



Course Specifications of: Nuclear Power Station MEP 512

Program(s) on which the course is given: Diploma in Mechanical Power Engineering
(Conventional and Renewable Power Plants)

Compulsory or Elective element of program: Compulsory

Department offering the program: Mechanical Engineering / Power

Academic year / Level: year/ 2014/2015

Date of specification approval: 2012

A. Basic Information

Title: Nuclear Power Station

Code: *MEP 512*

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 nuclear reaction and neutron interactions relevant to nuclear engineering, including fission, moderation, absorption.
- 2- Demonstrate principles of the operation of nuclear power plants.
- 3- Promote awareness to the different types of nuclear power plants.

2- Intended learning outcomes of course (ILOs)

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

2.1 Knowledge and understanding

- a1. Identify theories and specialized knowledge in nuclear power plants and categorize sciences related to professional practice. (2.1.1)
- a2. Describe principles of quality in professional practice in the nuclear power plants. (2.1.3)
- a3. Represent computer tools available for analysis, design and operation of nuclear power station. (2.1.5)

2.2 Intellectual skills

- b1. Analyze the problems in the nuclear power plants and categorize them according to their priority.(2.2.1)
- b2. Solve study of nuclear power plant problems.(2.2.2)
- b3. Analysis and criticize research papers and topics related to nuclear power plant in the area of study of conventional and renewable power plants. (2.2.3)

2.3 Professional and practical skills

- c1. Apply professional skills in nuclear power plants. (2.3.1)
- c2. Prepare professional reports.(2.3.2)

**2.4 General and transferable skills**

- d1. Use information technology in nuclear power plants to improve the professional practice. (2.4.2)
- d2. Work in a group and manage time effectively. (2.4.5)

3- Contents

Topic No.	Topic	No. of weeks	Total no. of hours
1	Introduction - Principles of Nuclear Energy	1	3
2	Nuclear and chemical reactions	1	3
3	Relativity theory	2	6
4	Energy Generation and Transfer in Nuclear Vessel	2	6
5	Exothermic and Endothermic nuclear reactions	2	6
6	Thermal fission reactors power plants - reactions of fission reactions- fusion reaction energy - control in the fission reaction	2	6
7	The chain reaction - nuclear reactors - pressurized water reactors – boiling water reactors	2	6
8	gas cooled reactors - high temperature gas cooled reactor – nuclear fuel production reactors. -Nuclear Fusion and Locations Selection of Nuclear Power Plants	2	6
9	Exam	1	3
10	Total	15	45

4- Course Matrix

ILO's code number	Teaching/learning methods and strategies	Assessment methods and strategies
2.1.1 2.1.3 2.1.5	Describe principles and fundamentals of quality in professional practice in the nuclear power plants. Explain the effect of professional practice on the environment and work towards its conservation and maintenance.	Acquisition of core knowledge and understanding is achieved mainly through lectures, seminars, tutorials, directed reading, project work and independent study. Assessment will be through individual coursework assignments, quizzes, oral discussions and reports. In addition final written examinations are given. The grades distribution system is shown in the curriculum table below.
2.2.1 2.2.2 2.2.3	Discern and analyze the problems in the nuclear power plants and categorize them according to their priority. Solve study of nuclear power plant problems.	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 2.3.2	Apply professional skills in the area of study of steam power plants. Prepare professional reports.	Experiments demonstrations, practical work, laboratory visits, work on the final dissertation or thesis.
2.4.2 2.4.5	Those skills are not explicitly taught; 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.	Project presentation

5- Assessment schedule

Assessment 1	Assignments	on weeks	1, 3, 6, 11
Assessment 2	Quizzes	on weeks	2, 4, 9, 13
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 Text books**

Course notes Prepared by the instructor:

- M. Elwakil , “Nuclear Power Plant”, McGraw hill book Company
- M. Elwakil , , “Power Plant Technology” McGraw hill Book Company
- John R. Lamarsh , “Introduction to Nuclear Engineering”, Addison-Wesley Publishing Company.
- Springer , “Handbook of Nuclear Engineering”;; 1st Edition. edition (September 14, 2010) | ISBN: 0387981306 | 3600 pages | PDF | 63 MB

7.2 Websites

- * Yahoo mail group
- * Yahoo scribd.com
- * www.sciencedirect.com

8- Facilities required for teaching and learning

Presentation board, computer and data show
Laboratory

Prepared by: Assoc. Prof. Ali Abdel Aziz

Heat of Department: Prof. Dr. Osama Ezzat Abdellatif



Matrix of course content and ILO's

Course Title: *Nuclear Power Station*

Code: **MEP 512**

Lecture: 3.

Tutorial: ----

Practical: ----

Total: 3

Program on which the course is given: Diploma in Mechanical Power Engineering.

Major or minor element of program: Compulsory

Department offering the program Mechanical Engineering / Power

Department offering the course: Mechanical Engineering / Power

Academic year / level: 2014/2015. Date of specifications approval: **2012**

Course content	ILO's A	ILO's B	ILO's C	ILO's D
Introduction - Principles of Nuclear Energy	a1, a2			
Nuclear and chemical reactions	a2	b1, b2		
Relativity theory	a2	b2		
Energy Generation and Transfer in Nuclear Vessel	a2	b2		d1
Exothermic and Endothermic nuclear reactions	a1	b1		
Thermal fission reactors power plants - reactions of fission reactions- fusion reaction energy - control in the fission reaction	a2,a3		c1	d1
The chain reaction - nuclear reactors - pressurized water reactors – boiling water reactors	a2	b2	c2	d1
Gas cooled reactors - high temperature gas cooled reactor – nuclear fuel production reactors. -Nuclear Fusion and Locations Selection of Nuclear Power Plants	a1	b1	c2	d2



Matrix of course aims and ILO's

Course Title: *Nuclear Power Station*

Code: MEP 512

Lecture: 3.

Tutorial: ----

Practical: ----

Total: 3

Program on which the course is given: Diploma in mechanical Power Engineering.

Major or minor element of program: Compulsory

Department offering the program: Mechanical Engineering / Power

Department offering the course: Mechanical Engineering / Power

Academic year / level: 2014/2015. **Date of specifications approval:** 2012

Course aims	ILO's	ILO's	ILO's	ILO's
	A	B	C	D
1- Understand the fundamentals of nuclear reaction and neutron interactions relevant to nuclear engineering, including fission, moderation, absorption.	a2	b1, b2	c2	d1
2- Demonstrate principles of the operation of nuclear power plants.	a1,a3	b1, b2		
3- Promote awareness to the different types of nuclear power plants.	a1, a2	b1	c2	d1