent years studying, synthesizing, and expanding advanced knowledge in the academic discipline to which he or she has devoted his or her life’s work, a graduate instructor has a legally-recognized property interest in her or his thinking about that work, which may include the graduate instructor’s lectures. Kennesaw State University prohibits the misappropriation of intellectual property (which is a form of theft), which can result in discipline for a graduate student, up to and including dismissal from the University. If the graduate student is also a member of a profession with an applied code of ethics, it may additionally result in professional discipline, as well as subjecting the student to any civil legal remedies protecting intellectual property. Graduate students should recognize the rights of their fellow graduate students to engage in free exchange of ideas in their graduate coursework, asking questions or making observations that they might not make if they believed those observations could be publicly disseminated without their knowledge or permission.

If a student needs to electronically record a course as a result of a recognized disability or other exceptionality, the student should contact the University’s Disabled Student Support Services to develop an appropriate reasonable accommodation.

**Academic Integrity**

Every KSU student is responsible for upholding all provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. The Code of Conduct includes the following:

* + Section II of the Student Code of Conduct addresses the University’s policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an “informal” resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct’s minimum one semester suspension requirement.
  + Students involved in off-campus activities shall not act in a disorderly or disruptive fashion, nor shall they conduct any dangerous activity.
  + Students involved in off-campus activities shall not take, damage or destroy or attempt to take, damage or destroy property of another.

Frequently students will be provided with “take-home” exams or exercises. It is the student’s responsibility to ensure they fully understand to what extent they may collaborate or discuss content with other students. No exam work may be performed with the assistance of others or outside material unless specifically instructed as permissible. If an exam or assignment is designated “no outside assistance” this includes, but is not limited to, peers, books, publications, the Internet and the WWW. If a student is instructed to provide citations for sources, proper use of citation support is expected.

Additional information can be found at the following locations:

* http://www.apa.org/journals/webref.html
* http://bailiwick.lib.uiowa.edu/journalism/cite.html
* http://www.indiana.edu/~wts/wts/plagiarism.html
* http://www.virtualsalt.com/antiplag.htm

**Campus Policies**

Confidentiality and Privacy Statement (FERPA):

Kennesaw State University adheres to the Family Educational Rights & Privacy Act of 1974 - FERPA. See the following link for more information:

<http://usg.edu/information_technology_handbook/section9/tech/9.5_privacy_and_security>

University - Student Rights & Responsibilities:

Students of Kennesaw State University are entitled to an environment that is conducive to learning and individual growth. To this end, students enrolling at Kennesaw State University assume a responsibility to abide by the policies and regulations expressed in this section. By doing so, students may fulfill their responsibilities and enjoy the exercise of their own rights while also respecting the rights of others.

<http://catalog.kennesaw.edu/content.php?catoid=27&navoid=2263>

Ethics Statement:

All students are responsible for knowing the information, policies and procedures outlined in the Kennesaw State

University Codes of Conduct. The KSU Codes of Conduct include: the general Student Code of Conduct, the Residential

Code of Conduct, and the Code of Academic Integrity. Kennesaw State University reserves the right to make changes to this code as necessary and once those changes are posted online, they are in effect. Students are encouraged to check online for the updated versions of all policies.

<http://scai.kennesaw.edu/codes.php>

Sexual Misconduct Policy:

Kennesaw State University is committed to providing programs, activities, and educational environment free from all forms of sex discrimination. For more information click here. KSU issues this statement of policy to inform the community of the University's comprehensive plan addressing sexual misconduct, educational programs, and procedures that address sexual assault, domestic violence, dating violence, and stalking, whether the incident occurs on or off campus. This policy generally covers faculty, students, and staff of the University, as well as third parties. Third parties include but are not limited to guests, vendors, contractors, retirees, and alumni.

<http://scai.kennesaw.edu/procedures/sexual-misconduct.php>

Course Accessibility Statement (ADA Statement):

<http://catalog.kennesaw.edu/content.php?catoid=27&navoid=2263&hl=FERPA&returnto=search#ADA>

**Additional Student Resources**

For CCSE Student resources:

<http://ccse.kennesaw.edu/student-resources.php>

KSU Service Desk:

The KSU Service Desk is your portal to getting assistance or access to University IT Services. Students call: 470-578-3555 or email [studenthelpdesk@kennesaw.edu](mailto:studenthelpdesk@kennesaw.edu)

For Academic Advising information and to schedule appointments:

<http://ccse.kennesaw.edu/advising/index.php>

Links to frequently used and helpful services:

<http://www.kennesaw.edu/myksu/>

Department of Career Planning & Development

<https://careers.kennesaw.edu>

Counseling and Psychological Services

<https://counseling.kennesaw.edu>

Center for Health Promotion and Wellness

<https://wellness.kennesaw.edu>

Student Health Services

<https://studenthealth.kennesaw.edu>