

Module (Course Syllabus) Catalogue
(Advanced Engineering Measurements)
2023-2024


College/ Institute	Erbil Technical Engineering College	
Department	Mechanical and Energy	
Module Name	Advanced Engineering Measurements	
Module Code	AEM105	
Degree	Technical Diploma <input type="checkbox"/>	Bachler <input type="checkbox"/>
	High Diploma <input type="checkbox"/>	Master <input checked="" type="checkbox"/>
		PhD <input type="checkbox"/>
Semester	7 th	
Qualification	PhD	
Scientific Title	Assist. Prof.	
ECTS (Credits)	5	
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/>
		Assist. <input type="checkbox"/>
Weekly hours		
Weekly hours (Theory)	(3) hr Class	(3) Total hrs Workload
Weekly hours (Practical)	() hr Class	() Total hrs Workload
Number of Weeks	15	
Lecturer (Theory)	Assist. Prof. Dr. Abdulkhalek M. Kadir	
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Lecturer (Practical)		
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	<p>This course consists of 7 main sections, and each section consists of (4- 6) topics. The first section is (Basics of engineering measurements), which includes the following topics: basic concepts, scopes and methods of measurement, Quality of measurement, errors calculation, and also, it contains the standards, dimensions, and codes. The second section is (Applications of electronic instrument system) that includes some topics such as electronic instrument system, instruments, characteristics of recording instruments, and Electric energy and circuits. Third section is about (Sensors and transducers) which are technology instruments assist the measurement procedures, it includes the subjects of potentiometers, strain gages, sensors, thermistors, thermocouples, and it contain solved examples.</p> <p>In the fourth section (Signal conditioning circuits) there are some topics studied such as power supply, potentiometer circuit, Wheatstone bridge or other circuit system, converters, galvanometers, and for each of them, there will be examples to be solved in the lecture. Other section is the fifth is about (Temperature measurement) which include the topics of temperature standards and definitions, thermal expansion, electrical resistance thermometry (thermistors), thermoelectric temperature measurement (thermocouples), radioactive temperature measurements, physical errors in temperature measurement. The sixth section (Pressure, velocity, force, and torque measurements) consists of related topics which include pressure concepts, pressure reference instruments (Barometer, Manometer), pressure transducers and calibration, strain and stress, force measurement (load cells), torque measurement (torque cells), then each topic will enhanced with examples.</p> <p>The section seven (Flow measurements) which includes the topics of flow rate concepts, volume flow rate, mass flow meter, flow meter calibration, then the examples will be solved for each topic.</p>
Course objectives	<p>The aim of this lesson subject is to teach the student the foundations of engineering measurements, through electronic devices and equipment, and that it includes measuring temperature, pressure, resistance and vibration, measuring fluids and transferring the rate of mass and liquids, and it includes measuring current and electrical voltages, measuring wattage, and teaching the student to calculate errors.</p>
Student's obligation	<p>The students are obligated to study and to learn of how to measure engineering operations which are mentioned in the overview according</p>

