CSE 4308/5360: Artificial Intelligence
Fall 2024

Instructor Information

Instructor
Vamsikrishna Gopikrishna, Ph.D.

Office Number
ERB 553

Email Address and TEAMS ID
vamsikrishna.gopikrishna@uta.edu

Website
https://crystal.uta.edu/~gopikrishnav/

Faculty Profile
https://mentis.uta.edu/explore/profile/vamsikrishna-gopikrishna

Office Hours
- Timings: **Friday: 1:30 PM – 3:00 PM**
- Location: In-Person in my office (ERB 553) or via TEAMS meeting
  (Note: Priority for In-Person students)

If you are unable to meet at these times, please email the instructor to set up an alternate meeting time.

Course Information

Section Information
- CSE 5360 001
- CSE 5360 002
- CSE 4308 003 / CSE 5360 003
- CSE 4308 004 / CSE 5360 004
- CSE 4308 005 / CSE 5360 005

Time and Place of Class Meetings
Class meetings for all sections will be On Campus
- **CSE 5360 001**: NH 203 – **Monday/Wednesday 2:30 PM – 3:50 PM**
- **CSE 5360 002**: NH 203 – **Tuesday/Thursday 5:30 PM – 6:50 PM**
- **CSE 4308 003 / CSE 5360 003**: NH 202 – **Monday/Wednesday 7:00 PM – 8:20 PM**
- **CSE 4308 004 / CSE 5360 004**: NH 229 – **Tuesday/Thursday 3:30 PM – 4:50 PM**
- **CSE 4308 005 / CSE 5360 005**: NH 203 – **Monday/Wednesday 4:00 PM – 5:20 PM**

Course Webpage
- Course slides, programming assignment problem statements, and sample exam material will be posted on: http://crystal.uta.edu/~gopikrishnav/classes/2024/fall/4308_5360/
- Videos, Submission Links for programming assignments, and any other material will be posted on: Canvas

Description of Course Content
This course introduces the basic philosophies and techniques of Artificial Intelligence. AI techniques have become an essential element in modern computer software and are thus essential for a successful career and advanced studies in computer science. Topics covered in this course include search algorithms (such as breadth-first, depth-first, A*), game-playing algorithms (such as Minimax), knowledge and logic reasoning, planning methods, probabilistic reasoning, and machine learning.

Student Learning Outcomes
Students successfully completing this course will be able to apply a variety of techniques for the design of efficient algorithms for complex problems.

Required Textbooks and Other Course Materials
Slides of course content will be posted on the website. Recommended textbook: **Artificial Intelligence: A Modern Approach, 4th Edition by Stuart Russell, Peter Norvig**. Price: $39.96 - $206.75 at the UTA Bookstore (https://www.bkstr.com/texasatarlingtonstore/product/artificial-intelligence-991236-1). Note: 3rd or 2nd Edition is also acceptable.

Description of Assignments
There will be several programming assignments in this course. If you find yourself in an emergency and cannot deliver the assignments on time, immediately inform the instructor. The work done for the assignment must be your individual work. Any external resources or code segments you want to use must first be cleared by the instructor and cited appropriately in your work. **Violations of this will not be tolerated and result in severe penalties for all parties involved, in strict compliance with official UTA policy**.
The assignments must be coded in base versions of C, C++, Python, Java. Alternatively, they can be coded to run on the ACS machine omega (All students will have an account on the ACS machine omega). Note that Omega compatibility is not required (just provided as an option for students). If any partial code is provided as part of the assignment, it will generally be only provided in a limited number of languages. However, you are under no obligation or requirement to use it. Additional details will be announced in class.
All assignments are required. No assignments will be dropped from your final score (unless in case of a documented emergency)
All submissions must be submitted via Canvas. No other method of submission accepted under any circumstances.

