



Arab Academy for Science, Technology & Maritime Transport
 College of Engineering & Technology
 Mechanical Engineering Department

University/Academy: Arab Academy for Science, Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: B.Sc. Mechanical Engineering

Form no. (12): **Course Specification**

1- Course Data

Course Code: ME 241	Course Title: Experimental methods	Academic Year/Level: 2nd year / 4th semester	
Specialization: Mechanical	No. of Instructional Units 3 credits	Lecture 2 hrs.	Practical 2 hrs.

2- Course Aim

- To understand modern engineering experimentation including experiment design, system calibration, data acquisition, analysis and presentation.
- To understand how to quantify error and uncertainty in physical measurements.
- To gain hands-on experience with modern instrumentation and systems-level experimentation.
- To improve written and oral communication skills, to develop the ability to write engineering reports of high quality, and to improve the student's ability to function as a member of an engineering team.
- The professional and ethical responsibilities of mechanical power and energy engineers.

3- Intended Learning Outcomes

a- Knowledge and Understanding	<p>Through knowledge and understanding, students will be able to:</p> <p>a.2) Basics of information and communication technology (ICT)</p> <p>a.4) Principles of design including elements design, process and/or a system related to specific disciplines.</p> <p>a.5) Methodologies of solving engineering problems, data collection and interpretation</p> <p>a.6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.</p> <p>a.10) Technical language and report writing</p> <p>a.p.1) Fundamentals of thermal and fluid processes</p> <p>a.p.3) Fluid power systems</p> <p>a.p.7) Basic theories and principles of some other engineering and mechanical engineering discipline providing support to mechanical power and energy disciplines.</p>
b- Intellectual Skills	<p>Through intellectual skills, students will be able to:</p> <p>b.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.</p> <p>b.5) Assess and evaluate the characteristics and performance of components, systems and processes</p>

	<p>b.8) Select and appraise appropriate ICT tools to a variety of engineering problems</p> <p>b.p.2) Analyze and interpret data, and design experiments to obtain new data</p> <p>b.p.5) Analysis of fluid power systems, subsystems and various control valves and actuators</p>
c- Professional Skills	<p>Through professional and practical skills, students will be able to:</p> <p>c.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services</p> <p>c.4) Practice the neatness and aesthetics in design and approach.</p> <p>c.5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results</p> <p>c.6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.</p> <p>c.8) Apply safe systems at work and observe the appropriate steps to manage risks.</p> <p>c.10) Apply quality assurance procedures and follow codes and standards.</p> <p>c.12) Prepare and present technical reports</p> <p>c.p.1) Use basic workshop equipment safely and appropriately.</p> <p>c.p.2) Prepare engineering drawings, computer graphics and specialized technical reports</p> <p>c.p.3) Write computer programs pertaining to mechanical power and energy engineering</p> <p>c.p.4) Describe the basic Thermal and fluid processes mathematically and use the computer software for their simulation and analysis</p>
d- General Skills	<p>Through general and transferable skills, students will be able to:</p> <p>d.1) Collaborate effectively within multidisciplinary team.</p> <p>d.3) Communicate effectively</p> <p>d.5) Lead and motivate individuals</p> <p>d.7) Search for information and engage in life-long self learning discipline</p> <p>d.9) Refer to relevant literature</p>

4- Course Content

Week No.1	Introduction
Week No.2	Generalized Measuring System, Significant Digits, Rounding, Truncation
Week No.3	Data Acquisition, Signals, Signal Conditioning, Sampling
Week No.4	Lab View – Lab View Tutorial
Week No.5	Back ground and Introduction to thermal experiments

Week No.6	Background and Introduction Fluid mechanics experiments
Week No.7	Background and introduction to Material experiments / 7th week evaluation
Week No.8	Background and Introduction to solid mechanics experiments
Week No.9	Presentation & communication skills
Week No.10	Accuracy, Precision, Error in Measurement, Calibration - Lab Work
Week No.11	Uncertainty Analysis – Exercise
Week No.12	Displacement and Dimensional Measurement – Lab work / 12th week evaluation
Week No.13	Library Exercise.
Week No.14	Oral Presentation for Selected Topic
Week No.15	Oral Presentation for Selected Topic
Week No.16	Final examination

5- Teaching and Learning Methods

- Lectures
- Tutorials
- Reports & sheets
- Laboratories
- Seminars

6-Teaching and Learning Methods for Students with Special Needs

- Lectures
- Tutorials
- Reports & sheets
- Laboratories
- Seminars

Engineering Requirements and Design Considerations in college Buildings and its Leading Passages

- The design of college buildings and pedestrian passages leading to it are sloppy to allow the transportation of the handicapped;
- Doors are wide enough to let wheel chairs pass through easily and conveniently.
- Lifts are provided for movement between floors.
- Doors are made from light weight materials to make it easy for the handicapped suffering from weakness in limb muscles or those handicapped using prosthetic limbs to deal with them with the least muscular effort.
- Class floors are made from non-slippery materials to prevent falls on the part of the handicapped.

- Sudden changes in the floor level are prevented.

Design Considerations of the Classes

- Class boards are placed at 60 cm high to allow wheeled chair users or those suffering from limited arm mobility use them.
- Enough spaces are left between seats and benches to prevent hindering the movement of wheeled chairs between them.
- Handicapped students sit among normal people in class to be able to interact with them. Nevertheless, in urgent cases according to the nature of the disability, the handicapped students sit in fixed suitable places whether at the front or the back of the class.
- Handicapped students sit close to the main exits of the class to be able to evacuate in case of emergencies.

Academic Support:

- The general academic advisor appoints an academic supervisor for handicapped students.
- Continuous follow ups are made for handicapped students after each assessment to evaluate their academic level of achievement

7- Student Assessment

a-Procedures used	1-Written Examinations to assess The Intended Learning Outcomes.	
	2-Class Activities (Reports, Discussions, -----) to assess The Intellectual and general Skills.	
b- Schedule:	Assessment 1	7 th Week Assessment
	Assessment 2	12 th Week Assessment
	Assessment 3	Continuous Assessments
	Assessment 4	16 th Week Final Written Exam
c- Weighing of Assessment	7 th Week Evaluation	30 %
	12 th Week Evaluation	20 %
	Final-term Examination	40 %
	Oral Examination	00 %
	Practical Examination	00 %
	Semester Work	10 %
	Total	100%

8- List of References:

a- Course Notes	N/A
b- Required Books (Textbooks)	• Experimental Methods for engineers Text/Handout.
c- Recommended Books	<ul style="list-style-type: none"> • J.P. Holman, Experimental Methods for Engineers, McGrawHill, 2011, 5th Edition • Figliola, R. S., Beasley, D.E. (2006) "Theory and Design for Mechanical Measurements" 4th ed., John Wiley & Sons, Inc., Hoboken, NJ. ISBN: 0-471-44593-2. • Taylor, J. R. (1997), "An Introduction to Error Analysis", University Science Books, 2nd edition.
d- Periodicals, Web Sites, etc.	N/A

**Course Instructor: Prof. Mohamed
Teamah**

Head of Department: Prof. El-Sayed Saber

Program Manager: Prof. El-Sayed Saber

**Dean of College of Engineering and
Technology of AASTMT**

Name: Prof. Moustafa Hussein Aly

Signature:

**Executive Manager of Quality Assurance
Center of AASTMT**

Name: Prof. Aziz Ezzat

Signature: