2023
TP-153

Course Specification
(Bachelor)

Course Title:	Mechanics of Machines
Course Code:	312-MEC-3
Program:	Bachelor of Science in Engineering
Department:	Mechanical Engineering
College:	College of Engineering
Institution:	Najran University
Version:	1.0
Last Revision Date :	02/27/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: Fourth Year \ Level 7					
4. Course general Description:					
Basic Concepts of and Machines: Link, Kinematic Pairs and their Classification, Kinematic Chain, Mechanism and their Inversions, Degree of Freedom, Four Bar Chain and its Inversions. Velocity and Acceleration in Mechanisms, Analytical Method, Relative Velocity and Instantaneous Centre Method, Velocity and Acceleration Diagrams, Klein's Construction for Reciprocating Engine. Kinematic Synthesis of Plane Mechanism: Types, Dimensional and Number Synthesis, Function and Path Generation, Analytical Method of Synthesis: Freudenstein's Equation, Bolch's Synthesis. Gears: Nomenclature, Motion Transmitted by Two Gears, Minimum Number of teeth, Arc and Path of Contact. Gear Trains, Types of Gear Trains, Torques and Tooth Loads in Epicyclic Gear Trains, Power Transmitted through Friction in Belts, Ropes and Clutches Mechanisms					
5. Pre-requirements for this course (if any)**:**					
261-MEC-3(Manufacturing Processes)					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
1. Identify different machine elements and mechanisms. 2. Interpret kinematics and dynamics of different machines and mechanisms. 3. Select suitable drives and mechanisms for a given application. 4. Illustrate the concepts of gears and its nomenclature. 5. Design different types of gear trains and perform power transmission					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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	**Demonstrate and apply principles**	**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.**	**-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: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	
1.2	Design of Mechanisms and gear trains.	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	Review and recapitulate in the beginning of class and asking students to recall the	2	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based	•Locally Developed Exams such as Quiz, Mid & Final Exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	contents of previous class		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	with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes
2.2	Involving the students to solve problems	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			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Motivating through Group discussions among the students	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 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
3.2	Use of technical words related to the courses contents	4	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 Mechanisms and Machines: Link, Kinematic Pairs and their Classification	5
2.	Four Bar Chain and its Inversions	5
3.	Velocity and Acceleration in Mechanisms, Analytical Method Relative Velocity and Instantaneous Centre Method	5
4.	Velocity and Acceleration Diagrams	5
5.	Gears: Nomenclature, Motion Transmitted by Two Gears, minimum Number of teeth, Arc and Path of Contact	5
6.	Gear Trains, Types of Gear Trains	6
7.	Epicyclic Gear Trains	6
8.	Power Transmitted through Friction in Belts, Ropes and Clutches	8
Total		60

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	30%
4.	labs	-	-
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	**Theory of Machines by Thomas Bevan, CBS Publishers and Distributors, 2009**
Supportive References	**1.Theory of Machines by S. S. Rattan, McGraw Hill Publications, 2009** **2.Theory of Machines by Ghosh and Mallik, East West Press, 1988**
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	**02/27/2024**