CSCE 4201, Section 501
Introduction to Artificial Intelligence

Department of Computer Science and Engineering
University of North Texas

Fall 2026 · 3 Credit Hours

Course and Contact Information

Class meetings	Thursday 6:30 p.m. - 9:20 p.m.
Location	FRLD 360
Delivery	100% in person
Course site	UNT Canvas (unt.instructure.com)
Instructor	Yunhe Feng, Ph.D. (he/him)
Email	Yunhe.Feng@unt.edu
Office hours	Thursday, 9:00 a.m.–11:00 a.m.
Office	F251, Discovery Park and by appointment
Teaching Assistant	Rohitha Aradhyula
Email	RohithaAradhyula@my.unt.edu
Office hours	Wednesday , 10:00 a.m.–12:00 p.m.
Office	Virtually, `https://shorturl.at/LJZPj`
Teaching Assistant	Hanzhi Zhang
Email	HanzhiZhang@my.unt.edu
Office hours	Monday, 3:00 p.m.–5:00 p.m.
Office	F221, Discovery Park

I reserve the right to modify course policies, the course calendar, assignment or project point values, and due dates. Any change will be announced in class and posted to Canvas.

Course Description

This course provides an introduction to the foundations, methods, and emerging applications of artificial intelligence. The course begins with an overview of artificial intelligence, its history, and the programming foundations needed to develop AI systems. Students are then introduced to fundamental machine learning paradigms, including supervised, semi-supervised, and reinforcement learning.

A substantial portion of the course focuses on commonly used machine learning methods, including regression, k-nearest neighbors, decision trees, boosting, and techniques for evaluating classification models. The course then introduces the foundations of neural networks and deep learning, including perceptrons, multilayer neural networks, activation functions, gradient descent, backpropagation, and convolutional neural networks.

The later part of the course examines modern AI technologies and applications, including computer vision, natural language processing, transformers, and agentic AI. Students are also exposed to industrial perspectives on contemporary AI systems through guest lectures covering topics such as generative AI, production AI agents, retrieval-augmented generation (RAG), model evaluation, the Model Context Protocol (MCP), and deployment of AI systems.

Throughout the course, conceptual material is complemented by programming assignments and a team project. Students gain practical experience implementing, evaluating, and communicating AI solutions while developing an understanding of both foundational techniques and emerging directions in modern artificial intelligence.

Prerequisites

CSCE 2110 (Foundations of Data Structures) with a grade of C or better.

Comfort with Python, discrete mathematics, elementary probability, and linear algebra will make the material substantially easier to absorb. No prior exposure to artificial intelligence or machine learning is assumed. Students who feel unsteady on any of these prerequisites should come to office hours in the first two weeks so that we can identify review resources early rather than late.

Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Explain fundamental concepts, major milestones, and current directions in artificial intelligence, and distinguish among major AI and machine learning paradigms.
2. Use Python programming, data structures, and object-oriented programming concepts to implement and experiment with artificial intelligence and machine learning methods.
3. Explain and differentiate supervised learning, semi-supervised learning, and reinforcement learning, and identify appropriate learning paradigms for different AI problems.
4. Implement and analyze fundamental machine learning algorithms, including logistic regression, polynomial regression, k-nearest neighbors, decision trees, AdaBoost, and gradient boosting.
5. Explain and compute important concepts used in decision-tree learning, including entropy and Gini impurity, and analyze how they are used to construct classification models.
6. Evaluate machine learning classification models using appropriate performance measures and interpret the strengths and limitations of different evaluation metrics.
7. Explain the fundamental components of artificial neural networks, including perceptrons, multi-layer networks, activation functions, loss functions, gradient descent, and backpropagation, and implement neural networks using modern machine learning tools.
8. Explain the principles of convolutional neural networks and apply deep learning techniques to basic computer vision problems such as image classification and feature extraction.
9. Describe fundamental concepts in natural language processing and explain how attention and transformer architectures enable modern language models and generative AI systems.
10. Explain the architecture and operation of modern agentic AI systems and describe how technologies such as large language models, retrieval-augmented generation (RAG), Model Context Protocol (MCP), tool use, and AI agents can be integrated into practical AI applications.
11. Analyze practical considerations in developing and deploying contemporary AI systems, including model evaluation, reliability, computational requirements, and production deployment, informed by both academic and industrial perspectives.

12. Design, implement, evaluate, document, and present a team-based AI project that applies techniques learned in the course to a practical problem.

