Syllabus: COP 4613-01: Applied Deep Learning Spring 2026

Course Information
- **Course Number and Title**: COP4613.01- Applied Deep Learning
- **Credit Hours:** credits: 3
- **Academic Term:** Spring 2026

Instructor Information
- **Instructor:** Dr. Paniz Abedin
- **Office Location**: BARC 2236
- **Office Hours**: MWF: 1-2 PM
- **Email address**: pabedin@floridapoly.edu

Course Delivery and Course Description

- **Delivery Mode**: Face-to-Face learning experience with class meetings twice a week in the class meeting location specified above. Please check the Canvas course website for all information, including announcements, discussions, and any supplementary material for topics covered in this course.
- **Course Website**:
- **Official Catalog Course Description**: This course provides an in-depth exploration of reinforcement learning techniques, algorithms, and applications. Students will learn the theoretical foundations and practical aspects of reinforcement learning, with a focus on developing intelligent agents that can learn to make decisions in complex environments.
  - **Course Pre and/or Co-Requisites**: CAP 4612 Machine Learning *and ((*COP 3415 COP 3415 - Data Structures *and* COP 4531 COP 4531 - Algorithm Design & Analysis*) or* COP 3530 COP 3530 - Data Structures & Algorithms*)*
  - **Communication/Computation Skills Requirement (6A-10.030** "Gordon Rule": NO
- **Required Texts and Materials:**
  - Textbook: Deep learning with Python, 3rd edition, by Francois Chollet, Manning Publications
  - References:
    - Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow: Concepts, tools, and techniques to build intelligent systems. 2nd edition by Aurélien Géron O'Reilly Media.
    - Deep Learning, by Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press (online free)
    - Dive into Deep Learning, by Aston Zhang and Zachary C. Lipton and Mu Li and Alexander J. Smola. https://d2l.ai/ (online free) by folks at Amazon
    - Machine Learning Crash Course -- an interactive online course by folks at Google (online free)
    - Neural Networks and Deep Learning -- an online book by Michael Nielsen (online free)

- **Equipment and Materials**: Laptop, Google Colab, Jupyter Notebook

Course Objectives and Outcomes

- **Course Objectives**:
    - Expose students to modern deep learning techniques.
    - Students will understand the difference between the different techniques and the context in which they can be applied.
    - Students will apply deep learning to different domains to solve problems in areas such as computer vision, time series analysis, and adversarial learning.
- **Course Learning Outcomes**:

Learning Outcomes of Instruction:	CS	CE
Understand the elements and the process of training of neural network	1	1
Understand and implement the components of convolutional neural networks.	1,6	1, 6
Identifying scenarios where it makes sense to use deep learning for real-world problem-solving	1,,6	1,7
Understand the elements and applications of recurrent neural networks, and deep generative models	1,6	1,7

Course Learning Outcome	Course Learning Outcome and Learning Level
1	Evaluation
2	Synthesis
3	Analysis
4	Evaluation

Learning level as described in Bloom's taxonomy and Anderson and Krathwohl's taxonomy.

- **Students' outcomes Computer Science**

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

- **Students' outcomes Computer Engineering**

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental,

and societal contexts.

5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Peer Learning Strategists (PLS)**: Are specially trained student leaders who help their peers strategize approaches to course content and work through solution methods. PLS work in collaboration with the courses they support so the content and methods are aligned with your instructors' expectations. Students can meet with a PLS in The Learning Center, which is located on the first floor of the Innovation, Science and Technology (IST) building in room 1019.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit https://floridapoly.edu/writingcenter.

Civility and Collegiality

Faculty and students come to the university for the same reason, which is to participate in a highly professional educational environment. To that end, both students and faculty are expected to treat each other with mutual regard and civility. Communication, written, oral and behavioral, between faculty and students must remain respectful. Within and outside of the classroom, students must refrain from derogatory comments toward the faculty member and their fellow students, and faculty as well must refrain from derogatory comments toward their students. Faculty and students should address each other with respect, in accordance with the wishes of the faculty and the students: for example, no one should be addressed by their last name alone.

Faculty from the outset of a course can and should specify what constitutes activities and behavior that take away from, that diminish, the educational environment. An individual student's distracting behavior impedes the education of fellow students, which itself is a form of disrespect. Civility and collegiality also include respecting each other's time: for example, neither students nor faculty should arrive late to class (unless unforeseen, pressing circumstances prevail); faculty should be present at the posted office hours; and students and faculty should be punctual when meeting times are scheduled. In more general terms, collegiality means respecting the right of both faculty and students to participate fully and fairly in the educational enterprise.