Late Submission policy for Assignments
The points each assignment graded out of will be provided as part of its description. Assignments submitted late will be automatically penalized, at a rate of **2% of assignment max points per hour late**. Note that the link to submit the assignment will be removed **48 hours** after the due date (**unless otherwise mentioned in class**). The submission due time (and the time the submission link will be available till) will be shown in Canvas and the course webpage. **No submissions will be accepted after the link is no longer available**. Exceptions will only be made for documented emergencies, in strict adherence to UTA policy. Computer/Network crashes, Submission of Incomplete files, Submission of Incorrect Files, Submitting at Incorrect Link are NOT acceptable excuses for late submissions. **No exceptions will be made**. To avoid problems with such crashes and last-minute problems, students are encouraged to submit as early as possible. They are also advised to ensure that their file was uploaded correctly once you finish submitting it and make a resubmission ASAP in case of any errors. You can always revise your submission till the deadline. If you are unable to work on/submit an assignment due to a valid documented reason (illness, critical family emergencies, military service obligations, observance of major religious holidays, and certain university service commitments) and provide the documentation before the deadline for the assignment, one assignment will be excused from your final grade calculation.

Description of Exams and the Final Examination
There will be four non-cumulative exams spread out throughout the course. All exams will have equal weight in your final grade (However, the lowest exam score will be dropped). The exam will be held on campus as in-person exams barring any extended university closures. If the university requires exams to be moved online, then they will be held online via the Lockdown browser with Respondus monitoring system. The exams are closed book/closed notes. However, exam relevant formulae and algorithms will be provided as a handout for the students use. No other material is allowed during the exam. Students may also need a non-programmable standard or scientific calculator.

There will be one Final Exam held during finals week that covers all testable material discussed in class during the semester. The exact date, time and location of the Exam will be determined by the university and posted here. The final is a closed book exam. The handout will include all relevant formulae and algorithms. In addition, Students are allowed 1 sheet of **handwritten** notes they can use during the exam. These notes can contain whatever information the students feel might be useful during the exam but cannot contain solutions to problems discussed during the class or from the exams or from other sources and will have to be submitted along with your exam (more details will be given in class). Students will also need a non-programmable standard or scientific calculator. No other material is allowed during the exam. **The presence of unauthorized material in your notes or in any other form will be treated as cheating and penalized as such**.

For both exams and the final, please follow all instructions regarding what information needs to be provided in your answer booklet. Missing information may be penalized. These penalties will **not** be reverted under any circumstances. All work done during the exams, or the exam has to be individual work. **Violations of this will not be tolerated and result in severe penalties for all parties involved, in strict compliance with official UTA policy**.

Exams and Final Absence policy
Absence from exams may be excused, with appropriate documentation, for illness, critical family emergencies, military service obligations, observance of major religious holidays, and certain university service commitments. Requests for excused absence, and documentation for such absences, must be provided either before the exam or before the 1st lecture immediately following the exam. In case of excused absence, a makeup exam covering the same material will be set up and conducted by the instructor on a date before the last day of finals week. **Even if the reason for an absence/non-attendance is valid, a request for an excused absence will be rejected if provided later than the lecture that immediately follows the exam.** An unexcused absence will be given a score of 0. **If there are two or more unexcused absences for exams, you will be given a grade of F for the course**. The dates for all the exams are subject to change. Any changes will be announced in class at least a week in advance (unless in case of an emergency or unforeseen university closure).

Absence from the final exam may be excused, with appropriate documentation, for illness, critical family emergencies, military service obligations, observance of major religious holidays, and certain university service commitments. Requests for excused absence, and documentation for such absences, must be provided before the end of Finals Week. In case of excused absence, the student will be given a grade of Incomplete (I). A makeup final will be set up and conducted by the instructor at a date at some point in Spring 2025 and the grade updated based on the score from that exam.

The exact date, time and location of the Final will be determined by the university and posted here. Students are expected to be available till the last day of finals week. No accommodation/makeup exams will be provided if the student misses the Final exam due to being unavailable before the last day of finals week due to travel plans.

Description of Lectures and Supplementary materials
Lectures will be held in person in the assigned classroom at the scheduled time. Students are expected to attend the lectures. The lectures are recorded and posted online via the Echo360 system for student review purposes. If in person lectures are not possible due to any reason, the instructor will inform the student as soon as possible. The lecture may be shifted to either synchronous online lecture (via TEAMS) or asynchronous online lecture (via video posted on Canvas).

In addition to the lectures, the instructor may provide some supplementary videos to cover topics tangential to what was covered in class or cover certain topics in more detail. It is the student's responsibility to view this material when they are posted and use the lecture sessions or office hours to clarify any questions they may have.

