Department of Computer & Electrical Engineering and Computer Science
Florida Atlantic University
Course Syllabus

1. Course title/number, number of credit hours	
Deep Learning – CAP 6619	3 credit hours

2. Course prerequisites, corequisites, and where the course fits in the program of study

Prerequisites: COP3530 Data Structures and algorithm analysis

The course requires a significant amount of programing efforts, entry-level programming skills (C, Java, Python, or R) is required.

3. Course logistics

Term: Fall 2020

Class location and time: 4:00PM – 7:20 PM, Tuesday (Live Virtual Lecture)
Webex Link for Live Virtual Lecture: https://fau.webex.com/meet/xzhu3

Course Delivery Mode: This is a classroom lecture course. Live virtual lectures will be held via Cisco Webex.

Exams will be given only at the scheduled times. No make-ups, except in documented emergencies.

Other logistics are as follows:

1. Canvas registration is required.
2. The instructor will regularly post materials/announcements on Canvas. It is student's responsibility to regularly check Canvas and their FAU email for the most recent information.
3. No hard-copy handouts will be provided. Copies will be posted in files on Canvas
4. All classes will be virtual via webex. You are expected to participate in all sessions and keep up with the material. You are not expected to be a distraction in class. Final grades will be reduced by one full letter for class disruption or lack of participation (as determined by the instructor).
5. Participation in University-approved activities or religious observances, with prior notice, will not be penalized.
6. Students need a reliable internet condition capable of streaming Webex lectures, taking exams on Canvas, etc. Recommended: Broadband Internet connection with a speed of 4 Mbps or higher. To function properly, Canvas requires a high-speed Internet connection (cable modem, DSL, satellite broadband, T1, etc.). The minimum Internet connection speed to access Canvas is a consistent 1.5 Mbps (megabits per second) or higher. Check your Internet speed here.
7. Students should have an operational computer system equipped with Windows 10 or macOS Sierra (or higher), Microsoft Office, web browser, a webcam, speakers, and microphone, which should be compatible with the most recent version of Cisco Webex, etc.

Department of Computer & Electrical Engineering and Computer Science
Florida Atlantic University
Course Syllabus

4. Instructor contact information	
Instructor's name *Office address* *Office Hours* *Contact telephone number* *Email address* WebEx Link:	Dr. Xingquan Zhu Engineering East (EE-96) Bldg., Room 503B T, TR: 1:00PM – 4:00PM 561-297-3452 xzhu3@fau.edu (please always include "CAP 6619" in your email subject) https://fau.webex.com/meet/xzhu3
5. TA contact information	
TA's name *Office address* *Office Hours* *Contact telephone number* *Email address*	Zhabiz Gharibshah T, TR: 1:00PM – 4:00PM zgharibshah2017@fau.edu
6. Course description	
This course teaches students basic concepts of deep learning, with an application in engineering, business and other areas. The class will cover three major topics including neural network and deep learning theory, implementation of deep learning algorithms, and applications of deep learning. Topics include math preliminaries, machine learning basics, deep feedforward networks, convolution networks, auto-encoders, representation learning networks, and their implementations and applications.	
7. Course objectives/student learning outcomes/program outcomes	
Course objectives	The goal of this class is for students to gain theoretical foundation and hands-on experiences on deep learning. At the end of the class, students should be able to understand the fundamentals of deep learning, algorithmic and implementation details and should be able to apply popular deep learning models to study their research problems.
Student learning outcomes & relationship to ABET 1-7 outcomes	1. An Ability to identify, formulate, and solve complex computing/engineering problems by applying principles of computing, engineering, science, and mathematics. (Problem solving) 2. An ability to apply the computing/engineering design process to produce solutions that meet a given set of computing/engineering requirements with consideration for public health and safety, and global cultural, social, environmental, economic, and other factors as appropriate to the discipline. (Design) 6. An ability to apply engineering/computer science theory and hardware/software development fundamentals to develop and conduct appropriate experimentation, analyze and interpret data, and use computing/engineering judgment produce engineering/computing-based solutions/conclusions. (Experimentation and/or simulation)

Department of Computer & Electrical Engineering and Computer Science
Florida Atlantic University
Course Syllabus

8. Course evaluation method

Home Work and Project - 50% Midterm - 15% Participation - 5% Final Exam (or report)- 30%	**No submission is accepted after homework solutions is posted online.**

9. Course grading scale

Grading Scale:
90 and above: "A"
85-89: "A-"
76-84: "B+"
70-75: "B"
66-74 : "C+"
60-65: "C"
50-59: "D"
49 and below: "F."

10. Policy on makeup tests, late work, and incompletes

Makeups are possible, and are given only if there is solid evidence of medical or otherwise family/personal emergency issues that prevent the student from participating in the exam. Makeup exam should be administered and proctored by department personnel unless there are other pre-approved arrangements

Late work is not acceptable.

A grade of incomplete will be assigned only in the case of solid evidence of medical or otherwise serious emergency situation.

11. Special course requirements

All homework assignments and all lab work in this course must be **INDIVIDUAL** effort, unless specified otherwise.

12. Classroom etiquette policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

13. Attendance policy statement

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance.
Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities.

It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

14. Disability policy statement

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

15. Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

16. Code of Academic Integrity policy statement

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001. If your college has particular policies relating to cheating and plagiarism, state so here or provide a link to the full policy—but be sure the college policy does not conflict with the University Regulation.

17. Required texts/reading

1. *Deep Learning*, Goodfellow, Bengio and Courvillo, MIR Press, in print (PDF is available for free download.)
2. *Deep Learning with Python, Francois Chollet, Manning,* ISBN 9781617294433, Dec. 2017

18. Supplementary/recommended readings

1. Neural Networks for Pattern Recognition, Christopher M. Bishop, Clarendon Press, 1996 (Online version available)
2. Pattern Recognition and Machine Learning Christopher M. Bishop, Springer, October, 2007, (Online version available)
3. Various research monographs, forums, and papers.

19. Course topical outline, including dates for exams/quizzes, papers, completion of reading

Course topics

- **Introduction to Neural Network Learning**
  1. Introduction to machine learning

2. Perceptron Learning
3. Feedforward Neural Network

- **Dee Learning Framework**
  4. Convolutional Neural Network (CNN)
  5. Recurrent Neural Network (RNN)
  6. Auto-encoder learning
  7. Generative Adversarial Network (GAN)
  8. Word-Embedding
- **Applications and Programming**
  9. Introduction to Python programming
  10. Python for Deep Learning
  11. Deep learning for image recognition and text classification

Course Term Project:

The goal of the course term project is to practice knowledge learned from the class and have each student to work on a large project during the second part of the class. Each student is required to identify a suitable topic (a set of tentative topics, such as using deep learning for image classification), and apply knowledge learned from the class to solve a research problem, implement and validate the design, and collect experimental results for reporting. The final outcomes of the project will be turned into a technical report (detailed term project instructions will be posted after the mid-term exam).