UNIVERSITY OF TEXAS AT ARLINGTON
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

4308/5360  ARTIFICIAL INTELLIGENCE I  FALL 2019

3 UNITS

Class Schedule: Tuesday and Thursday 15:30-16:50, Room 111, Nedderman Hall (NH)
Section Information: CSE 4308-002, CSE 5360-002
Instructor: William Beksi
Office: ERB 523
Phone: 817-272-3602
Email: william.beksi@uta.edu
Faculty Profile: https://mentis.uta.edu/explore/profile/william-beksi
Office Hours: Tuesday and Thursday 14:00-15:00, ERB 523
TA: TBA
TA Email: TBA
TA Office Hours: TBA

1 Course Objective

The objective of this course is to provide an introduction to the fundamental ideas and techniques of artificial intelligence (AI) - the design of intelligent computer systems. Topics include: agents, search, game playing, probabilistic reasoning, learning from examples and probabilistic models, decision making, reinforcement learning, and the programming language Lisp.

The course is suitable to gain a solid technical background and as a preparation for more advanced work in AI. Upon successful completion of the course, the student will be able to:

- Learn about the basic tools and approaches for designing and analyzing AI algorithms.
- Gain hands-on experience in building AI systems.
- Understand the potential and current research challenges in AI.

2 Prerequisites

Students are expected to have the following background:

- Knowledge of basic computer science principles and programming.
- Knowledge of algorithms and data structures.

The student must be familiar with the basic concepts of calculus, discrete structures, and probability theory. If the student has not taken the equivalents of these courses, then they need permission from the instructor. The student also needs to have taken CSE 2320 and CSE 3315.

3 Textbook

ISBN: 9780136042594
4 Additional References (Not Required)


5 Expectations

This course will cover a relatively large range of topics which rely on various background material. As a result, at times the current topic may be rather basic or very challenging. For example, Lisp may be easy to grasp for a student who has experience in functional programming. However, the same student may find Bayesian networks quite challenging. Here are some tips that may be helpful:

- Do not rely on a single source to learn the material. If the topic in one book does not make sense, then do not hesitate to review other books even basic texts such as an algorithms and data structures book. If guidance is needed, then do not delay talking to the instructor or the TA. There are also excellent resources online.
- The diversity of the class is a big asset, learn from each other.
- Since the list of topics is quite varied, it is extremely important to work regularly and review the material in a timely fashion.

6 Grading

The grade of the course will consist of the following components:

- Written Assignments 30%
- Programming Assignments 30%
- Midterm Exam (10/10/19) 20%
- Final Exam (12/10/19) 20%

Grades: 90% and above yields an A, 89% - 80% = B, 79% - 70% = C, 69% - 60% = D, and less than 60% yields an F.

Late assignment submissions will not be accepted. Questions regarding a specific grade must be raised within seven days after the grade is given. In general, an incomplete (or make up exams) will not be given. Exceptions will only be considered when a serious family or personal emergency arises, proof is presented, and the student has already completed all but a small portion of the work.

7 Assignments

There will be six written assignments and six programming assignments during the semester. The written assignments will consist of applying the theory to problem solving while the programming assignments will consist of applying the theory to system design. Specifically, there will five programming assignments using Python and one programming assignment using Lisp. Attempting and completing the assignments is vital to the success of the student in this course.
Information on the Python programming language can be obtained from the Python Software Foundation: https://www.python.org/. Information on Common Lisp, a dialect of the Lisp programming language that will be used in this course, can be found on Wikipedia: https://en.wikipedia.org/wiki/Common_Lisp. Using implementations from the Internet, or elsewhere, will result in no credit (zero points) for the assignment. If code is used from anyone or anywhere, then it must be referenced. Otherwise, this constitutes cheating.