To help prepare for the exams and the final, the instructor will post sample questions and solutions. The student is expected to use these to familiarize themselves with the sort of questions to be expected in exams and exams and use the Office Hours to clarify any questions they may have.

Academic Dishonesty Policy
If you are caught colluding or copying in the assignments, exams, or the final exam the following consequences will be applied.

Per n^{th} offence in this course:
- You will be given a score of 0 points for that assignment, exam, or final.
- Your final grade will be reduced by n letter grades (Up to a minimum of F)
- An academic integrity violation form will be filed.
    - If you agree to sign the form
        - You will be placed on disciplinary probation for 1 year and a 7-year reportable disciplinary record being created.
        - Additional violations may result in increasing sanctions up to and including suspension or expulsion.
    - If you do not agree to sign the form
        - You will be temporarily given a grade of Incomplete (I)
        - The Office of Academic Integrity will conduct a formal investigation based on evidence provided
        - Based on decision, Either the grade will be calculated with the penalty and with the consequences discussed above or grade will be calculated without penalties and no forms being filed.

This policy is not up for discussion/negotiation under any circumstances.

Technology Requirements
Students will need to be able to program in C, C++, Python or Java for their programming assignments. If any part of their assignment involves written work, they will also need to know how to scan and upload their handwritten text or typed text as PDF files.

They will need to be able to use Canvas to view any supplementary material provided by the instructor, submit assignments and to view lecture session recordings (for review purposes).

They are also strongly recommended to get used to TEAMS to get in touch with the instructor to clarify any questions they may have.

If due to the COVID-19 pandemic, any exams or the final exam need to be moved online, students will have to use the Lockdown browser with the Respondus monitoring system for the exams in which case they will need a computer with a webcam and an internet connection to take their exam.

Grading Information

Grading

You will be assigned a numerical final score based on your performance in your assignments, your exams and in your final exam.

Material	Contribution to Final score
Policy Acknowledgement	5%
Average Exam Score	45 %
Average Assignment Score	20 %
Final Exam	30 %

Note: Not completing policy acknowledgement form submission by its due date (Weekend following Census date) may result in students not being allowed to sit for Exams and the Final.

The exams and assignments averages will be calculated as the average of the percentage scores of each assignment and exam:

$$Score_{avg} = \frac{\sum_{i=1}^{n} \left(\frac{Score_i}{Score_{max}} * 100 \right)}{n}$$

Note: The lowest exam score will **not** be used in the calculation of its average. **All** assignment scores will be used in the calculation of its average.

The numeric score is converted to a letter grade according to the following rubric.

Numerical Score	Grade
>= 85	A
>= 70 & < 85	B
>= 55 & < 70	C
>= 40 & < 55	D
Otherwise	F

For the Exams and Assignments, if any tasks were graded incorrectly (a correct answer given less than full credit) or if there is a totaling error, please contact either the TA or the instructor ASAP. Any partial credit obtained for incorrect tasks is not up for discussion/negotiation.

Note: **If there are two or more unexcused absences from exams, you will be given a grade of F for the course**.

Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels. **No makeup assignments or exams will be provided for the purpose of bumping up your grade under any circumstances**.

Grade Grievances

Any appeal for a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.

Course Schedule (For Sections with Lectures on Monday/Wednesday)

Week	Date	Lec.	Topic
1	8/19/2024	1	Course Details, Overview
	8/21/2024	2	Agents, Solving Problems with search
2	8/26/2024	3	Uninformed Search, Informed Search
	8/28/2024	4	Informed Search (Contd.)
3	9/2/2024		Labor Day - NO CLASS
	9/4/2024	5	Game Playing
4	9/9/2024		Exam 1
	9/11/2024	6	Game Playing (Contd.), Constraint Satisfaction Problems
5	9/16/2024	7	Constraint Satisfaction Problems (Contd.)
	9/18/2024	8	Knowledge and Logic Reasoning
6	9/23/2024	9	Knowledge and Logic Reasoning (Contd.)
	9/25/2024	10	First Order Logic
7	9/30/2024	11	Inference in FOL
	10/2/2024	12	Planning
8	10/7/2024		Exam 2
	10/9/2024	13	Contingency Planning, Online Replanning
9	10/14/2024	14	Probability
	10/16/2024	15	Prior and Posterior Probabilities
10	10/21/2024	16	Bayesian Networks
	10/23/2024	17	Bayesian Networks (Contd.)
11	10/28/2024	18	Learning
	10/30/2024	19	Decision Trees
12	11/4/2024		Exam 3
	11/6/2024	20	Decision Trees (Contd.)
13	11/11/2024	21	Real World Decision Trees, Bayesian Classifiers
	11/13/2024	22	Bayesian Classifiers (contd.), Probability Estimations
14	11/18/2024	23	Nearest Neighbor Classifiers
	11/20/2024	24	Intro to Neural Networks, Backpropagation learning
15	11/25/2024		Exam 4
	11/27/2024		Thanksgiving Holiday - No Class
16	12/2/2024		Final Exam Review Session
	12/4/2024		Student Study Day - NO CLASS
17	12/9/2024		FINALS WEEK - Check Calendar for exact Date & Time
	12/11/2024		FINALS WEEK - Check Calendar for exact Date & Time

