FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Graduate Programs

UGPC Approval _____
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner Posted _____
Catalog _____

Department CEECS

College College of Engineering and Computer Science
*(To obtain a course number, contact **erudolph@fau.edu**)*

Prefix CAP **Number** 6617	*(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)* **Lab Code**	**Type of Course** Lecture	**Course Title** Sparse Learning

Credits *(Review Provost Memorandum)*
3

Effective Date *(TERM & YEAR)*
Fall 2019

Grading *(Select One Option)*
Regular (●)
Sat/UnSat ( )

Course Description *(Syllabus must be attached; see Guidelines)*

This course introduces new concepts, theory, algorithms, and applications of sparse representation and modeling, and their relationship with deep learning. Topics covered include mathematical preliminaries, L1 optimization, pursuit algorithms, sparse representation classifiers, sparse dictionary learning, sparse deep learning, and applications.

Prerequisites
MAS 2103 Matrix Theory and Engineering
Graduate Standing, or permission of instructor

Corequisites
N/A

Registration Controls *(Major, College, Level)*
Graduate Students in the College of Engineering & Computer Science

Prerequisites, Corequisites and Registration Controls are enforced for all sections of course

Minimum qualifications needed to teach course:
Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field.)

List textbook information in syllabus or here

Sparse and Redundant Representations from Theory to Applications in Signal and Image Processing, Michael Elad, Springer 2010.

Faculty Contact/Email/Phone
Hanqi Zhuang/zhuang@fau.edu/561-297-3413

List/Attach comments from departments affected by new course
N/A

Approved by	***Date***
Department Chair	2/26/2019
College Curriculum Chair	3/11/19
College Dean	3/11/2019
UGPC Chair	
UGC Chair	
Graduate College Dean	
UFS President	
Provost	

Email this form and syllabus to UGPC@fau.edu one week before the UGPC meeting.

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

1. Course title/number, number of credit hours	
Sparse Learning – CAP 6617	3 credit hours

2. Course prerequisites, corequisites, and where the course fits in the program of study
MAS 2103 Matrix Theory and Engineering Graduate Standing, or permission of instructor

3. Course logistics
Term: TBA *Class location and time*: TBD

4. Instructor contact information	
Instructor's name	Dr. Hanqi Zhuang
Office address	Engineering East (EE-96) Bldg.
Office Hours	TBD
Contact telephone number	561-297-3413
Email address	zhuang@fau.edu

5. TA contact information	
TA's name	N/A
Office address	N/A
Office Hours	N/A
Contact telephone number	N/A
Email address	N/A

6. Course description
This course introduces new concepts, theory, algorithms, and applications of sparse representation and modeling, and their relationship with deep learning. Topics covered include mathematical preliminaries, L1 optimization, pursuit algorithms, sparse representation classifiers, sparse dictionary learning, sparse deep learning, 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 sparse learning. At the end of the class, students should be able to understand the fundamentals of sparse dictionary learning and sparse deep learning, algorithmic and implementation details and should be able to apply sparse models to their research problems.

8. Course evaluation method	
Homework set 1-	15%
Homework set 2-	15%

Middle term project - 35%
Final project - 35%

In the middle term project, students will apply Sparse Representation Classifier for an object recognition task. In the final project, each of the students will design a sparse deep neural network for an application of the choice.

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

No makeup tests will be given, except with documentation from a Doctor. Late assignments will only be accepted and graded, if excused by me. Blackboard will allow you to submit an assignment after the due date and time. However, Blackboard will mark a late assignment late. Incomplete grades will only be given if the student is passing the class and has proper documentation for the reason of the incomplete.

11. Special course requirements

None
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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.

17. Required texts/reading

Sparse and Redundant Representations from Theory to Applications in Signal and Image Processing, Michael Elad, Springer 2010.

18. Supplementary/recommended readings

None

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

Topics

1. Introduction (week 1)
2. Mathematical Preliminaries (week 2-3)
3. Basics of Sparse Representation (week 4)
4. Lo and L1 Optimization (week 5)
5. Optimization Algorithms (weeks 6-7)
6. Sparse Representation Classifier (week 8)
7. Dictionary Learning (weeks 9-10)
8. From Sparse Learning to Deep Learning (weeks 11-12)
9. Sparse Transfer Learning (week 13)
10. Case Studies (weeks 14-15)