# *Course Specifications of:*
# *Selected Topics in Power Plants (MEP 706)*

**Program(s) on which the course is given:** **Ph.D**. in Mechanical Power Engineering
**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: Selected Topics in Power Plants** **Code: MEP 706**
**Credit Hours: 3** **Lecture: 3**
**Tutorial: -** **Practical: -** **Total: 3**

## B- Professional Information

**1- Overall aims of course**:

Upon completing this course, it is expected that the students will be able to:

1-Design, analysis, and operate of the Heat exchanger and gas turbine power plant components.
2-Know about the treatment and synthesis of electric-generating power plant technology and engineering.
3-Understand the principle analysis of theoretical, experimental, and design of heat exhanger and gas turbine power plants.
4-Introduce the gas turbine power plant enhancement by intercooler, reheat, regenration, and water injection.

**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 principles of power stations. (2.1.1)
a2. Demonstrate environmental impact of power plants engineering professional practice. (2.1.2)
a3. Have a significant knowledge in the basic, methodologies, ethics at the forefront of the power plants. (2.1.4)
a4. Describe the current power plants problems in critically evaluated manner. (2.1.6)
a5. Capacity to understand and respect interdisciplinary and diverse cultural perspectives, and the roles and expertise of others professionals. (2.1.8)

### 2.2 Intellectual Skills

b1. Analyze and assess information in power plants engineering and draw analogies to solve problems. (2.2.1)
b2. Plan and conduct a research study and/or write a scientific essay about a research problem.(2.2.3)

b3. Assess and analyze risks in power plants field. (2.2.5)
b4. Have creativity and make good decisions in different professional aspects.( 2.2.7)
b5. Engage effectively in the power plants philosophy. (2.2.9)
b6. Add new information to the knowledge by carry out a research studies in the power plants field. (2.2.10)

## 2.3 Professional and Practical Skills

c1. Perform basic professional and modern skills in the area of power plants engineering according to the relevant codes of practice. (2.3.1)
c2. Adaptation assessment methods and tools existing in power plants field. (2.3.3)
c3. Ability to plan and implement experimental design and evaluate testing. (2.3.4)
c4. Ability to identify research opportunities and use of the appropriate technological means to serve power plants practice. (2.3.9)

## 2.4 General and Transferable Skills

d1. Analyzing and synthesizing information or data from a variety of sources and demonstrate effective IT capabilities to serve the development in the mechanical engineering field. (2.4.2)
d2. Adopt self-assessment and adopt life-long learning. (2.4.5)
d3. Demonstrate a high level of competence the management of time and scientific meetings. (2.4.7)

**3- Contents**

| No. of weeks | Topic | No. of hours |
|---|---|---|
| 1 | Steam codensers arrangment | 3 |
| 2 | Steam codensers design | 3 |
| 3 | Steam Condenser performance testing | 3 |
| 4 | Material of Construction | 3 |
| 5 | Corrosion Protection | 3 |
| 6 | Regenerative cycle | 3 |
| 7 | Feed water Heat Design | 3 |
| 8 | Mid term | 3 |
| 9 | Elements of Gas Turbine Power Plant -Power Plant Economics | 3 |
| 10 | Auxiliary Systems | 3 |
| 11 | Control of Gas Turbine | 3 |
| 12 | Operation and Maintenance Perofrmance | 3 |
| 13 | Combined Cycle Power Plant | 3 |
| 14 | Oral Exam. | 3 |
| 15 | Exam. | 3 |
| | Total | 45 |