8 Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/22/2019</td>
<td>Introduction to AI</td>
<td>A0 Out</td>
</tr>
<tr>
<td>2</td>
<td>8/27/2019</td>
<td>Intelligent Agents</td>
<td>A0 Due, A1 Out</td>
</tr>
<tr>
<td></td>
<td>8/29/2019</td>
<td>Uninformed Search</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9/3/2019</td>
<td>Informed (Heuristic) Search</td>
<td>A1 Due, A2 Out</td>
</tr>
<tr>
<td></td>
<td>9/5/2019</td>
<td>Adversarial Search (Game Playing)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9/10/2019</td>
<td>Constraint Satisfaction Problems</td>
<td>A2 Due</td>
</tr>
<tr>
<td></td>
<td>9/12/2019</td>
<td>Lisp</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>9/17/2019</td>
<td>Quantifying Uncertainty</td>
<td>A3 Out</td>
</tr>
<tr>
<td></td>
<td>9/19/2019</td>
<td>Bayesian Networks</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>9/24/2019</td>
<td>Exact Inference in Bayesian Networks</td>
<td>A3 Due</td>
</tr>
<tr>
<td></td>
<td>9/26/2019</td>
<td>Approximate Inference in Bayesian Networks</td>
<td>PA2 Due, PA3 Out</td>
</tr>
<tr>
<td>7</td>
<td>10/1/2019</td>
<td>Hidden Markov Models</td>
<td>A4 Out</td>
</tr>
<tr>
<td></td>
<td>10/3/2019</td>
<td>Kalman and Particle Filters</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10/8/2019</td>
<td>Midterm Review</td>
<td>A4 Due</td>
</tr>
<tr>
<td>9</td>
<td>10/10/2019</td>
<td>Midterm Exam</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10/15/2019</td>
<td>Dynamic Bayesian Networks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10/17/2019</td>
<td>Decision Trees</td>
<td>PA3 Due, PA4 Out</td>
</tr>
<tr>
<td>10</td>
<td>10/22/2019</td>
<td>Logistic Regression</td>
<td>A5 Out</td>
</tr>
<tr>
<td></td>
<td>10/24/2019</td>
<td>Perceptrons and Neural Networks</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>10/29/2019</td>
<td>Naive Bayes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10/31/2019</td>
<td>Markov Decision Processes I</td>
<td>PA4 Due, PA5 Out</td>
</tr>
<tr>
<td>12</td>
<td>11/5/2019</td>
<td>Markov Decision Processes II</td>
<td>A5 Due, A6 Out</td>
</tr>
<tr>
<td></td>
<td>11/7/2019</td>
<td>Reinforcement Learning I</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>11/12/2019</td>
<td>Reinforcement Learning II</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11/14/2019</td>
<td>Reinforcement Learning III</td>
<td>PA5 Due, PA6 Out</td>
</tr>
<tr>
<td>14</td>
<td>11/19/2019</td>
<td>Natural Language Processing</td>
<td>A6 Due</td>
</tr>
<tr>
<td></td>
<td>11/21/2019</td>
<td>Perception</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>11/26/2019</td>
<td>Robotics</td>
<td>PA6 Due</td>
</tr>
<tr>
<td></td>
<td>11/28/2019</td>
<td>Thanksgiving Holiday</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>12/3/2019</td>
<td>Final Review</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>12/10/2019</td>
<td>Final Exam</td>
<td></td>
</tr>
</tbody>
</table>

This schedule is tentative and subject to change at instructor’s discretion. Changes will be announced in class and on the course page. The instructor reserves the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.
9 Attendance

Students are expected, but not required, to attend all lectures. Any material that the student missed will not be covered again in class. If the student is unable to attend a class due to personal reasons, then it is the responsibility of the student to use the textbook and online slides to learn the content and meet with either the instructor or the TA to clarify any doubts.

10 Drop Policy

Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student’s responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/ao/aad/).

11 Disability Accommodations

UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA), and Section 504 of the Rehabilitation Act. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: The Office for Students with Disabilities, (OSD) http://www.uta.edu/disability/ or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

12 Counseling and Psychological Services (CAPS)

www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

13 Non-Discrimination Policy

The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.
14 Title IX Policy

The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or titleix@uta.edu.

15 Academic Integrity

Students enrolled in all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, 2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/. Faculty are encouraged to discuss plagiarism and share the following library tutorials http://libguides.uta.edu/copyright/plagiarism and http://library.uta.edu/plagiarism/.

16 Electronic Communication

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

17 Campus Carry

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/.
18 Student Feedback Survey

At the end of each term, students enrolled in face-to-face and online classes categorized as “lecture,” “seminar,” or “laboratory” are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback via the SFS database is aggregated with that of other students enrolled in the course. Students’ anonymity will be protected to the extent that the law allows. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

19 Final Review Week

For semester-long courses, a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

20 Emergency Exit Procedures

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exits, which are located south and east of the classroom. These exits are shown in the Nedderman Hall evacuation plan for Room 111: (http://www.uta.edu/campus-ops/ehs/fire/Evac_Maps_All/Evac_NH/Evac_NH_111.pdf). When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

21 Student Support Services

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/studentsuccess/success-programs/programs/resource-hotline.php.

The IDEAS Center (2nd Floor of Central Library) offers FREE tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in, or check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

The English Writing Center (411LIBR): The Writing Center offers FREE tutoring in 15-, 30-, 45-, and
60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Register and make appointments online at https://uta.mywconline.com. Classroom visits, workshops, and specialized services for graduate students and faculty are also available. Please see www.uta.edu/owl for detailed information on all our programs and services. The Library’s 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library’s hours of operation: http://library.uta.edu/academic-plaza.

22 Emergency Phone Numbers

In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911. The non-emergency number is 817-272-3381.