Required and Recommended Materials

There is no required textbook to purchase. Course content is drawn from the references below, from lecture notes distributed on Canvas, and from a reading list of historically significant and recent research papers that will be posted as the semester progresses. Readings are dense by design; you are encouraged to supplement them with additional resources as needed.

Primary references (all freely available)

- Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 4th edition, Pearson. The standard reference for the first half of the course.
- David L. Poole and Alan K. Mackworth, *Artificial Intelligence: Foundations of Computational Agents*, 2nd edition, Cambridge University Press, 2017. ISBN-13: 9781107195394. Available at artint.info/2e.
- Shai Shalev-Shwartz and Shai Ben-David, *Understanding Machine Learning: From Theory to Algorithms*, Cambridge University Press, 2014. Available from the authors' website.

Recommended for the programming component

- Paul Deitel and Harvey Deitel, *Intro to Python for Computer Science and Data Science: Learning to Program with AI, Big Data and The Cloud*, Pearson.
- Official documentation for NumPy, pandas, scikit-learn, and PyTorch.

Technology requirements

This course has digital components. To participate fully you will need reliable internet access and a laptop capable of reaching Canvas and running Python 3.10 or later. All programming work can be completed in Jupyter Notebook locally or in Google Colab; assignments requiring a GPU are sized so that the free Colab tier is sufficient. Setup instructions are distributed in Week 1.

Assessing Your Work

Component	Weight
Attendance and participation	5%
Programming assignments (6 × 4∼6%)	30%
Quizzes (3 × 2∼4%, in class)	10%
Midterm exam	20%
Second exam	20%
Final project	15%
Total	**100%**

Assignments (30%)

Six assignments, each worth 4-6% of the final grade, track the modules of the course. Assignments are individual work. Each is released on Canvas at least ten days before it is due and is submitted

as a single archive containing your code and a short report describing your approach, your results, and your interpretation of them. Code that does not run receives no credit for the affected portion, so verify your submission in a clean environment before you upload it.

Quizzes (10%)

Four short in-class quizzes, each worth 2.5%, cover the material of the preceding weeks. Quizzes are given at the beginning of class; you must be present when class begins in order to take one. There are no make-up quizzes except for a university-excused absence documented under the policy below.

Exams (40%)

The midterm exam is held in class in Week 7 and covers Weeks 1–6. The second exam is held in November 2026, and is comprehensive with emphasis on material after the midterm. Both exams are closed-book and closed-notes. No electronic devices of any kind are permitted.

Final project (15%)

The project is where the pieces of the course come together. You may work individually or in teams of up to five students; the expected scope scales with team size. Reports must follow the NeurIPS format, and each project receives a 20-minute in-class presentation. Attendance at your classmates' presentations is mandatory and counts toward your participation grade.

Deliverable	Due	Weight
Team formation and topic	Week 9 (Oct. 12–16)	Ungraded
Proposal (1–2 pages)	Week 10 (Oct. 19–23)	3%
Presentation video and Final report (4–6 pages)	Monday, Dec. 7, 2026, 11:59 p.m.	5% for video; 7% for report

Upload presentation videos and final reports on Canvas

Suitable project directions include, but are not limited to:

1. **Reproducing results from top-tier AI conferences.** Reimplement and validate the findings of a paper from ICML, ICLR, NeurIPS, CVPR, or AAAI published within the last three years, using the same datasets, hyperparameters, and experimental setup. Evaluate how reproducible the reported results are and document any inconsistencies or obstacles you encounter. Optionally, extend or modify the original approach.
2. **Exploring innovative applications.** Identify a real-world problem, propose an AI-driven solution, demonstrate its feasibility, and analyze the ethical, societal, or technical implications of deploying it.
3. **Extending existing results.** Improve the performance of an existing algorithm, apply a known method to a new domain, or propose modifications that improve its scalability, robustness, or efficiency.
4. **Auditing a deployed system.** Evaluate a publicly available model or API for accuracy, bias, robustness, or privacy leakage, and report what you find with the evidence that supports it.

The final report should state the problem and its motivation, describe your approach and methodology, present results and analysis, and close with conclusions and future work.

Attendance and participation (5%)

Research consistently shows that students who attend class perform better. Attendance is taken on randomly selected days. Participation includes engagement in class discussion, contribution to your project team, and attendance at the final presentation sessions.

