

Course Information

Course Number: ICPE 639
Course Title: Introduction to Machine Learning for Energy
Section: 600, 701
Time: April 8, 10, 12, 15,16 1:00pm - 5:30pm
Location: GERB XXX and Zoom
Credit Hours: 1.5

Instructor Details

Instructor: Yalong Pi, PhD
Office: 221C, John R. Blocker Building
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Office Hours: By appointment

Course Description

This is an introductory course discussing machine learning fundamentals and methods commonly seen in data science with potential applications in energy and power systems. Machine learning methods to be discussed include basic supervised and unsupervised learning methods, performance evaluation, neural networks and other advanced predictive models, as well as an introduction to reinforcement learning.

Course Prerequisites

Graduate Classification, Data Science Fundamentals for Energy I & II

Course Learning Outcomes

By the end of the course students should be able to:

- Develop understanding of concepts of neural network and machine learning.
- Apply simple convolutional neural network (CNN) models and evaluate their performance.
- Apply generative adversarial network (GAN) models and evaluate their performance.
- Apply transformer and generative pretrained transformer (GPT) models and evaluate their performance.
- Solve practical energy problems using machine learning techniques.

Textbook and/or Resource Materials

Textbook: Mathematics for Machine Learning, by Deisenroth, Faisal, and Ong. CUP (free online)
All course materials and assignments, including the final exam, will be provided on Canvas.

Grading Policy

Quizzes

There will be a quiz at the beginning of each class except the first one. Topics about the quizzes will be provided on Canvas and will be covered in the previous lecture.

Final Exam

Final exam topic will be provided at the beginning of the class and due on the last day. The exam must be completed individually. Each class session and quiz will include content you will be using in completing your final exam.

Grading:

Quiz	40%
Final Exam	60%
Total	100%

Grading Scale:

- A = 90-100
- B = 80-89
- C = 70-79
- D = 60-69
- F = <60

Late Work Policy

Solutions to the homework assignments will be provided after the due date. No late submissions will be accepted.

Work submitted by a student as makeup work for an excused absence is not considered late work and is exempted from the late work policy ([Student Rule 7](#)).

Course Schedule

Session	Topic	Quiz
1	Neural network fundamentals and continuous optimization	
2	Image classification, object detection, and pixel segmentation	Quiz #1
3	Autoencoder, autodecoder, and generative adversarial network (GAN)	Quiz #2
4	Attention mechanism, transformers (GPT) and reinforcement learning	Quiz #3
5	Final project Q&A, advanced topics review	Quiz #4

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" ([Student Rule 7, Section 7.4.1](#)).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" ([Section 20.1.2.3, Student Rule 20](#)).

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a

disability, please contact the Disability Resources office on your campus (resources listed below) Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Disability Resources is located in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's [Title IX webpage](#).

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on your campus

Students who need someone to talk to can contact Counseling & Psychological Services (CAPS) or call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends.

24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.