Course Specifications of: Energy Conversion Systems MEP 515

Program(s) on which the course is given: Diploma in Mechanical Power Engineering (Conventional and Renewable Power Plants)
Compulsory or Elective element of program: Elective
Department offering the program: Mechanical Engineering/ Power
Academic year / Level: year/ 2014/2015
Date of specification approval: 2012

A. Basic Information

Title: Energy Conversion Systems **Code: *MEP 515***
Credit Hours: 3 **Lecture: 3**
Tutorial: **Practical:** **Total; 3**

B- Professional Information

1- Overall aims of course:

This course introduces students to:

1- Recognize the fundamentals of energy conversions.
2- Demonstrate principles and practice for the different types of energy conversions and fuel cells.
3- Recognize the physical principles and the most important techniques in energy conversions.
4- Research skills are developed through a small subject oriented research project.

2- Intended learning outcomes of course (ILOs)

By completion of the course, the student should be able to:

2.1 Knowledge and understanding

a1. Express fundamentals of quality in professional practice in the area of energy conversions. (2.1.3)
a2. Explain the effect of energy conversions on the environment and work towards its conservation and maintenance. (2.1.4)

2.2 Intellectual skills

b1. Analyze the problems in energy conversions systems and categorize them according to their priority. (2.2.1)
b2. Appraise the risks in professional practices. (2.2.4)
b3. Make professional decisions in the light of available information. (2.2.5)

2.3 Professional and practical skills

c1. Apply professional skills in the area of study of conventional and renewable power plants. (2.3.1)

2.4 General and transferable skills

d1. Use information technology to improve his professional practice. (2.4.2)
d2. Have shown a commitment to life-long learning and continuous self-improvement. (2.4.3)
d3. Use different sources for obtaining information and knowledge. (2.4.4)
d4. Support Conduct self-learning and continuous education practices. (2.4.7)

3- Contents

Topic No.	Topic	No. of weeks	Total no. of hours
1	Introduction, Definition of energy, Energy forms	2	6
2	Conversion of thermal energy to electric, Fundamentals of energy conversion, Transformation of energy, Energy conversion machines, First law of thermodynamics, Solar energy, active solar energy, passive solar energy.	5	15
3	Converting kinetic energy to electric, sources of renewable energy, wind energy, ocean tidal. Ocean thermal energy conversion	2	6
4	Conversion of chemical energy to electric, Device used to convert chemical energy into electrical.	2	6
5	Fuel cells, fuel cells systems, fuel cells types, fuel cells performance	3	9
6	Exam	1	3
	Total	15	45

4- Course Matrix

ILO's code number	Teaching/learning methods and strategies	Assessment methods and strategies
2.1.3 2.1.4	Formal lectures	Individual coursework assignments, quizzes, oral discussions and reports. Mid year and /or final written examination is given.
2.2.1 2.2.4 2.2.5	Analysis and problem-solving skills are developed through tutorial/problem sheets and small group exercises. Research skills are developed through a small subject oriented research project.	Analysis and problem-solving skills are assessed through oral and written examinations. Design and research skills are assessed through project write-ups, coursework and project reports.
2.3.1	Experiments demonstrations, practical work, laboratory visits.	Practical skills are assessed through laboratory experimental write-ups, coursework exercises and reports, project reports and presentations.
2.4.2	Those skills are not explicitly taught;	Project presentation

2.4.3 2.4.4 2.4.7	however, along the course of study the student will acquire those skills to be able to perform his obligations. Attendance of seminars, workshops or conferences will help the student in developing those skills. Presentation by students (either group or individual) will train students for those skills.	

5- Assessment schedule

Assessment 1	Assignments	on weeks	2, 5, 9, 11
Assessment 2	Quizzes	on weeks	6, 12
Assessment 3	Mid-term exam	on weeks	8
Assessment 3	Oral exam	on week	14
Assessment 4	Final exam	on week	15

6- Weighting of assessments

20% (60 marks) Home assignments, Quizzes, and reports
20% (60 marks) Mid-term examination and Oral examination
60% (180 marks) Final-term examination
100% (300 marks) Total

7- List of References

7.1 Essential books (Text books)

- Course notes Prepared by the instructor:
- Principles of Solar Engineering, Second Edition , by D. Yogi Goswami , Frank Kreith , Jan F. Kreider , Jan 2000
- Fuel Cell Handbook (Seventh Edition), By EG&G Technical Services, Inc. November 2004

7.2 Recommended books; Periodicals & Websites.

-www.google.com/solar energy
- www.google.com.eg/fuel cell

8 Facilities required for teaching and learning

Lecture room equipped with overhead projector
Presentation board, computer and data show
Laboratory

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Head of Department: Prof. Dr. Osama Ezzat Abdellatif

Matrix of course content and ILO's

Course Title: ***Energy Conversion Systems*** **Code**: **MEP 515**
Lecture: 3 .**Tutorial**: --- **Practical**: ---- **Total:** 3
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Course content	ILO's A	ILO's B	ILO's C	ILO's D
1- Introduction, Definition of energy, Energy forms	a1			d1
2- Conversion of thermal energy to electric, Fundamentals of energy conversion, Transformation of energy, Energy conversion machines, First law of thermodynamics, Solar energy, active solar energy, passive solar energy.	a1	b2		d3
3- Converting kinetic energy to electric, sources of renewable energy, wind energy, ocean tidal. Ocean thermal energy conversion	a2	b1		d1
4- Conversion of chemical energy to electric, Device used to convert chemical energy into electrical.	a2		c1	d4
5- Fuel cells, fuel cells systems, fuel cells types, fuel cells performance	a1			d2

Matrix of course aims and ILO's

Course Title: ***Energy Conversion Systems*** **Code**: **MEP 515**
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Course aims	ILO's A	ILO's B	ILO's C	ILO's D
1- Understand the fundamentals of energy conversions.	a1, a2	b3		
2- Demonstrate principles and practice for the different types of energy conversions and fuel cells.	a3			d1, d2
3- Recognize the physical principles and the most important techniques in energy conversions.	a2	b2		d3
4- Research skills are developed through a small subject oriented research project.			c1	d4