

Texas A&M University-Texarkana

Course Syllabus

Artificial Intelligence (CS 360)

Summer 2020

Disclaimer: *This syllabus is tentative and is subject to change at instructor's discretion.*

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Online Office Hours: I will be holding a few Zoom office hours (*video teleconference*) throughout the semester. Students can also request a one-on-one Zoom meeting with me if they have any questions.

Course Description: This course will introduce the basic principles of artificial intelligence (AI) and its applications. The class will begin by discussing ways to represent knowledge about the world through logic and how to reason logically with that knowledge. The students will learn general principles of rule-based expert systems. Techniques that allow reasoning under uncertainty will be introduced and analyzed. Bayesian networks and other probabilistic reasoning models will also be considered. Basic principles of the learning theory will be observed, and real-world applications of AI, such as expert-based systems and natural language representation will be *considered*

Course Delivery Method: *Web-based*

Required Textbooks/Resources:

Russell, Stuart & Norvig, Peter (2010). *Artificial Intelligence: A Modern Approach*, 3rd ed. Upper Saddle River, NJ: Pearson Prentice Hall.

References:

John D. Kelleher, Brian Mac Namee and Aoife D'Arcy (2015). *Fundamentals of Machine Learning for Predictive Data Analytics*, The MIT Press; 1st edition.

Student Learning Outcomes:

- Explain the foundations and history of Artificial Intelligence, as well as the science of agent design.
- Illustrate the use of problem-solving techniques, such as the various search methods, games, and constraint satisfaction problems.
- Demonstrate AI's use of knowledge representation, through logic agents and first-order logic to address AI problems.
- Discuss the philosophical foundations of AI and explain the possibilities for the future of AI.

Course Outline: (*Lecture notes and video lectures will be posted on the Blackboard.*)

| Week | Topics |
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| 1 | <p>Introduction: AI, goals, and history</p> <p>Readings:</p> <ul style="list-style-type: none"> • Russell & Norvig, "Chapter 1: Introduction" in <i>Artificial Intelligence: A Modern Approach</i>. • Chui, et. al, "Notes From the AI Frontier," McKinsey Global Institute, April 2018, available at https://www.mckinsey.com/~media/mckinsey/featured%20insights/artificial%20intelligence/notes%20from%20the%20ai%20frontier%20applications%20and%20value%20of%20deep%20learning/mgi_notes-from-ai-frontier_discussion-paper.ashx |
| 2 | <p>Intelligent Agents: The concept of rationality, and structure of agents</p> <p>Readings:</p> <ul style="list-style-type: none"> • Russell & Norvig, "Chapter 2: INTELLIGENT AGENTS" in <i>Artificial Intelligence: A Modern Approach</i>. • Cristiano Castelfranchi, Modelling social action for AI agents, <i>Artificial Intelligence</i>, Volume 103, Issues 1–2, 1998, Pages 157-182, ISSN 0004-3702, https://doi.org/10.1016/S0004-3702(98)00056-3. |
| 3 | <p>Search Methods: Uninformed and informed search strategies</p> <p>Readings:</p> <ul style="list-style-type: none"> • Russell & Norvig, "Chapter 3: SOLVING PROBLEMS BY SEARCHING" in <i>Artificial Intelligence: A Modern Approach</i>. • Patel, Ronit & Pathak, Maharshi. (2018). Comparative Analysis of Search Algorithms, <i>International Journal of Computer Applications</i>, Volume 179 – No.50, June 2018, available at https://www.researchgate.net/publication/333262471_Comparative_Analysis_of_Search_Algorithms |
| 4-5 | <p>Logical Agents: Knowledge based agents and The Wumpus world environment - Exam 1</p> <p>Readings:</p> <ul style="list-style-type: none"> • Russell & Norvig, "Chapter 7: LOGICAL AGENTS" in <i>Artificial Intelligence: A Modern Approach</i>. |