Course Policies

Attendance

- Students in **face-to-face (this includes labs and C-courses)** courses are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" (University Policy, FPU-5.0010AP).
- A+ attendance on canvas will be utilized to keep track of the attendance.
- If you know that you will miss a class for any reason discuss the situation with your instructor in a timely manner. Exceptions to any attendance requirements may be made on a case-by-case basis.

Participation

Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

Late Work/Make-up work

In general, there is no make-up for assignments and quizzes. Make-up for a missed exam will be provided, given that an official excuse is presented. No make-up will be given to any of the work of this course. No make-up without providing written proof of absence (doctor note, etc.).

Grading Scale

A: 93% - 100%	B+: 87% - 89%	C+: 77% - 79%	D+: 67% - 69%	F: 0% - 59%
A-: 90% - 92%	B: 83% - 86%	C: 73% - 76%	D: 63% - 66%	
	B-: 80% - 82%	C-: 70% - 72%	D-: 60% - 62%	

Assignment/Evaluation Methods

Midterm exam	20%
Final Exam	25%
Projects	20%
Homework	15%
Quizzes	15%
Attendance	5%
Total	100%

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The University, through the Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations.

If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive.
If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible.

The Office of Disability Services (ODS):
DisabilityServices@floridapoly.edu
(863) 874-8770
The Access Point
ODS website: www.floridapoly.edy/disability

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. You may speak to your professor, but your professors have an obligation to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discussion resources and options available.

Academic Integrity

The faculty and administration take academic integrity very seriously. Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in an academic integrity hearing and sanctions against the accused student if found in violation. Sanctions range from receiving a zero on the exam or assignment, to expulsion from the university. Repeat offenders are subject to more severe sanctions and penalties.

Any "special" instructions that are appropriate for academic integrity and the course should go here.
(It is essential that a heading and a statement on what constitutes, includes, academic integrity be included in the syllabus, and that the students be made aware of academic integrity at the beginning of a course.)

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidently, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action).

*Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is **prohibited**.*

Course Schedule

- Include a week-by-week, class-by-class schedule of activities, assignments, etc. If specific dates are not included, then at least a week-by-week calendar should be included in the syllabus.
- Important Dates: https://floridapoly.edu/academics/academic-calendar/index.php

Week	Topic	Out of Class Student Homework
Week 1	Introduction to Deep Learning Course overview, AI/ML/DL definitions, brief history, applications	Set up Google Colab, Python/TensorFlow environment
Week 2	Mathematical Foundations & First Neural Network Tensors, tensor operations, gradient-based optimization, anatomy of neural networks, gradient-based optimization	Homework 1
Week 3	Quick walk-through: Programming environment: Google Colab Cloud, Jupyter Notebook Ch3: Introduction to Keras and First Neural Network Keras API, building first neural network (MNIST classification),	Quiz 1
Week 4	Fundamentals of Machine Learning Generalization, evaluation protocols (train/val/test), data preprocessing, feature engineering	
Week 5	Loss functions, optimizers (SGD, Adam), backpropagation intuition, overfitting/underfitting	Project 1
Week 6	Regularization & Advanced Training Techniques Dropout, L1/L2 regularization, batch normalization, learning rate scheduling	Homework 2
Week 7	Introduction to Computer Vision & CNNs	Quiz 2
Week 8	Convolution operation, max pooling, CNN architecture basics, filters/feature maps	Exam 1 (3/6)
Week 9	Data augmentation, using pre-trained networks (VGG, ResNet, Inception), fine-tuning	Homework 3 Quiz 3
Week 10		Spring Break – No Classes
Week 11	Advanced CNN Architectures & Techniques Residual connections, batch normalization in depth, modern CNN architectures	Project 2
Week 12	Introduction to Sequential Data & RNNs Sequence processing problems, simple RNNs, LSTMs,	Homework 4

Week	Topic	Out of Class Student Homework
Week 13	Time Series & Advanced Sequence Models Time series forecasting, temperature prediction, 1D convolutions for sequences	Quiz 4
Week 14	Transformer Architecture & Attention Self-attention mechanism, Transformer architecture, sequence-to-sequence models	Homework 5
Week 15	Generative Models Latent space, autoencoders, variational autoencoders (VAEs)	Project 3
Week 16	Generative Adversarial Networks GAN architecture, training dynamics, applications (image generation, data augmentation)	Quiz 5
Week 16	Review Final 1	Final Exam

Disclaimer: This syllabus is tentative and may be subject to change. Everything in the syllabus might change except for: 1) the Course Description; 2) the textbook; and 3) the grading policy