FAU

FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Graduate Programs

Department Ocean & Mechanical Engineering

College COECS

*(To obtain a course number, contact **erudolph@fau.edu**)*

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

Prefix EML **Number** 6451	*(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)* **Lab Code**	**Type of Course** Lecture	**Course Title** Advanced Energy Conversion Processes and Systems

Credits *(Review Provost Memorandum)*: 3

Effective Date *(TERM & YEAR)*: Fall 2020

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

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

This course provides fundamentals of thermodynamics, fluid mechanics, heat transfer, chemistry, and transport phenomena applied to various energy conversion systems. System analysis of energy conversion in thermal, mechanical, chemical, electrical, and biological processes is introduced. Current status and future outlook of each energy source and its associated conversion processes is also discussed. Energy conversion performance characteristics and sources of inefficiencies are explored for a variety of applications.

Prerequisites	**Corequisites**	**Registration Controls** *(Major, College, Level)*
EML 3701 Fluid Mechanics or permission of instructor		Graduate students and seniors in the College of Engineering and Computer Science

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

Minimum qualifications needed to teach course:	**List textbook information in syllabus or here**
Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field.)	
Faculty Contact/Email/Phone Dr. Mike (Myeongsub) Kim kimm@fau.edu / (561) 297-3442	**List/Attach comments from departments affected by new course** None

Approved by	***Date***
Department Chair [signature]	11/18/2019
College Curriculum Chair Ramesh Teegavarapu (Digitally signed by Ramesh Teegavarapu)	11/22/2019
College Dean Mihaela Cardei	11/22/2019
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.

GRADUATE COLLEGE
NOV 25 2019

Department of Ocean and Mechanical Engineering
Florida Atlantic University
Course Syllabus

1. Course title/number, number of credit hours	
EML 6451 Advanced Energy Conversion Processes and Systems	# 3 credit hours
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Pre-Requisites: EML 3701 Fluid Mechanics or permission of instructor	
3. Course logistics	
Term: 2021 Summer. This is a classroom lecture course. Each lecture consists of discussions, video materials, and Q&A. Please bring your laptop or tablets as we will search information online during our class time. Class location and time: CM130, TR 9:45 AM - 11:20 AM	
4. Instructor contact information	
Instructor's Name *Office Address* *Office Hours* *Contact Telephone Number* *Email Address*	Dr. Mike (Myeongsub) Kim Engineering West (EG-36), Room 181 T 3 pm – 5 pm. Available by appointment. (561) 297-3442 kimm@fau.edu
5. TA contact information	
TA's name *Office address* *Office Hours* *Contact telephone number* *Email address*	N/A
6. Course description	
This course provides fundamentals of thermodynamics, fluid mechanics, heat transfer, chemistry, and transport phenomena applied to various energy conversion systems. System analysis of energy conversion in thermal, mechanical, chemical, electrical, and biological processes is introduced. Current status and future outlook of each energy source and its associated conversion processes is also discussed. In particular, the course introduces principles, theories, and processes of devices and systems that convert thermal, chemical, solar, biological and electromagnetic energy to electrical, mechanical, and alternative chemical forms. Energy conversion performance characteristics and sources of inefficiencies are explored for a variety of applications that include conventional fossil energy combustion based systems, solar, wind, hydro, biomass, thermoelectric, and geothermal energy systems.	
7. Course objectives/student learning outcomes/program outcomes	
Course objectives	To acquaint engineering students with a basic background in various energy conversion systems including solar energy, geothermal energy, wind energy, biomass energy, and fossil fuels; intended to motivate the students to have strong interests in the development of innovative energy conversion systems at commercial scales.
Student learning outcomes & relationship to ABET 1-7k objectives	The students will be able to 1. Become familiar with the global environmental issues including the greenhouse effect and global climate change and also understand physics behind the energy conversion systems (1) 2. Apply engineering analysis techniques to design energy harvesting systems using the emerging energy technologies. (2) 3. While working with team members, survey current literature, develop new ideas, and present the project outcomes to the class audience (3, 5) 4. Understand the performance and design requirements of various energy conversion systems (7)
8. Course evaluation method	
In-Person: Attendance – **15%**, Midterm Examination – **25%**, Term Project – **35%**, Final Examination – **25%**	

Online: Midterm Examination – **30%**, Term Project – **40%**, Final Examination – **30%**

