



Educate. Innovate. Inspire.

CS-316 Intelligent Systems

Professor: Zane Harvey Email: zwharvey@captechu.edu Phone: (412) 709-2184	Office Hours: Wednesday 4:30 – 5:00 PM ET Dates/Times: Wednesday 5-7:40 PM ET Number of Meetings: 16 All Meetings are Live online in Canvas.
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Spring 2019

Course Description:

This course will cover an introduction to artificial intelligence and intelligent systems including the five keys to modern AI systems: Data Ingestion, Adaptive Behavior, Reactive Behavior, Forward Looking Problem Solving, and Concurrent Data Processing. Agent Theory and statistical learning will be used as the fundamental building blocks to an AI/intelligent system. Fundamental techniques and concepts of intelligent systems and artificial intelligence: agent theory, tree searching techniques including recursive searches, minimax algorithms, heuristics, alpha beta pruning, local search algorithms. Machine learning, genetic, and a priori algorithms. A brief history of AI will be discussed. Python and R programming languages. Homework and programming assignments. Prerequisites: CS-230.

Course Objectives and Expectations

Upon Completion of the course, the student will be knowledgeable in the following topics and concepts (in no respective order):

Machine Learning	Agent Theory
Search Algorithms	Rationality
Graph Theory	History of AI
NP vs. P problem classification	Uninformed vs. Informed Search Strategies
Heuristic Solutions	IOT
Big O Notation/Complexity Analysis	Big Data
Local Search Algorithms	Data Science
Stochastic vs. Deterministic Problems	Regression vs. Classification Problems
Game Theory	Supervised vs. Unsupervised Learning
Alpha Beta Pruning	Games and Game Theory
Logic	Gradient Descent Algorithms
Forward Chaining	Hill Climbing Algorithms
Backward Chaining	Alpha Beta Pruning
Planning Algorithms	Stochastic Games
Scheduling Algorithms	Constraint Satisfaction Problems
Regression vs. Classification problems	Planning Algorithms
Statistics	Markov Models
Bayes' Rule	Utility Theory
Bayesian Networks	Utility Functions
Probability Models	Sequential Decision Problems
Supervised vs. Unsupervised Learning	Linear and Nonlinear Models
Decision Trees/Random Forests	Hypothesis Testing
Neural Network Models	Minmax Algorithm
Reinforcement Learning	Genetic Algorithms
Recommender Systems	Python Programming
Support Vector Machines	R Programming
Ensemble Learning	Logical Agents

Time and Locations

Synchronous lessons will be online Wednesday evenings from 5-7:40 PM ET.

Course Materials/Books:

- Artificial Intelligence: A Modern Approach, Peter Norvig and Stuart Russel
- Course Notes

Course Schedule

The schedule will follow a weekly format with three exams on the dates provided below. The provided required readings are subject to change and additional readings will be assigned throughout the semester. You are responsible for reading the assigned reading prior to class.

Week	Main Topic/Event	Other Notes
1	Chapter 1 and AI Overview	
2	Chapter 2 and Python/R Review	
3	Machine Learning Introduction and Chapter 2	
4	Chapter 3 and Mathematics Review	
5	Chapter 3 and Mathematics Review	
6	Chapter 4	
7	Chapter 4	
8	Chapter 5	
9	Chapter 6	
10	Chapters 7,8,9	
11	Chapter 18	
12	Chapter 18	
13	Chapter 18	
14	Chapters 19 and 20	
15	Chapter 21	
16	Review	

Three Exams:

Week of March 4th – Take Home Exam

Week of April 1st – Timed Exam in Canvas

Week of April 22nd – Take Home Final

Grading

Grading Components:

Projects: 40%

Exam 1: 10%

Exam 2: 10%

Final: 20%

HW: 15%

Attendance: 5%

Late homework and assignments will be accepted with a 50% penalty for up to one week after due date. After one week from due date, the student will receive a score of 0.

Course Requirements

CS-230 and knowledge of a programming language. All mathematical concepts necessary for the course will be reviewed in class.

Participation

Attendance for class is tracked in Canvas.

Homework

Homework will be due on the indicated due date in Canvas. Late homework will receive 50% credit.

Communication

Emails, phone calls, text. Canvas Appointments are suggested. Course announcements will be used frequently to communicate with the class.

Academic Integrity

Every Student is expected to be familiar with Capitol Technology University's Code of Academic Conduct including (but not limited to) the issues of cheating, plagiarism, etc. All cases of suspected academic dishonesty will be reported to the appropriate school officials, and disciplinary action may result, following investigation by a judiciary committee. Some of the core concepts are given here:

DEFINITION AND EXPECTATIONS OF ACADEMIC INTEGRITY:

Cheating – intentionally using or attempting to use unauthorized materials, information or study aids in any academic exercise. Examples include, but are not limited to, submitting another student’s work as your own, using books or notes during closed book tests.

Fabrication – intentional and unauthorized falsification or invention of any information or citation in an academic exercise. Examples include, but are not limited to, changing collected data to meet the hypothesis, listing a research source that does not exist, listing a quote that does not exist.

Facilitating academic dishonesty – intentionally or knowingly helping or attempting to help another to violate any provision of this code. Examples include, but are not limited to, giving any individual other than the professor your completed assignment, suggesting ways to cheat or plagiarize.

Plagiarism – The Technology University plagiarism policy may be found online at <http://www.capttechu.edu/resources/lib/writingguide/plagarism.html>

Self-Plagiarism – submitting the same paper or assignment for more than one class for a grade without the professor’s knowledge or permission.

Complicity – failing to report the incidents of academic dishonesty to the professor, department chair, Dean of Academic Affairs, or the Vice President for Academic Affairs.

Code of Conduct – the academic integrity code is incorporated into the Capitol Technology University’s Code of Conduct Standards.

Judicial Process

Any incidents should be reported to the appropriate Department Chair with written documentation. The Department Chair will forward academic integrity cases to the Academic Affairs Council for review and all other incidents to the Dean of Students. Once the case is reviewed, the Judicial Facilitator, Dean of Students or designee, will meet with the student to discuss the allegations. The student will have the opportunity to accept responsibility and sanctions or to have the case heard by a Conduct Review Panel (CRP). If a CRP is needed, the student and all other faculty, staff or students who have direct knowledge of the incident will be asked to participate in a hearing. The CRP is composed of three members who are selected by the Judicial Facilitator from a pool of faculty, staff, or students. In cases of potential violations of the Academic Integrity Code, the CRP is generally composed of faculty members. The CRP will determine if it is more likely than not that the campus policies have been violated. If the CRP finds that the policies have been violated, they will recommend sanctions. The Judicial Facilitator will notify the student in writing of the CRP’s findings. The student has the opportunity to appeal to the VP for Academic Affairs.

To learn more about the official policies of the university on this issue, please read “Code of Academic Integrity” beginning on page 18 and “Sanctions for Violations of Regulations” beginning on page 63 of the Student Handbook. The Student Handbook can be downloaded from:

<http://www.capttechu.edu/current-students/undergraduate/academic-resources>

The contents of this syllabus or the scheduled contained herein can be modified at any time without notice by the Professor.