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| | <ul style="list-style-type: none"> Thiagarajan, Joshva. (2012). INTELLIGENT AGENT-BASED KNOWLEDGE MANAGEMENT. <i>International Journal of Advanced Research in Computer Science</i>, Available at https://www.researchgate.net/publication/294621605_INTELLIGENT_AGENT-BASED_KNOWLEDGE_MANAGEMENT |
| 6-7 | <p>First-order Logic: Predicates, variables, quantifiers, and translating English to logic</p> <p>Readings:</p> <ul style="list-style-type: none"> Russell & Norvig, "Chapter 8: FIRST-ORDER LOGIC" in <i>Artificial Intelligence: A Modern Approach</i>. Rosen, "Chapter 1: The Foundations: Logic and Proofs" in <i>Discrete mathematics and its applications</i> Freire, R.A. First-Order Logic and First-Order Functions. <i>Log. Univers.</i> 9, 281–329 (2015), available at https://doi.org/10.1007/s11787-015-0126-8 |
| 8 | <p>Machine learning and predictive data: Data analytic, and introduction to machine learning</p> <p>Readings:</p> <ul style="list-style-type: none"> John D. Kelleher, Brian Mac Namee and Aoife D'Arcy "Chapter 1: Machine learning for predictive data analytics" in <i>Fundamentals of Machine Learning for Predictive Data Analytics</i> Intel "The Future of Machine Learning, Data and Predictive Analytics", Available at https://www.intel.com/content/www/us/en/analytics/machine-learning/machine-learning-data-and-predictive-analytics.html |
| 9 | <p>Information-based Learning: Decision trees, and Shannon's Entropy Model – Exam 2</p> <p>Readings:</p> <ul style="list-style-type: none"> John D. Kelleher, Brian Mac Namee and Aoife D'Arcy "Chapter 4: Information-based learning" in <i>Fundamentals of Machine Learning for Predictive Data Analytics</i> Russell & Norvig, "Chapter 18: Learning" in <i>Artificial Intelligence: A Modern Approach</i>. |
| 10 | <p>Philosophical foundation and the future of AI- Exam 3</p> <p>Readings:</p> |

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| | <ul style="list-style-type: none"> • Russell & Norvig, "Chapter 26: Philosophical foundations" in <i>Artificial Intelligence: A Modern Approach</i>. • Russell & Norvig, "Chapter 27: AI: The present and future" in <i>Artificial Intelligence: A Modern Approach</i>. • Aguilar Wendy, Santamaría-Bonfil Guillermo, Froese Tom, Gershenson Carlos, "The Past, Present, and Future of Artificial Life" in <i>Frontiers in Robotics and AI</i> (2014), Available at https://www.frontiersin.org/article/10.3389/frobt.2014.00008 • Jiang F, Jiang Y, Zhi H, et al "Artificial intelligence in healthcare: past, present and future" in <i>Stroke and Vascular Neurology</i> (2017); available at http://dx.doi.org/10.1136/svn-2017-000101 |
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Methods of Evaluation:

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| *HW (<i>The lowest graded HW will be dropped</i>) | 15% |
| **Discussion Forum (<i>Check rules of discussion forum below</i>) | 15% |
| Exam 1 | 20% |
| Exam 2 | 20% |
| Exam 3 (<i>Comprehensive</i>) | 30% |

**All written HWs will be submitted using Blackboard. Plagiarism software will be used to check assignments for plagiarism.*

Grading Scale: (*The Deans' Council has established a University-wide Common Grading Scale to be used in ALL courses effective fall 2010*)

A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F = 0-59%

****Discussion Board Standards (10%):**

a. Participation Policy: *Students are expected to post once per week throughout most of the semester, but they are encouraged to make more than just the required contributions. Each student is required to post to 10 different forums over the semester. This means one forum/week.*

b. Postings: *A posting should be more than one or two brief sentences. It should also express the complete thoughts of its author. Students may provide some examples or share their understanding of the discussed topic. Please do not wait until the last minute to post. It does not help the discussion if no one sees an interesting posting because it was added so late in the week. Post early and post often!*

c. Discussion Board Standards:

- *Students are encouraged to check the boards frequently for new postings. Students are expected to read and comment on other students' postings.*
- *While I read each discussion-board posting, I may not often comment in the boards (unless there are factual errors or there is confusion about an idea). I keep track of what is being said and by whom.*

Disability Accommodations: Students with disabilities may request reasonable accommodations through the A&M-Texarkana Disability Services Office by calling 903-223-3062.