Term Project

- Subjects of the project and detailed instructions for the report and presentation slides will be given in the middle of the semester through CANVAS
- The DIFFERENT topics for UNDERGRADUATE and GRADUATE students will be given: GRADUATE students should review and summarize 10 literature papers (minimum). Then, the student is required to provide a thorough study in a separate section that compares the existing technology (the literature papers) with the proposed idea.
- For in-person students:
  - GRADUATE students need to complete the project INDIVIDUALLY.
  - Please send me your project topic via email, kimm@fau.edu, by **May 23** at 5 pm.
  - A report and Microsoft PowerPoint slides need to be submitted to kimm@fau.edu by **July, 21 at 5 pm.** Instructions will be given on CANVAS
  - At the end of the semester, the student will present their work in 20 min with 5 min Q&A.
  - Evaluation: Report (**40%**) + Presentation (**60%**)
- For online students:
  - An individual report (pdf format) should be submitted to kimm@fau.edu by **July, 28**.
  - Evaluation: Report **100%**

9. Course grading scale

Grading Policy:

- Grade will be evaluated in **4** different categories
  - In-Person: Undergraduate Students (Category **1**), Graduate Students (Category **2**)
  - Online: Undergraduate Students (Category **3**), Graduate Students (Category **4**)

Letter Grade	Percentage (%)
A	≥ 95
A-	≥ 90
B+	≥ 85
B	≥ 80
B-	≥ 75
C+	≥ 70
C	≥ 65
C-	≥ 60
D+	≥ 55
D	≥ 50
F	< 50
Note: The minimum grade required to pass the course is C.	

- Grade Appeal
  - I will hold office hours at the end of the semester and the students who want to discuss their grades are welcome to drop by my office.
  - There will be no such an "automatic" round-up of your grade. For example, 89.5 will not automatically rounded up to 90.
  - DO NOT email the professor to ask/discuss your grade. I will not respond to any email questions, so don't expect my responses
  - If you plan to travel before the appeal date, you can email the professor with your questions including the proof of travel document(s).

10. Policy on homework and exams

Homework

- There is no homework assigned in this course.

Department of Ocean and Mechanical Engineering
Florida Atlantic University
Course Syllabus

Exams

- There will be one midterm exam and a final exam (noncumulative). These tests will be mainly descriptive and system design aspects will be also included.
- **No make-up exam** will be given unless a medical or other emergency was the reason for missing the exam or the assignments.
- The tests will be given by **open book & open notes**.
- No electronics (cell phones, laptops etc.) allowed
- If possible, no restroom.
- An engineering calculator allowed.

- In-Person Students:
  - Location and Time: CM130 at 9:20 am – 11:20 am (2 hours)
  - If you need to take your exam at Student Accessibility Services, you should email me your name by **May 23.**

- Online Students:
  - George Edmunds (edmunds@fau.edu), an academic program coordinator, will organize all the tests for online students. Please communicate with George regarding your test-related questions. DO NOT email the professor because George will handle all exams for online students.
  - You should take your exam on the **same date** as in-person students.
  - You can come in and take your exam with in-person students, but you should notify your plan to the professor and George in advance.
  - You should find your proctor and a testing location on your own close to your area and report the information to George as early as possible because George need to save your proctor's information in his file to send/receive your exams via emails.
  - Same exam rules as in-person students will be applied to your tests

11. Special course requirements

- Use Professor's office hours (please avoid sudden visits)
- Visit the University CANVAS system for important course materials and announcements
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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. In addition, no food except drinks will be allowed during the class.

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. Honor code policy

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 unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. See University Regulation 4.001 at

www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf

No cell phones are allowed during exams (OME department policy)

16. 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/]http://www.fau.edu/counseling/

17. Required texts/reading

There is no required textbook in this course.

Suggested References:

1. Renewable Energy: Power for a Sustainable Future, 3rd Ed., Godfrey Boyle, Oxford University Press, ISBN-13: 978-0199545339
2. Energy Systems Engineering: Evaluation and Implementation, 2nd Ed., Francis Vanek, Louis Albright, and Largus Angenent, McGraw Hill, ISBN-13: 978-0071787789

18. Supplementary/recommended readings

Class notes

- Textbook reading in advance at each class is strongly recommended.
- Course materials will be uploaded on the CANVAS web site.

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

Course Topics

Week	Topics	Exams
1	Basic Principles (Thermodynamics, Fluid Mechanics, Heat Transfer)	
2	Basic Principles (Thermodynamics, Fluid Mechanics, Heat Transfer)	
3	Global Energy Use & Supply, Climate Change	
4	Fossil Fuel Resources, Combustion System and Modeling	
5	Carbon Sequestration, Renewable Energy Resources (Introduction)	
6	Solar Thermal	**Midterm (Date/Location: TBD)**
7	Solar Photovoltaic	
8	Biofuel	
9	Biofuel/Wind	
10	Geothermal / Hydroelectric	
11	**Presentation**	
12	**Presentation**	**Final (Date/Location: TBD)**