UCCS
Department of Electrical and Computer Engineering

ECE 4222/5222 – Deep Learning
(3 credits)

Syllabus

Fall 2026

Part A - Course Outline

Catalog description:
This course is an introduction to deep learning. A range of topics will be covered from basic deep learning algorithms, architectures for deep learning and applications to problem domains. Prer., ECE 1021, ECE 2021 or CS 2060 or instructor permission.

Textbook *(optional)*:
Machine Learning with TensorFlow, 2018 (Author: Nishant Shukla), Manning Publications
[ISBN: 9781617293870]
Neural Networks and Deep Learning, 2016 (Author: Michael Nielsen), Online book

Reference books *(optional)*:
Deep Learning, 2016 (Authors: Ian Goodfellow, Yoshua Bengio, Aaron Courville), The MIT Press
[ISBN: 978-0-26-203561-3]
Computer Organization and Design, 5th Edition (Authors: D. Patterson and J. Hennessy), *Morgan Kaufmann*
[ISBN: 978-0-12-407726-3]
Digital Systems Design Using Verilog, 1st Edition, 2015 (Charles Roth, Lizy John, Byeong Kil Lee), *Cengage*
[ISBN: 978-1-28-505107-9]

Major prerequisites by topic:
1. Basic logic design
2. Basics of microcomputer system
3. Basics of linear algebra, probability and statistics
4. C/C++ programming
5. Verilog modeling

Course objectives:
1. To develop skills in neural network and deep learning
2. To understand fundamentals of supervised, unsupervised learning and reinforcement learning
3. To understand performance metrics, architecture of neural processing unit, deep learning applications
4. To develop skills of applying deep learning technology to various applications

Topics covered:
- Review of basic digital systems design and computer architecture
- Applied math and neural network basics
- Modern practical deep networks
- Supervised learning and unsupervised learning
- Neural network architectures for training and inference
- Network processing unit and performance metrics of deep learning application
- Cost-effective training
- Recent research topics

Course content:

- 60% Engineering Sciences; 40% Engineering Design

Class/laboratory schedule:

- **Class:**
  - 2 – 75 minute lecture session/week
- **Lab:**
  - No lab recitation, but the course has lab assignments

Contribution of course to meet the professional component:

- This course prepares students to work professionally in the area of deep learning.

Part B - Course Details

Instructor:

- Name: Dr. Byeong Kil Lee
- Office: AEC 304
- Phone: 719-255-4565
- Office hours: M/W 12:15 pm - 1:15 pm or by appointment
- E-mail: blee@uccs.edu
- URL: http://faculty.uccs.edu/blee

Class:

- Classroom: AEC 103
- Class hours: Mon/Wed 1:40 pm - 2:55 pm

TA/Grader:

- Name: TBA
- E-mail: TBA

Evaluation Methods:

- Homework & Lab assignment 20%
- Midterm Exam 20%
- Term Project 50%
- Class Participation, Quiz, etc. 10%

Evaluation Methods for Term Project:

- Literature survey / proposal (presentation) 20%
- Progress report 10%
- Presentations 35%
- Final report (IEEE paper format) 35%

Homework and Lab Assignment:

- 1-2 homework and 4-5 lab assignments
- Lab assignments include C/C++/Python programming, simulation, and analysis, etc.

Important Deadlines:

Note that midterm performance (HW, Quiz, Lab and Midterm Exam) will be available by October 30, 2026, on Canvas. Use this to decide on continuing or dropping the course.

† The deadline for dropping without ECE Chair's/the Dean's signature is October 30, 2026.
Instructor for the course will not sign any petition to drop after October 30, 2026.

Attendance Policy:

- Attendance is required (in-person class). Students are responsible for topics covered in missed classes, as well as any assignments due.

Recording Lectures: (No recording for Fall 2025; it might be changed depending on the COVID 19 status)

- If recorded, portions of this class might be recorded by the instructor for educational purposes. These recordings may be made available to students registered for this class. Students may not reproduce the recording, share the recording, or upload the recording to any online environments. Your instructor will communicate how you can access the recordings. If the instructor or the University plan any other uses for a recording, consistent with FERPA, students identifiable in the recordings will be notified to request consent prior to such use or they will be de-identified.

Military Policy:

- If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact your UCCS Course Instructor no later than the first week of class to discuss the class attendance policy

Academic Integrity:

- Cheating in any form will be fully prosecuted.
- Academic Honor Code (http://catalog.uccs.edu/content.php?catoid=7&navoid=277#Acad_Honor_Code)

Quizzes:

- There will be one quiz during the semester (one week before the exam). No makeups allowed on the quiz.

In classroom:

- No disruptive activity/talking amongst students in class during lectures. If you have a question about the material, ask the instructor. Be professional in your behavior in class. Disruptive activity can lead to grade penalties.

UCCS Disability Services:

- UCCS provides, upon request, appropriate academic adjustments for qualified students with disabilities. For more information, visit Disability services homepage (https://www.uccs.edu/disability) or contact 719.255.3345, dservice@uccs.edu

Links:

- Canvas: https://canvas.uccs.edu
- Academic Calendar: https://www.uccs.edu/admissions-aid/calendar
- UCCS Health Center: https://uccs.edu/recwellness/health-services

Tentative Schedule:

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Tentative Schedule

		Lecture	Project	HW/Lab	Exam/Quiz
Week1		syllabus			
		lect. Intro			
Week2		No class (Labor day)			
		lect. linear regression			
Week3					
		lect. Lab basics			
Week4		lect. logistic regression	List papers/topics	HW#1 due	
		comp vision basics			
Week5		lect. Regularization		Lab#1 due	
Week6		lect. Back Propagation	topic, team decision		
		lect. Deep Neural Nets	assign papers		
Week7					
		lab		Lab#2 due	
Week8			Presentation		
		lect. CNN			
Week9		lect. RNN			**Quiz**
		Presentation			
Week10		Presentation	Proposal		**Exam**
		Presentation			
Week11		lect. RNN		Lab#3 due	
		lect. Sparse Matrix			
Week12		lect. Unsupervised			
		Quiz			
Week13		lect. Unsupervised			
		Exam	Progress report	Lab#4 due	
Week14		No class (Fall break)			
Week15		lect. Various topics			
		Final presentations	Final presentations		
Week16		Final presentations	Final presentations	Lab #5 due	
		Final presentations	Final presentations		