Academic Integrity: Academic honesty is expected of students enrolled in this course. Cheating on examinations, unauthorized collaboration, falsification of research data, plagiarism, and undocumented use of materials from any source constitute academic dishonesty and may be grounds for a grade of 'F' in the course and/or disciplinary actions. For additional information, see the university catalog.

A&M-Texarkana Email Address: Upon application to Texas A&M University-Texarkana an individual will be assigned an A&M-Texarkana email account. This email account will be used to deliver official university correspondence. Each individual is responsible for information sent and received via the university email account and is expected to check the official A&M-Texarkana email account on a frequent and consistent basis. Faculty and students are required to utilize the university email account when communicating about coursework.

Drop Policy: To drop this course after the census date, a student must complete a [Drop/Withdrawal Request Form](#), located on the University Registrar's webpage or obtained in the Registrar's Office. The student must submit the signed and completed form to the instructor of each course indicated on the form to be dropped for his/her signature. The signature is not an "approval" to drop, but rather confirmation that the student has discussed the drop/withdrawal with the faculty member. The form must be submitted to the Registrar's office for processing in person, email Registrar@tamut.edu, mail (7101 University Ave., Texarkana, TX 75503) or fax (903-223-3140). Drop/withdraw forms missing any of the required information will not be accepted by the Registrar's Office for processing. It is the student's responsibility to

ensure that the form is completed properly before submission. If a student stops participating in class (attending and submitting assignments) but does not complete and submit the drop/withdrawal form, a final grade based on work completed as outlined in the syllabus will be assigned.

Class Participation: Students are responsible for beginning their participation on the FIRST CLASS DAY by logging on and completing assignments according to the COURSE CALENDAR. Failure to submit online assignments between the first day of classes and the University census date (according to the University schedule) will result in an ADMINISTRATIVE DROP from the course

Student Technical Assistance:

Solutions to common problems and FAQ's for your web-enhanced and online courses are found on the [Online Student Training](#) page on our website.

If you cannot find your resolution there, you can submit a support request by contacting the IT Service Desk:

Email: isite@tamut.edu

Phone: 903-334-6603

Submit a [Support Request](#)

Additional student help for Blackboard can be found here:

[Blackboard Help for Students](#)

Technical Requirements:

The following are the minimum computer requirements for online learning:

A computer capable of handling streaming video. A mid-range multi-core CPU should be adequate.

A sound card.

A high speed internet connection preferably directly connected to the computer via a hard-wired Ethernet connection rather than wirelessly connected.

Virus and adware protection software.

Microsoft Word, minimum version 2007 or above.

[Mozilla Firefox](#) browser available free.

The most recent versions of Java, Flash, QuickTime, Adobe Reader, and Shockwave. You can check this in the Firefox browser by visiting:

[Firefox Plugin Check Tool](#)

Please note: some instructors may require the use of a headset with microphone and/or a webcam. If so, the cost of these items is not included in your course fees and will need to be acquired at your own expense.

Blackboard Mobile for iOS and Android Devices

Android and iOS devices are currently supported using the Blackboard Mobile App, available for free from your App Store or scan the code below:



The Blackboard Mobile App provides limited access to courses, including the ability to read and contribute to discussions, check grades and announcements, access content, read and comment on blogs, reflect in journals, link to your personal Dropbox, and receive push notifications when courses are updated. Limited course features may also be available via your mobile device's browser; however, your mobile device does not replace your personal computer and should not be used as a substitute for one. High stakes assignments, tests, etc. should be completed on your personal computer, and not on your mobile device.