



Course Specifications of: Precision Measurements Theory MEP 602

Program(s) on which the course is given : Post Graduate **M. Eng.** in Mechanical Power

Engineering 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: Precision Measurements Theory

Code: MEP 602

Credit Hours: 3

Lecture: 3

Tutorial:

Practical:

Total:

B- Professional Information

1- Overall aims of course:

This course introduces students to:

1. Provide a fundamental background in the theory of engineering measurements and measurement system performance in mechanical engineering.
2. Convey the principles and practice for the design of measurement systems and measurement test plans, including the role of statistics and uncertainty analyses in design in mechanical engineering.
3. Establish the physical principles and practical techniques most important to engineering applications in mechanical engineering.

2- Intended learning outcomes of course (ILOs)

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

2.1 Knowledge and understanding

- a1. Define theories, fundamentals and specialized knowledge in engineering measurement filed. (2.1.1)
- a2. Recognize the scientific developments in engineering measurement filed. (2.1.3)
- a3. Explain the basic principles of ensuring higher levels of quality in professional measurement practice. (2.1.5)

2.2 Intellectual skills

- b1. Analyze and assess information in the engineering measurement field. (2.2.1)
- b2. Solve problems in spite of the lack of some data. (2.2.2)
- b3. Link different knowledge sources to solve problems. (2.2.3)
- b4. Make professional decisions in various professional contexts. (2.2.7)

**2.3 Professional and practical skills**

- c1. Perform basic professional and modern skills in engineering measurement field. (2.3.1)
 c2. Assess methods and current tools in engineering measurement field. (2.3.3)
 c3. Use the different instruments for measuring the system properties safely and according to the specified accuracy. (2.3.7)

2.4 General and transferable skills

- d1. Use information technology in order to serve the development of professional practice.(2.4.2)
 d2. Experiment different sources for obtaining information and knowledge.(2.4.4)
 d3. Set basis and standards to assess the performance of others. (2.4.5)

3- Contents

Topic No.	Topic	No. of weeks	Total no. of hours
1	The theoretical basis for the use of lasers to measure ultrasonic measurements	1	3
2	Optical measurements - computer measurements - laser measurements Filters – signals converters – systems of data collection, analysis and processing	2	6
3	Advanced methods to measure temperature - advanced methods for measuring the pressure - methods of measuring humidity	2	6
4	Hot wire measurement. direct contact and non-contact measurement- Measurement of one element or all	3	9
5	Factors affecting the accuracy of measurement - measurement errors	2	6
6	Assess the results statistically	2	6
7	Measuring equipment classification–design considerations of measuring instruments Measurement of the shapes in three dimensions.	2	6
8	Exam	1	3
	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	Formal lectures	Individual coursework assignments, quizzes, oral discussions and reports. Mid-year and /or final written examination is given.
2.2.1 2.2.2 2.2.3	Analysis and problem-solving skills are developed through tutorial/problem sheets and small group	Analysis and problem-solving skills are assessed through oral and



2.2.7	exercises. Research skills are developed through a small subject oriented research project.	written examinations. Design and research skills are assessed through project write-ups, coursework and project reports.
2.3.1 2.3.3 2.3.7	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 2.4.4 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
Assessment 2	Quizzes	on weeks	2, 4, 9, and 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: Prof. Maher Higazy
- Theory and Design for mechanical Measurements-second edition
By R.S. Figliola and D.E. Beasley

7.2 websites

- www.sciencedirect.com
- www.4shared.com
- Yahoo mail group

8- Facilities required for teaching and learning

Presentation board, computer and data show
Laboratory

Course coordinator: Prof. Dr. Maher Higazy , Dr.Ahmed Salah Kandil

Course instructor: Prof. Dr. Maher Higazy , Dr.Ahmed Salah Kandil

Head of Department: Prof. Dr. Osama Ezzat Abdellatif



Matrix of course content and ILO's

Course Title: Precision Measurements Theory

Code: MEP 602

Lecture: 3. Tutorial: ---- Practical: ----

Total: 3

Program on which the course is given: Post Graduate M. Eng. in 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
The theoretical basis for the use of lasers to measure ultrasonic measurements	a1	b1	c3	
Optical measurements - computer measurements - laser measurements Filters – signals converters – systems of data collection, analysis and processing	a1	b1	c1	d1
Advanced methods to measure temperature - advanced methods for measuring the pressure - methods of measuring humidity	a1,a3	b2		d1
Hot wire measurement. direct contact and non-contact measurement- Measurement of one element or all	a1	b2,b4		d3
Factors affecting the accuracy of measurement - measurement errors	a2	b2	c2	
Assess the results statistically	a1	b3	c1	
Measuring equipment classification–design considerations of measuring instruments Measurement of the shapes in three dimensions.	a1	b2		d2



Matrix of course aims and ILO's

Course Title: Precision Measurements Theory **Code:** MEP 602

Lecture: 3. **Tutorial:** ---- **Practical:** ---- **Total:** 3

Program on which the course is given: Post Graduate **M. Eng.** in 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 A	ILO's B	ILO's C	ILO's D
1. Provide a fundamental background in the theory of engineering measurements and measurement system performance in mechanical engineering.	a1	b1	c1,c3	
2. Convey the principles and practice for the design of measurement systems and measurement test plans, including the role of statistics and uncertainty analyses in design in mechanical engineering.	a2	b2,b4	c2	d1
3. Establish the physical principles and practical techniques most important to engineering applications in mechanical engineering.	a1,a3	b3	c2	d2,d3