## 4- Course Matrix

| ILO's code number | Teaching/learning methods and strategies | Assessment methods and strategies |
|---|---|---|
| 2.1.1<br>2.1.2<br>2.1.4<br>2.1.6<br>2.1.8 | Formal lectures | Individual coursework assignments, quizzes, oral discussions and reports. Mid-term and /or final written examination is given. |
| 2.2.1 , 2.2.3<br>2.2.5, 2.2.7<br>2.2.8,2.2.10 | Analysis and problem-solving skills are developed through tutorial/problem sheets and small group exercises. | Analysis and problem-solving skills are assessed through oral and written examinations. |
| 2.3.1 , 2.3.3<br>2.3.4, 2.3.9 | Virtual experiments demonstrations | Coursework exercises and reports, project reports and presentations. |
| 2.4.2<br>2.4.5<br>2.4.7 | 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 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13
Assessment 2 Quizzes on weeks 4, 7, 10, 13
Assessment 3 Mid-term exam on week 8
Assessment 4 Oral Exam on week 14
Assessment 5 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)**

- Power Plant Engineering by C. Elanchezhian (Apr 23, 2007)
- * Power Plant Engineering by Larry Drbal, Kayla Westra and Pat Boston (Dec 31, 1995)
- Course notes Prepared by the instructor

**7.2 Recommended books; Periodicals & Websites.**

- Power Generation Handbook : Selection, Applications, Operation, Maintenance by Philip Kiameh (Aug 28, 2002)
- www.google.com/Thermodynamics
- www.sciencedirect.com

**8- Facilities Required for Teaching and Learning**

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

**Course coordinator: Assoc. Prof. Karam Elshazly**
**Course instructor: Assoc. Prof. Mohamed Moawed**

**Head of department: Prof. Dr. Osama Ezzat**

# Matrix of course content and ILO's

**Course Title**: **Selected Topics in Power Plants** **Code**: **MEP706.**
**Lecture**: 3. **Tutorial**: ---- **Practical**: ---- **Total:** 3
**Program on which the course is given:** Ph.D**.** in Mechanical Power Engineering.
**Major or minor element of program:** Elective
**Department offering the program:** Mechanical Engineering / Power
**Department offering the course:** Mechanical Engineering / Power
**Academic year / level: year 2014/2015**
**Date of specifications approval: 2012**

| Course content | ILO's A | ILO's B | ILO's C | ILO's D |
|---|---|---|---|---|
| Steam codensers arrangment | a1 | b1 | c1 | |
| Steam codensers design | a2 | b2 | c2 | |
| Steam Condenser performance testing | a3 | b4 | c2 | d1 |
| Material of Construction | a2 | b1 | c3 | |
| Corrosion Protection | a1 | b2 | c1 | d3 |
| Regenerative cycle | a3,a5 | b1,b6 | | |
| Feed water Heat Design | a1 | b3 | | d1 |
| Elements of Gas Turbine Power Plant | a2 | b4 | c2 | d2 |
| Power Plant Economics | a3 | b2 | | d1 |
| Auxiliary Systems | a3 | b3,b6 | | d1 |
| Control of Gas Turbine | a2 | | c2,c4 | d3 |
| Operation and Maintenance Perofrmance | a1,a4 | | c3 | d2 |
| Combined Cycle Power Plant | a3 | | c2 | d3 |

# Matrix of course aims and ILO's

**Course Title**: **Selected Topics in Power Plants** **Code**: **MEP706.**
**Lecture**: 3. **Tutorial**: ---- **Practical**: ---- **Total:** 3
**Program on which the course is given:** Ph.D. in Mechanical Power Engineering.
**Major or minor element of program:** Elective
**Department offering the program:** Mechanical Engineering / Power
**Department offering the course:** Mechanical Engineering / Power
**Academic year / level: year 2014/2015**
**Date of specifications approval: 2012**

| Course aims | ILO's A | ILO's B | ILO's C | ILO's D |
|---|---|---|---|---|
| 1- Design, analysis, and operate of the Heat exchanger and gas turbine power plant components. | a1 | b1 | c1 | |
| 2-Know about the treatment and synthesis of electric-generating power plant technology and engineering. | a2 | b2 | c2 | d2 |
| 3-Understand the principle analysis of theoretical, experimental, and design of heat exhanger and gas turbine power plants. | a3 | b3 | c2 | d1 |
| 4-Introduce the gas turbine power plant enhancement by intercooler, reheat, regenration, and water injection. | a2 | b4 | c3 | d3 |