University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Mechanical Engineering
M.S./Ph.D. in Mechanical Engineering

Course Syllabus

1. General Information:

Alpha-numeric codification: INME 6035
Course Title: Conservation and Alternate Energy Systems
Number of credits: 3
Contact Period: Three hours of lecture per week

2. Course Description:

English: Technology of energy conservation and of systems for production of electricity which do not use fossil fuels. Case studies of conservation schemes, and of the technology of wind, ocean energy, direct solar, nuclear and biofuels. Energy sources, conversion processes, transportation and storage, supply systems, and socio-economic and ecological assessment. Individual, in depth, term papers are required on two of the topics covered.

Spanish: Tecnología de la conservación de energía y de los sistemas para la producción de electricidad que no utilizan combustibles fósiles. Estudio de los métodos de conservación y de la tecnología del viento, energía del océano, energía solar directa, energía nuclear y combustibles de procesos biológicos. Fuentes de energía, procesos de conversion, transportación y almacenamiento, sistemas de suministro y evaluación socio-económica y ecológica. Se requerirán proyectos escritos individuales.

3. Pre/Co-requisites and other requirements:

Pre-requisite: Authorization of the Director of the Department

4. Course Objectives:

- Understanding different sources of energy, availability, classification and use.
- Appraising and analyzing conventional fossil fuels and nuclear based energy conversion systems.
- Evaluating the environmental impact of power plant operation.
- Analyzing direct energy conversion systems (thermoelectric, fuel cells, and solar cells).
- Analyzing OTEC, geothermal, biomass, solar and wind energy systems.
- Evaluating performance of energy conversion systems.

5. Instructional Strategies:

☒conference ☐discussion ☐computation ☐laboratory

☐seminar with formal presentation ☐seminar without formal presentation ☐workshop

☐art workshop ☐practice ☐trip ☐thesis ☐special problems ☐tutoring

☐research ☒other, please specify:

6. Minimum or Required Resources Available:

None

7. Course time frame and thematic outline

General Topics	Contact Hours
Sources of energy	3
Economics aspects of energy sources	4
Fuels for energy conversion	3
Production of thermal and mechanical energy by fossil fuel system	4
Production of thermal and mechanical energy by nuclear reactors	3
Direct energy conversion systems	4
Geothermal and biomass energy systems	3
Solar energy conversion systems	4
Wind energy systems	3
Ocean thermal energy conversion	4
Energy storage systems	4
Environmental impact of energy production systems	4
Tests	2
Total hours: (equivalent to contact period)	**45**

8. Grading System

☒ Quantifiable (S/NS) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
☒ **Exams**	**2**	**40**
☒ **Final Exam**	**1**	**20**
☐ **Short Quizzes**		
☒ **Oral Reports**	**1**	**20**
☐ **Monographies**		
☐ **Portfolio**		
☒ **Projects**	**1**	**20**
☐ **Journals**		
☐ **Other, specify:**		
TOTAL:		**100%**

10. Bibliography:

Textbook:

Da Rosa, Aldo Vieira. 2013. *Fundamentals of Renewable Energy Processes*. Amsterdam: Elsevier/AP. [Available at the Circulation Collection (TJ163.9. D3 2013), UPRM General Library]

Other resources:

1. Fuchs, Ewald F. and Mohammad A.S. Masoum. 2011. *Power Conversion of Renewable Energy Systems*. New York: Springer. http://dx.doi.org/10.1007/978-1-4419-7979-7. [Available via Springer eBooks, UPRM General Library Databases]
2. Culp, Archie W. 1991. *Principles of Energy Conversion*. New York, NY: McGraw Hill. [Available at the Circulation Collection (TJ163.9 .C84 1991), UPRM General Library] (**)

3. Capehart, Barney L. ed. 2007. *Encyclopedia of Energy Engineering and Technology*. Florida: CRC Press. http://dx.doi.org/10.1201/9780849338960. [Available via MechanicalENGINEERINGnetBASE, UPRM General Library Databases] (*)
4. Electronic resources available through the Library's website: http://www.uprm.edu/library/cre/listdbsp.php?l=1&st=0&topic=77.

* These are classical handbooks
** These books are key classic references and remain as the top books for the subjects covered in the course and there are no up-to-date textbooks to substitute these books.

11. Law 51: The Comprehensive Educational Services Act for People with Disabilities:
States that after identifying with the instructor and the institution, the student with disabilities will receive reasonable accommodation in their courses and evaluations. For more information, contact the Department of Counseling and Psychological services at the Office of the Dean of Students (Office DE 21) or call 787-265-3864 or 787-832-4040 x 3772, 2040 and 3864.

12. Academic Integrity
The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Students General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person answers to the questions of an oral or written exam by taking or getting someone else to take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure laid down in the UPR Students General Bylaws. ─

13. Certification 06-43 of the Academic Senate
"The academic guidelines for offering online courses," defines: Traditional face-to-face courses are those that have less than 25% of the course's regular contact hours via the Internet. Therefore, a three-credit course will be considered "face to face" if, of the 45 hours of regular contact, 11 or less are taught via the Internet. According to certification 06-43 of the Academic Senate, a course may include up to 25% of its total contact hours via the Internet. The objective of this is so that all professors have this alternative in the case of any unscheduled eventuality.

14. Sexual Harassment: Certification 130-2014-2015 states:
Sexual harassment in the workplace and in the study environment is an illegal and discriminatory act and is against the best interests of the University of Puerto Rico. All persons who understand they have been subject to acts of sexual harassment at the University of Puerto Rico may file a complaint and request that the institution investigate, where necessary, and assume the corresponding action by the university authorities. If the complainant is a student, he or she must refer his or her complaint to the Office of the Student Ombudsperson or that of the Dean of Students.

Revised: February, 2019