	to engineering units and dimensions, and according to measuring rules and mathematical equations too.				
Required Learning Materials	Lecture halls, data show presentation, white board, and overhead projector posters.				
Evaluation	Task	Weight (Marks)	Due Week	Relevant Learning Outcome	
	Paper Review	10%			
	Assignments	Homework			
		Class Activity	5%		
		Report			
		Seminar	5%		
		Essay			
		Project			
	Quiz	10%			
	Lab.				
	Midterm Exam	20%			
	Final Exam	50%			
Total	100%				
Specific learning outcome:	The specific learning outcomes are the students learn to calculate the geometric measurements of most engineering operations using mathematical equations				
Course References:	<ol style="list-style-type: none"> 1. Bahattin Karagözoğlu, Electrical engineering technologies, lectures notes, Sep. 2011, Faculty of engineering, department of electrical and computer engineering, Jeddah, SA. 2. Beckerath, Alexander, Eberlein, Anselm, Julien, Hermann, Kersten, Peter, Kreutzer, Jochem, Pressure and Temperature Measurement, WIKA Instrument Corporation, WIKA-Handbook, U.S. Edition, 1998, Corporate Printers, Cumming, GA 2008. 3. James W. Dally, William F. Riley, Kenneth G. McConnell, Instrumentation for Engineering Measurements, John Willey & Sons, Inc., ISBN: 0-471-04548-9, 1984, USA. 4. James W. Dally, William F. Riley, Kenneth G. McConnell, Instrumentation for Engineering Measurements, 2nd Edition, ISBN-10: 0-471-60004-0, ISBN-13: 978-0-471-60004-6, Published 1993. USA. 5. Kenneth G. McConnell, William F. Riley, James W. Dally, Instrumentation for Engineering Measurements, ISBN-13: 978-8126528011, Publisher: Wiley, 2nd edition, January 1, 2010, USA. 6. M.M.S. Anand, Electronic Instruments and Instrumentation Technology, ISBN: 978-81-203-2454-1, PHI- Learning, Delhi- 110092, January 2013. 7. Richard S. Figliola, Donald E. Beasley, Theory and Design for 				

	<p>Mechanical Measurements, Fifth Edition, 2011, John Wiley & Sons, Inc., USA.</p> <p>8. R.K. Rajput, Electrical measurements and Measuring Instruments, Ram Nagar, New delhi-110055, ISBN: 81-219-2963-6, 2008.</p> <p>9. Rosemount, The Engineer's Guide to Level Measurement, Emerson process management, 2013 edition.</p>	
Course topics (Theory)	Week	Learning Outcome
<p><u>Basics of engineering measurements</u></p> <p>a. Basic concepts. b. Scopes and methods of measurement. c. Quality of measurement. d. Errors and types of errors. e. Standards, dimensions, and units. f. Solving examples.</p>	1-3	Fundamentals learning
<p><u>Applications of electronic instrument system</u></p> <p>a. Electronic instrument system. b. Experimental error c. Instruments. d. Characteristics of recording instruments e. Electric energy and circuits. f. Solving examples</p>	4-5	Application
<p><u>Sensors and transducers</u></p> <p>a. Potentiometers. b. Strain gages. c. Sensors. d. Thermistors. e. Thermocouples. f. Solving problem.</p>	6-7	Instruments
<p><u>Signal conditioning circuits</u></p> <p>a. Power supply & examples. b. Potentiometer circuit & examples. c. Wheatstone bridge & examples. d. Converters. e. Galvanometers & examples</p>	8-9	Circuit process
<p><u>Temperature measurement</u></p> <p>a. Temperature standards and definitions. b. Thermal expansion. c. Electrical resistance thermometry (thermistors) & examples. d. Thermoelectric temperature measurement (thermocouples) & examples. e. Radioactive temperature measurements & examples. f. Physical errors in temperature measurement</p>	10-11	Measurements calculation
<p><u>Pressure, velocity, force, and torque measurements</u></p> <p>a. Pressure concepts & examples. b. Pressure reference instruments (Barometer, Manometer) & examples.</p>	12-13	Measurements calculation

<ul style="list-style-type: none"> c. Pressure transducers and calibration. d. Strain and stress. e. Force measurement (load cells) & examples. f. Torque measurement (torque cells) & examples 		
Flow measurements <ul style="list-style-type: none"> a. Flow rate concepts b. Volume flow rate & examples. c. Mass flow meter. d. Flow meter calibration and standards. 	14-15	Measurements calculation
Practical Topics	Week	Learning Outcome
Questions Example Design The design of questions will contain the subjects of definitions, measurement types, problem solving, errors calculation, current and voltage, and others.		
Extra notes: The length and shortness of topics of course book is change according to the allocated time hours in the week		
External Evaluator  Salim Aziz Kako Assist. Prof.		