This schedule is tentative and subject to change at instructor's discretion. Changes will be announced in class. The instructor reserves the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. The exams will be held at regular class times in the same location as lectures. The Final Exam location, date and time is subject to change by the University. Please visit: https://www.uta.edu/records/calendars/final-exams.php to get the updated date, time, and location information (unless otherwise mentioned, location is the same as lectures). Students should be prepared to be available for all of Finals Week (12/5/2024 to 12/11/2024) in case of any changes to Final Exam scheduling.

Course Schedule (For Sections with Lectures on Tuesday/Thursday)

Week	Date	Lec.	Topic
1	8/20/2024	1	Course Details, Overview
	8/22/2024	2	Agents, Solving Problems with search
2	8/27/2024	3	Uninformed Search, Informed Search
	8/29/2024	4	Informed Search (Contd.)
3	9/3/2024	5	Game Playing
	9/5/2024	6	Game Playing (Contd.), Constraint Satisfaction Problems
4	9/10/2024		Exam 1
	9/12/2024	7	Constraint Satisfaction Problems (Contd.)
5	9/17/2024	8	Knowledge and Logic Reasoning
	9/19/2024	9	Knowledge and Logic Reasoning (Contd.)
6	9/24/2024	10	First Order Logic
	9/26/2024	11	Inference in FOL
7	10/1/2024	12	Planning
	10/3/2024	13	Contingency Planning, Online Replanning
8	10/8/2024		Exam 2
	10/10/2024	14	Probability
9	10/15/2024	15	Prior and Posterior Probabilities
	10/17/2024	16	Bayesian Networks
10	10/22/2024	17	Bayesian Networks (Contd.)
	10/24/2024	18	Learning
11	10/29/2024	19	Decision Trees
	10/31/2024	20	Decision Trees (Contd.)
12	11/5/2024		Exam 3
	11/7/2024	21	Real World Decision Trees, Bayesian Classifiers
13	11/12/2024	22	Bayesian Classifiers (contd.), Probability Estimations
	11/14/2024	23	Probability Estimation (contd.)
14	11/19/2024	24	Nearest Neighbor Classifiers
	11/21/2024	25	Intro to Neural Networks, Backpropagation learning
15	11/26/2024		Exam 4
	11/28/2024		Thanksgiving Holiday - No Class
16	12/3/2024		Final Exam Review Session
	12/5/2024		FINALS WEEK - Check Calendar for exact Date & Time
17	12/10/2024		FINALS WEEK - Check Calendar for exact Date & Time
	12/12/2024		END OF SEMESTER

This schedule is tentative and subject to change at instructor's discretion. Changes will be announced in class. The instructor reserves the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. The exams will be held at regular class times in the same location as lectures. The Final Exam location, date and time is subject to change by the University. Please visit: https://www.uta.edu/records/calendars/final-exams.php to get the updated date, time, and location information (unless otherwise mentioned, location is the same as lectures). Students should be prepared to be available for all of Finals Week (12/5/2024 to 12/11/2024) in case of any changes to Final Exam scheduling.

