Tennessee Tech University
Department of Computer Science
CSC 6903-002
AI-Driven Secure Energy Applications
Tuesday, 3:00-5:50 PM, Bruner 309, 3 Credit Hours, Spring 2026

Instructor Information

Instructor's Name: Drs. Maanak Gupta, Charles Van Neste, and Doug Talbert

Office: By Appointment

Campus Email: mgupta@tntech.edu; cvanneste@tntech.edu; DTalbert@tntech.edu

Course Information

Prerequisites: MS or PhD standing in CSC, ECE or ME

Texts and Resources: None

Course Welcome and Description

This interdisciplinary course explores the intersection of Artificial Intelligence, cybersecurity, and energy systems, equipping students with both foundational knowledge and convergence insights. Participants will study core concepts of AI and machine learning, principles of cybersecurity, and the modern energy systems, including smart grids and renewable integration. Through case studies, group-based hands-on projects, and research-driven discussions, students will gain the skills to analyze, design, and secure AI-driven energy applications. Students will work in team and propose a semester long project integrating the technologies in AI, cybersecurity and energy. Key milestones will be defined by the team, and capstone-style final project presentations will be required.

Course Objectives/Student Learning Outcomes

1. **Explain** the foundational principles of artificial intelligence, cybersecurity, and energy systems, including their key components, terminologies, and challenges. *(Remember/Understand)*

2. **Analyze** the interactions and dependencies between AI models, cybersecurity mechanisms, and modern energy infrastructures, such as smart grids and renewable energy integration. *(Analyze)*

3. **Apply** machine learning, cybersecurity frameworks, and energy domain knowledge to evaluate or improve the resilience and performance of AI-driven energy applications. *(Apply/Evaluate)*

Reviewed and Revised July 21, 2025

4. **Design** an interdisciplinary team-based project that integrates AI, cybersecurity, and energy concepts, demonstrating technical accuracy, feasibility, and innovation. *(Create)*

5. **Assess and communicate** the effectiveness, risks, and ethical implications of AI-enabled energy solutions through written reports, presentations, and hands-on project outcomes. *(Evaluate/Create)*

Major Teaching Methods

Teaching methods may include lectures, hands-on labs, discussion, reading, written assignments. iLearn is used to deliver material for the course. It is expected that students spend substantial time outside the classroom to understand concepts.

Topics to be Covered

Energy	Energy Systems in Grid, Communication, how AI would fit, discuss energy datasets
Energy	Other energy systems, wireless, vehicular**
AI	Intro to AI (Basics and best practices), measuring, tuning, machine learning models, regressions/classification
AI	Trusted AI, Explainability, Adversarial Attacks, Human AI interaction, Privacy, energy related challenges
Cyber	Security Preliminaries: Cyber Attacks, Threats, Attack vectors, Cryptography Basics (Symmetric and Asymmetric), Hashing, Digital Signature
Cyber	Applied Security: Defense Mechanisms and Network Security, AI for security/Security of AI, Energy and AI related attacks.

Course Schedule (Tentative)

Week	Outline
1	Introduction and Overview
2	Energy
3	Energy
4	Project Proposals
5	AI
6	AI
7	Cyber
8	Cyber
9	Guest lecture and Milestone 2
10	Group Project Meetings
11	Group Project Meetings
12	Group Project Meetings
13	Boot-camp
14	Project Showcase
15	
	FINAL EXAM

Grading and Evaluation Procedures

Grading Scale

Letter Grade	Grade Range
A	89.5-100
B	79.5-89.5
C	69.5-79.5
D	59.5-69.5
F	59.5 and below

Course Policies

Student Academic Integrity Policy

Maintaining high standards of academic integrity in every class is critical to the reputation of Tennessee Tech, its students, faculty, alumni, and the employers of Tennessee Tech graduates. Academic integrity is at the foundation of the educational process and the key to student success. Students with academic integrity are committed to honesty, ethical behavior, and avoiding violations of academic integrity. All students are required to read and understand Policy 216: Student Academic Integrity. Please see the Academic Integrity website (https://www.tntech.edu/provost/academicintegrity/) for more information.

Attendance Policy

Attendance and participation are required for the course. Students who are unable to attend class for an extended period due to an emergency/extenuating circumstance (i.e., medical illness, hospitalization, death in the family/bereavement, military or legal obligation), may contact the Office of the Vice President for Student Affairs at studentaffairs@tntech.edu to request an absence notification.

Class Participation

The course is highly participatory in regards to learning activities performed in class. As such, students are expected to attend and actively engage with the instructor and fellow students. This is very critical to achieve the desired objectives of the course. The course will require considerable effort from students outside class.

Assignments and Related Policy

This is a project-based course, which would require defined milestones achieved and presented at regular intervals. It is expected that teams keep in mind the expectations, and pro-actively work as a team towards the projects. All members should contribute equally. No late submissions will be accepted.

Instructional and Assignment Use of Artificial Intelligence
Permitted when Assigned in this Course with Attribution.

In this course, Generative AI resources are allowed to be used for specific assignments or within set parameters, as designated by the instructor.

Reviewed and Revised July 21, 2025

To ensure academic integrity, students must openly disclose any AI-generated material they utilize and provide proper attribution. This includes in-text citations, quotations, and references.

To indicate the use of a Generative AI resource, a student should include the following statement in their assignments: "The author(s) acknowledge the utilization of [Generative AI Tool Name], a language model developed by [Generative AI Tool Provider], in the preparation of this assignment. The [Generative AI Tool Name] was employed in the following manner(s) within this assignment [e.g., brainstorming, grammatical correction, citation, specific section of the assignment]."

Disability Accommodation

Students with a disability requiring accommodations should contact the accessible education center (AEC). An accommodation request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The AEC is located in the Roaden University Center, room 112; phone 931-372-6119. For details, view Tennessee Tech's policy 340 – services for students with disabilities at policy central.

Additional Resources

Technical Help

If you are experiencing technical problems, visit the myTech IT Helpdesk for assistance.

If you are having trouble with one of the instructional technologies (i.e. Zoom, Teams, Qualtrics, Respondus, or any technology listed here)visit the Center for Innovation in Teaching and Learning (CITL) website or call 931-372-3675 for assistance.

Tutoring

The university provides free tutoring to all Tennessee Tech students through the Learning Center within the Volpe Library. Tutoring is available for any class or subject, as well as writing, test prep, study skills, and resume support. Appointments are scheduled, so contact the Learning Center website for more information.

Counseling and Health Services

Tennessee Tech offers support for student well-being through two key services. The Center for Counseling and Mental Health Wellness provides brief, solution-focused therapy to help students navigate personal and social challenges. Health Services delivers accessible, high-quality, and affordable medical care to promote overall wellness. Visit their respective websites to learn more or schedule an appointment.

Emergency Preparedness Protocols

Each student must take personal responsibility for following any University protocol related to pandemics, natural disasters, and other public health and safety events. Students are expected to follow all directives published by Tennessee Tech on its Environmental Health & Safety webpage.

Reviewed and Revised July 21, 2025