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

1. Course title/number, number of credit hours	
Renewable Energy Systems, EEL 4283	3 credit hours
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: EEL 3112- Circuits 2; EEE 3300 – Electronics 1 or permission of the instructor	
3. Course logistics	
Term: Spring 2014 This is a classroom lecture course *Class time and location*: M,W 11:00 am-12:20 pm; Room: FL427 Text book: Renewable and Efficient Electric Power Systems, Gilbert M. Masters, John Wiley [Second Edition] This course has moderate design content.	
4. Instructor contact information	
Instructor's name *Office address* *Office Hours* *Contact telephone number* *Email address*	Dr. Vichate Ungvichian, P.E. Professor Engineering East (EE96), Room 514 Tu 9:30-11:30 am and W 9:15-10:15 am 561-297-3465 ungvich@fau.edu
5. TA contact information	
TA's name	
6. Course description	
This in an introductory course on how renewable energy technologies work. Using basic electrical theories, an estimate on how much the energy deliver/recover from solar system, wind turbines or power generators will be enumerated. Relevant renewable design project will be assigned.	
7. Course objectives/student learning outcomes/program outcomes	
Course objectives	This course will provide the student with both the theory and applications of the fundamental principles of renewable of energy. The student will gain an experience from design project(s) and if time permitted, class visit current solar operating home will be arranged.
Student learning outcomes *& relationship to ABET a-k objectives*	As a review, the students will have to analyze simple DC, Ac and 3-phase circuits. (a, b, e) The students will understand and be able to calculate and apply the power factor correction technique. (a, b, c) The students will have an understanding the relationship between the earth orbit and the sun and how to calculate the energy at a specific longitudinal and latitudinal. (a, e)

	The students should be able to have a team design a simple Photovoltaic system and wind turbine for small residential to medium loads. (a, b, c, d, e, 3g2, h, k) There will be guest speakers presenting contemporary issues on a current design of Solar project and ocean current. (f, g)

8. Course evaluation method

Homework -	10 %	*Note*: The minimum grade required to pass the course is D-.
Midterm Exam -	25 %	
Final Examination -	35 %	
Project designs and reports-	30 %	

9. Course grading scale

Grading Scale: A: 100%-96% ; A- 95%-90%
B+: 89%-86%; B: 85%-80%; B-: 79%-76%
C+: 75%-73%; C: 72%-68%; C-: 67%-62%
D+: 61%-58%; D: 57%-55%; D-: 54%-50%
F: below 50%

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 prevents 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.

Must turn in homework, reports and project(s) ON TIME.
One point per working day will be deducted from the late assignment.
Will not accept your work after 3 working days OR the solution has been provided.

11. Special course off site activity (Optional)

If there is time and with an approval of a solar company, an off campus site visit to the solar project site to give students hands-on experience will be conducted.

.

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. Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca Raton campus, SU 133 (561) 297-3880 and follow all OSD procedures.

14. Honor code policy

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

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

15. Required texts/reading

Renewable and Efficient Electric Power Systems, by Glibert M. Masters, John Wiley [Second edition, 2013]
Hands-out and notes

16. Supplementary/recommended readings

Photovoltaic Systems Engineering, by Roger Messenger and Jerry Ventre, Second or Third Edition, CRC Press
IEEE Transactions on Sustainable Energy or similar Journals

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

Topics	Number of Weeks	
Basic Electric and Magnetic Circuits	2.0	
Fundamental of Electric Power	2.0	
The Solar Source	1.0	
Photovoltaic Electrical Characteristics	2.0	
Examination #1	Cover the above subjects	(0.5)
Photovoltaic Systems	2.0	
Wind Power Systems	2.0	
More Renewable Energy Systems	2.0	
Both Sides of the Meter	1.5	
**** Final Examination	Cover the remaining subjects	

Final is scheduled on Wed April 30 10:30 am- 1:00 pm in the same room

1. **Course number and name**: EEL 4283 - Renewable Energy Systems

2. **Credits and contact hours**: 3 credits; 2 classes per week of 80 minutes each

3. **Instructor's or course coordinator's name**: Dr. Vichate Ungvichian

4. **Text book, title, author, and year:** Renewable and Efficient Electric Power Systems, Gilbert M. Masters, John Wiley, 2013 [Second Edition]
    a. Supplemental materials: Solar module information from Internet

5. **Specific course information**
    a. brief description of the content of the course: Solar positions, Shading analysis, clear sky solar insolation, photovoltaic systems under off-grid and grid-tie conditions. Wind turbine technologies, Betz's limit and average power in the wind.
    b. prerequisite: EEL 3112 – Circuits 2 corequisite: EEE 4361- Electronics 2
    c. Required, elective, or selected elective: Elective

6. **Specific goals for the course**
    a. **Specific outcomes of instruction:**
    The student will understand the relative position between the Earth and Sun. (a, b)
    The student will be introduced to technology relating to PV, Wind and Ocean. (a, b)
    The student will be able to team design basic off-grid and grid-tie solar systems for residential and small scale PV systems as well as wind. (a, b, c, d, e, 3g2, k)
    The student will learn about an economic impact of renewable energy. (h, i, j)
    The student will be able to effectively communicate in writing answers to qualitative questions on tests. (3g2)
    The students will learn contemporary issues on renewable energy from experts in the field of Solar Energy and Ocean energy. (j)

    a. Student outcomes are addressed by the course: a, b, c, d, e, 3g2, h, i, j, k

7. Brief list of topics to be covered
    Basic Electric and magnetic circuits
    Power triangle and power factor correction techniques
    Balanced three phase systems, delta and wye –connected
    Power quality and harmonic distortion
    Solar resource: Day-time solar position, Clear-sky insolation
    Photovoltaic (PV) characteristics and PV models
    PV systems: Net metering, Off-grid and Grid-tie PV systems

PV systems economics: Cost analysis
Wind power systems: Turbine technologies, Betz's limitation, Power in the wind
Power from the ocean: Hydroelectric power and ocean current energy
Smart grid and smart meters