Institutional Information

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the Institutional Information page (https://resources.uta.edu/provost/course-related-info/institutional-policies.php) which includes the following policies among others:
- Drop Policy
- Disability Accommodations
- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Additional Information

Face Covering Policy
While the use of face coverings on campus is no longer mandatory, all students and instructional staff are strongly encouraged to wear face coverings while they are on campus. This is particularly true inside buildings and within classrooms and labs where social distancing is not possible due to limited space. If a student needs accommodation to ensure social distancing in the classroom due to being at high risk, they are encouraged to work directly with the Student Access and Resource Center to assist in these accommodations. If students need masks, they may obtain them at the Central Library, the E.H. Hereford University Center's front desk or in their department.

Attendance
Students are expected to attend the Lectures in person. While attendance is not required it is strongly recommended. While the lectures are recorded and posted online through Echo360 system, these are only provided for review purposes and not as a substitute for attending the lectures. If the student misses any of the lectures, it is the student's responsibility to look over the slides/videos/recordings to catch up with the rest of the class and clarify any questions they may have with the instructor.

At the University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will be following the attendance policy described above. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student, a grade of F, faculty report must the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Canvas. This date is reported to the Department of Education for federal financial aid recipients.

ABET Assessment (Only for CSE 4308 students)
Your solution to certain tasks in some exams and assignments will be assessed for the purpose of ABET accreditation. The rubric used for the assessment is attached to the end of the syllabus. The tasks used for the assessment will be indicated in each exam/assignment. Samples of some student work will also be drawn for the purposes of the assessment.

Emergency Exit Procedures
Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit, which is given in the Evacuation Route Maps given below. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Evacuation Route Maps: Available Here.

Students should also be encouraged to subscribe to the MavAlert system that will send information in case of an emergency to their cell phones or email accounts. Anyone can subscribe at Emergency Communication System.

Academic Success Center
The Academic Success Center (ASC) includes a variety of resources and services to help you maximize your learning and succeed as a student at the University of Texas at Arlington. ASC services include supplemental instruction, peer-led team learning, tutoring, mentoring and TRIO SSS. Academic Success Center services are provided at no additional cost to UTA students. For additional information visit: Academic Success Center. To request disability accommodations for tutoring, please complete this form.

The IDEAS Center (https://www.uta.edu/ideas/) **(**2nd Floor of Central Library) offers **FREE** tutoring and mentoring 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 the Writing Center (https://uta.mywconline.com). Classroom visits, workshops, and specialized services for graduate students and faculty are also available. Please see Writing Center: OWL for detailed information on all our programs and services.

The Library's 2nd floor Academic Plaza (http://library.uta.edu/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.

Librarian to Contact
Each academic unit has access to Librarians by Academic Subject that can assist students with research projects, tutorials on plagiarism and citation references as well as support with databases and course reserves.

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. Non-emergency number 817-272-3381

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Appendix: Rubric for ABET assessment for CSE 4308 CS students Only (Tasks used in Assessment will be marked in Exam/Assignment):

SO: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions

	Excellent (5 pts) 85-100%	Good (4 pts) 70-85%	Satisfactory (3 pts) 55-70%	Poor (2 pts) 40-55%	Unacceptable (1 pt) 0-40%
Task 1	Excellent understanding of how the algorithm can be used to solve the problem. Fully functional code (or) code with maybe only a few minor formatting errors.	A good understanding of concepts discussed in class. Can write code that implements methods discussed in class to solve problems accurately with maybe a few programming errors due to mistakes in translating the algorithm to code.	A satisfactory understanding of concepts discussed in class. Can write code that implements the methods as discussed in class, but the code has significant errors due to not understanding exactly how to translate from pen and paper methods to code	Poor understanding of concepts discussed in class. Is unable to write code that accurately implements the algorithms discussed in class.	Negligible understanding of the methods discussed in class and how to use them to solve the given problems. Missing or non-functional code
Task 2	Excellent understanding of the PDDL language. Accurate description of the problem in PDDL format (Accurate to the point that a PDDL solver can solve the problem and generate a solution)	Good Understanding of the PDDL language. Can generate a definition of the problem in PDDL that will work for the most part except maybe of other problems in the same domain	Satisfactory understanding of the PDDL language. Description given meets the core format requirements of the PDDL description even if it will not necessarily solve the given problem	Poor understanding of the PDDL language. Significant errors in the PDDL description format.	Negligible understanding of the PDDL language. Missing answer or answer is not in accurate PDDL format.