FLORIDA ATLANTIC UNIVERSITY

COURSE CHANGE REQUEST
Graduate Programs

Department CEECS

College Engineering and Computer Science

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

***Current* Course Prefix and Number**	***Current* Course Title**
EEL 6291	Smart Grid

*Syllabus must be attached for **ANY** changes to current course details. See Guidelines. Please consult and list departments that may be affected by the changes; attach documentation.*

Change title to:

Change prefix

From: **To:**

Change course number

From: **To:**

Change credits*

From: **To:**

Change grading

From: **To:**

Academic Service Learning (ASL) **

Add ☐ **Remove** ☐

* Review Provost Memorandum
** Academic Service Learning statement must be indicated in syllabus and approval attached to this form.

Change description to:

Change prerequisites/minimum grades to:
None

Change corequisites to:

Change registration controls to:

Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade.

Effective Term/Year for Changes: Spring 2021

Terminate course? Effective Term/Year for Termination:

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

Approved by		***Date***
Department Chair	Hanqi Zhuang Digitally signed by Hanqi Zhuang Date: 2020.10.21 15:54:32 -04'00'	
College Curriculum Chair	Francisco Presuel-Moreno Digitally signed by Francisco Presuel-Moreno DN: cn=Francisco Presuel-Moreno, o=Florida Atlantic University, ou=Ocean and Mechanical Engineering, email=fpresuel@fau.edu, c=US Date: 2020.10.22 11:54:23 -04'00'	
College Dean	MCardei Digitally signed by Mihaela Cardei DN: cn=Mihaela Cardei, o=Florida Atlantic University, ou, email=mcardei@fau.edu, c=US Date: 2020.10.25 19:57:13 -04'00'	10/25/2020
UGPC Chair		
UGC Chair		
Graduate College Dean		
UFS President		
Provost		

Email this form and syllabus to UGPC@fau.edu 10 days before the UGPC meeting.

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

1. Course title/number, number of credit hours	
Smart Grid – EEL 6291	3 credit hours
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: None	
3. Course logistics	
Term: *Class location and time:*	
4. Instructor contact information	
Instructor's name *Office address* *Office Hours* *Contact telephone number* *Email address*	
5. TA contact information	
TA's name *Office address* *Office Hours* *Contact telephone number* *Email address*	
6. Course description	
Exposes students to concepts, theories, methods and latest topics in smart grids. Topics covered include principles and practices in data analytics, optimization, control, renewable energy and electrical power systems.	
7. Course objectives/student learning outcomes/program outcomes	
Course objectives	The goal of this course is to provide students with a broad background in state-of-the-art computational methods that repeatedly arise in smart grid, such as machine learning, optimization, and control, and to provide hands-on experience applying these methods to real-world domains. In particular, much of the class will use real data from electrical grid as a running example, and address issues regarding the prediction, modeling, and control of electricity from existing and renewable energy sources.
Student learning outcomes & relationship to ABET 1-7 outcomes	1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics 3. An ability to communicate effectively with a range of audiences 6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions 7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

8. Course evaluation method

Grades in the class will be based upon 8 problems sets, typically assigned every week (64% of the grade, each assignment worth 8%), a final written project (30% of the grade), and attendance (6%). Problem sets will consist of 1-2 questions, usually requiring some mathematical derivation or a programming assignment. The final project consists of a 4-page written report on an advanced research topic in computational methods for sustainable energy, smart grid, smart cities, and IoTs. Three topics will be given, and the students can choose one topic as their final project. Any students who are curious about other potential research projects are encouraged to talk with me during office hours. A short (500 word) project proposal will be due earlier in the semester (due date to be announced in class).

Students are allowed and encouraged to discuss and work through homework problems with each other in groups. However, after you have worked through the problems as a group, you must complete the final write-up of the problem sets yourself. This include programming assignments: you may discuss in a group the algorithms you will implement for solving the problems, but the actual code you submit must be written independently. Homework are due at the beginning of class on the due date.

9. Course grading scale

Grading Scale:

Score:	90%+	85%+	80%+	75%+	70%+	67%+	63%+	60%+	55%+	<55%
Grade:	A	A-	B+	B	B-	C+	C	C-	D	F

I typically adjust grades up from the above scheme, though grades will not be adjusted in the other direction. A 90.1% guarantees you an A no matter what.

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

Makeup exams are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exams will be administered and proctored by department personnel unless there are other pre-approved arrangements. Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation incomplete grades will not be given.

11. Special course requirements

N/A.

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

The followings will be posted on Canvas, which are required for reading.

- Lectures Notes
- Linear Algebra Review and Reference
- A Practical Introduction to MATLAB
- Appendix - Electric Power System Basics
- Related Research Papers

18. Supplementary/recommended readings

Taken together, these following textbooks have most of the material we cover in this class. This list is strictly optional reading for those who might want to pursue one of the topics more deeply; the lecture slides themselves cover everything that will be needed for the homework, and these books together cover substantially more material than what we cover in class.

- Machine Learning: C. Bishop. *Pattern Recognition and Machine Learning*.
- Optimization: S. Boyd, L. Vandenberghe. *Convex Optimization*.
- Electrical Power Systems: A. von Meier. *Electric Power Systems: A Conceptual Introduction*.
- Model Predictive Control: E. F. Camacho and C. Bordons. *Model Predictive Control*.

- Particle Swarm Optimization: James F. Kennedy. *Swarm Intelligence*.
- Smart Grid Security: S. Goel, Y. Hong, V. Papakonstantinou, and D. Kloza. *Smart Grid Security.*

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

This course will cover the fundamental of computational intelligence and the applications in smart grid. The computational techniques include:

- regression and classification
- time series prediction
- Newton's method for non-linear equations
- convex optimization
- networked control
- model predictive control
- swarm intelligence
- etc.

And the application areas include:

- cyber-physical smart grid
- electricity demand and renewable resource prediction
- modeling energy consumption in buildings
- electrical power systems, power flow, and power markets
- control of distributed storage
- etc.