Grading Scale

A	90–100%	Outstanding, excellent work. The student performs well above the minimum criteria.
B	80–89%	Good, impressive work. The student performs above the minimum criteria.
C	70–79%	Solid, college-level work. The student meets the criteria of the assignment.
D	60–69%	Below average work. The student fails to meet the minimum criteria.
F	$\leq 59\%$	Sub-par work. The student fails to complete the assignment.

Grades reflect mastery of the content. As a rule I do not grade on a curve, because that compares your outcomes to other people's rather than to the material. I do, however, strongly encourage you to learn with and through others: form study groups, use the Learning Center's coaching staff, and attend the review sessions offered the week before each exam.

Grade-Related Policies

Late work

Late submissions are not accepted.

A university-excused absence, documented within 48 hours of the missed deadline, waives the penalty entirely; see the Student Attendance and Authorized Absences Policy.

Turnaround time

I aim to return graded work within one week of the due date. When that is not possible, I will post an announcement to the class.

Grade disputes

Please wait 24 hours before contacting me to dispute a grade. In that time, review the assignment details and reflect on the work you submitted. If you would still like to meet, email me to schedule a meeting; I cannot discuss grades over email. Come prepared with specific evidence that you earned a higher grade than you received. If you miss a scheduled meeting, you forfeit the dispute. If you do not request a meeting within seven days of receiving the grade, you also forfeit the dispute.

Extra credit

There are no extra credit opportunities in this course.

How to Succeed in This Course

Where to ask questions

If you have a general question about the course, an assignment, or the project, post it on the Canvas discussion board. The TAs or I will answer it, or one of your classmates will, and everyone benefits

from seeing the answer. You may also want to find a classmate to be a "buddy" with, so that you always have at least one other person to compare notes with. For private matters, email me directly.

How to reach me

Email is the best channel. During busy periods my inbox fills up, so if you do not hear back within two business days, please send a follow-up; a gentle nudge is always appreciated. I do not generally respond over the weekend. Office hours exist so that you can ask for clarification and find support with the material, and I would much rather see you in week three than in week thirteen. Additional office hours, in person and virtually, will be offered as the semester concludes. Your success is our goal.

A note on how this course is paced

The first half of the course is mathematical and algorithmic; the second half is empirical and computational. Students who fall behind in the first half rarely recover in the second, because the probabilistic and optimization material underpins everything that follows. Keep current with the assignments, and use the quizzes as an honest diagnostic rather than as a grade.

Academic Integrity

The University of North Texas promotes the integrity of learning and embraces the core values of trust and honesty. Academic integrity is based on educational principles and procedures that protect the rights of all participants in the educational process and validate the legitimacy of degrees awarded by the University. In the investigation and resolution of allegations of student academic dishonesty, the University's actions are intended to be corrective, educationally sound, fundamentally fair, and based on reliable evidence. You are expected to adhere to the university's Academic Integrity Policy.

Work handed in for a grade — assignments, project reports, exams — must be your own effort only. Students are not permitted to use solutions from previous offerings of this course, from solution websites, or from any other external source. This will be checked and enforced. Plagiarism results in a score of zero for the assessment in which it occurs, and repeated or severe violations are referred for further action.

All departmental policies on academic integrity and student conduct apply to this course; these are available at engineering.unt.edu/cse/students/resources/academic-integrity.html. Any exceptions to this policy are noted explicitly in this syllabus.

Prohibited Use of Generative Artificial Intelligence

This is a course *about* artificial intelligence, and part of what you will learn here is how generative models are built and where they fail. That is precisely why you may not use them to do your work for you. The skills this course develops — formulating a problem as a search, deriving an inference by hand, diagnosing why a model underfits — are built through the effort of doing them yourself, and that effort is exactly what a generative model removes.

Accordingly, the use of generative AI tools such as Claude, ChatGPT, Gemini, GitHub Copilot, and similar systems is not permitted on any graded work in this course, including assignments, quizzes, exams, and the final project. Using generative AI to complete any part of an assignment, exam, or coursework will be treated as a violation of academic integrity and addressed under the Academic Integrity Policy.

The single exception is that you may study, run, and analyze generative models when an assignment or your approved project explicitly directs you to do so — that is, when the model is the object of study rather than the author of your submission. If you are unsure whether a particular use is permitted, ask me before you use it, not after.

Seeking Reasonable Accommodations

The University of North Texas makes reasonable academic accommodations for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to the faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time; however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the Office of Disability Access. You may also contact ODA by phone at (940) 565-4323.

