هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Automotive Engineering
Course Code:	496B-MEC-3
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: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (Fifth Year \ Level 10)					
4. Course general Description:					
Component of Automobile and their composition, chassis, Power unit, General Layout of automotive vehicle, Engineering performance, multi cylinder engines and their arrangement, firing order. Rolling, Air or wind and gradient resistance, power requirement, Drive Effectiveness, Relationship for two and four wheel vehicles. Power transmission, Clutch and its types, Gear boxes- sliding mesh, constant mesh, synchromesh and epicyclic arrangements, Propeller shaft, universal joints, Differential and its analysis. Steering system, Types of steering mechanisms- Ackerman steering, Davis steering and power steering, Suspension system and its need, Types of suspension system, Braking System, mechanical braking system, disc and drum brakes, hydraulic brakes.					
5. Pre-requirements for this course (if any)**:**					
351-MEC-3 (Mechanical Vibration)					
6. Co-requisites for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
1.List different types of Engines and their classifications. 2.Describe functioning of Transmission train, conventional and non-conventional drives, Clutches, Gear boxes, Synchromesh device, Propeller shaft, Differential axle, braking system and Suspension systems. 3.Describe functioning of steering system, steering geometry wheel alignment and wheel angles for modern Automobile. 4.Describe functioning of Suspension system and Braking system for modern Automobile.					

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	Impart knowledge of automobile structure and components.	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 for each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	
1.2	Make aware of functioning of different components and their effectiveness.	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 for 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	Learn the location and function of each major component separately.	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	•Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			chapter with the CLO. TS:4 – Conducting quizzes for each chapter TS: 5 – Discussion with the students in the class hours	critical and logical thinking questions •Quizzes
2.2	Understand the different aspects of drive mechanisms and steering systems.	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 for each chapter TS: 5 – 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	Understand the consequences of placing parts at their respective positions.	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	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
			Exam for each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	
3.2	Understand the need and importance of different types of gears and their locations.	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 midterm and Final Exam for 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

C. Course Content

No	List of Topics	Contact Hours
1.	Component of Automobile and their composition, chassis, Power unit, General Layout of automotive vehicle	8
2.	Engineering performance, multi cylinder engines and their arrangement, firing order	8
3.	Rolling, Air or wind and gradient resistance, power requirement, Drive Effectiveness	7
4.	Relationship for two and four wheel vehicles. Power transmission, Clutch and its types	8
5.	Gear boxes- sliding mesh, constant mesh, synchromesh and epicyclic arrangements, Propeller shaft, universal joints, Differential and its analysis	8
6.	Steering system, Types of steering mechanisms- Ackerman steering, Davis steering and power steering	7
7.	Suspension system and its need, Types of suspension system	7
8.	Braking System, mechanical braking system, disc and drum brakes, hydraulic brakes	7
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	1-12	10%
2.	Quizzes	1-12	10%
3.	Mid-term	6 & 12	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	Automotive mechanics- principles and practices by Heitner Joseph, East-West Press
Supportive References	1.Automotive Engineering by Newton & Steed. 2. Automotive Maintenance & Trouble Shooting by Frazee Bedell
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**