هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Mechanical Measurement
Course Code:	402-MEC-2
Program:	Bachelor of Science in Engineering
Department:	Mechanical Engineering
College:	College of Engineering
Institution:	Najran University
Version:	1.0
Last Revision Date:	27 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Fifth Year \ Level 9)					
4. Course general Description:					
Instruments: Classification and Functional Elements of a Measurement System, Static Performance Characteristics, Performance Parameters, Errors and Uncertainties. Dynamic Characteristics, Dynamic Response, Transducer Elements, AD and DA Converters, Data Transmission Elements, Measurement of Force, Torque, Power, Pressure and Temperature. Standards of linear measurement, line and end standards. Limit fits and tolerances. Interchangeability and standardization. Linear and angular measurements devices and systems Comparators: Sigma, Johansson's Microkrator. Measurement of geometric forms like straightness, flatness, roundness. Tool makers microscope, profile project autocollimator. Interferometry: principle and use of interferometry, optical flat. Measurement of screw threads and gears. Surface texture: quantitative evaluation of surface roughness and its measurement.					
5. Pre-requirements for this course (if any)**:**					
351-MEC-3 (Mechanical Vibrations)					
6. Co-requisites for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
1.Illustrate the basic functional elements of a measurement system and its static and dynamic characteristics. 2.Measure different entities such as force, torque and power. 3.Illustrate the concept of standards and its application in linear measurement. 4.Measure geometric forms such as flatness, roundness etc. using different instruments. 5.Make the use of optical means in making accurate measurements.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Illustrate Static & dynamic characteristics of measured signals and Dynamic response of zero, 1st and 2nd order measuring systems	**1**	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter	-Test performance evaluation -Evaluation of participation in discussion and group assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	
1.2	Analysis of data and statistical methods and How to determine the measuring system uncertainty from device imposed errors.	7	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Giving more assignment from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	-Test performance evaluation -Evaluation of participation in discussion and group assignments
2.0	**Skills**			
2.1	Select the measuring system components (e.g. DAQ system and its sample rate, resolution ...).	2	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter	•Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	
2.2	Do experiments for measuring physical quantities (e.g. temperature, fluid pressure, flow velocity, stress, strain…).	6	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	•Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes
3.0	**Values, autonomy, and responsibility**			
3.1	Team work and Develop an ideas and sharing with others	5	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting midterm and Final Exam from each chapter	Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	

C. Course Content

No	List of Topics	Contact Hours
1.	Basic concepts of measurements methods	5
2.	Static and dynamic characteristics of signals	5
3.	Measurement System Behavior	8
4.	Probability & Statistics	7
5.	Uncertainty analysis	5
6.	Sampling & Data Acquisition	5
7.	Measurement of temperature, Pressure, flow and strain measurement	5
8.	Displacement & Velocity measurement, measurement of force & torque	5
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	1-10	10%
2.	Quizzes	1-10	10%
3.	Mid-term	4 & 8	20%
4.	labs	1-10	10%
5.	Final exam	15	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Measurement Systems by Earnest O. Doeblin, Tata McGraw Hill Publication, 1984

Supportive References	Instrumentation Measurement and Analysis by Nakra and Chaudhary, TMH Publications, 2003
Electronic Materials	Online custom books
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and laboratories
Technology equipment (projector, smart board, software)	--
Other equipment (depending on the nature of the specialty)	--

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders and Peer Reviewer	Direct, Indirect
Effectiveness of Students assessment	Students & Faculty	Direct and Indirect
Quality of learning resources	Students & Faculty	Direct and Indirect
The extent to which CLOs have been achieved	Students & Faculty	Direct and Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT OF MECHANICAL ENGINEERING
REFERENCE NO.	
DATE	27/02/2024