Supporting Your Success and Creating an Inclusive Learning Environment

I value the many perspectives students bring to our campus. Please work with me to create a classroom culture of open communication, mutual respect, and inclusion. All discussions should be respectful and civil. Although disagreements and debates are encouraged, personal attacks are unacceptable. Together, we can ensure a safe and welcoming classroom for all. If you ever feel like this is not the case, please stop by my office and let me know. We are all learning together. We will discuss our classroom's habits of engagement, and I also encourage you to review UNT's Code of Student Conduct so that we can all start from the same baseline understanding of civility.

Attendance and Participation

Research has shown that students who attend class are more likely to be successful. You should attend every class unless you have a university-excused absence such as active military service, a religious holy day, or an official university function, as stated in the Student Attendance and Authorized Absences Policy. If you cannot attend a class due to an emergency, please let me know. Your safety and well-being are important to me.

To encourage attendance, punctuality, and learning, quizzes are administered at the beginning of class and cover the previous weeks' material. Plan to arrive on time, because you must be present when class begins in order to take the quiz. Because this course involves collaborative project work, participation is essential to learning. I understand that tardiness and absences occur; if you are late, please send me a brief email explaining the circumstances, and if you must miss class, please let me know beforehand where possible.

Eagle Alert

Students will be notified by Eagle Alert if there is a campus closing that will impact a class, and note that the proposed course schedule is subject to change. For more information on emergency

notifications and procedures, please review the Emergency Notifications and Procedures Policy.

Course Schedule (Tentative)

The schedule below is an estimate and is subject to change depending on lecture progress and class interest. All assignment deadlines are 11:59 p.m. Central Time on the stated day. Changes will be announced in class and posted on Canvas.

Week	Dates	Topics	Due / Assessment
Module 1 — AI Foundations			
1	Aug. 17–21	Course overview, expectations, and grading policies. What is AI? A short history.	
2	Aug. 24–28	Python Data Structures, OOP, Introduction to Machine Learning, Semi-Supervised Learning, Reinforcement Learning	Assignment 1 released
3	Aug. 31–Sep. 4	Logistic Regression, Polynomial Regression, k-Nearest Neighbors	**Quiz 1**
4	Sep. 7–11	Entropy, Gini Impurity, Decision Trees. *(No class Mon. Sep. 7 — Labor Day.)*	**Assignment 1 due** Assignment 2 released
5	Sep. 14–18	Boosting Foundations; AdaBoost and Gradient Boosting; Performance Measurement for ML Classification	—
Module 2 — Fundamentals of Neural Networks and Deep Learning			
6	Sep. 21–25	Neural network concepts. The perceptron, multilayer networks, activation functions	**Assignment 2 due** **Quiz 2** Assignment 3 released
7	Sep. 28–Oct. 2	**Midterm Exam** (in class, covering Weeks 1–6). No class.	**Midterm Exam (20%)**
8	Oct. 5–9	Backpropagation, Gradient descent, and Convolutional Neural Network (CNN)	—
9	Oct. 12–16	Introduction to Natural Language Processing	**Assignment 3 due** Project teams and topics due
10	Oct. 19–23	Transformer (Given by Ph.D. Hanzhi Zhang)	**Project proposal due (3%)** Assignment 4 released
Module 4 — Emerging AI and Industrial Perspectives on AI			
11	Oct. 26–30	Canceled due to Mean Green Football Event	
12	Nov. 2–6	Agentic AI; From Conversations to Actions **Bo Gu**, Director of Data Science & Generative AI at AT&T; Harness Engineering **Mingcheng Li** PhD candidate in Computer Science, UNT	**Quiz 3** **Assignment 4 due** Assignment 5 released
13	Nov. 9–13	**Guest Lecture**: **Asif Haider**, founder of SARZAD USA AI, AI ML Decision Science Strategic Advisor, Columbia University MSc.	—

continued on next page

Week	Dates	Topics	Due / Assessment
14	Nov. 16–20	**Guest Lecture**: **Shirish Gone**, AI/Agent Engineer @ Smartsheet | Production AI Agents, Evals, RAG, MCP | AWS Bedrock · Kubernetes	**Assignment 5 due**
—	Nov. 23–29	*Thanksgiving Break — no classes.*	—
15	Nov. 30–Dec. 3	Second exam.	
—	Dec. 4	*Reading Day — no classes.*	—
Finals	Dec. 7–11	Upload presentation videos and final reports on Canvas.	**Presentations (5%)** **Final report due Dec. 7 (7%)**

This syllabus is subject to change based on the needs of the class.