

COURSE PLAN

FIRST: AUTOMOTIVE ENGINEERING

College

College Faculty of Engineering Technology

Department Mechanical Engineering

Course

Course Title Automotive Engineering

Course Code 020201221

Credit Hours 3 (3 Theoretical, 0 Practical)

Prerequisite

Instructor

Name Dr. Waleed Momani

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Tel (Ext) 199

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Office Hours

Class Times

| Building | Day | Start Time | End Time | Room |
|----------|-----|------------|----------|------|
| 00 | 00 | 00 | 00 | 00 |

Text Book

Title : Automotive Technology. A Systems Approach, 5th Edition By Jack Erjavec, Printed in the United States of America 1 2 3 4 5 XX 12 11 10 09, 2010

References

1. Judge.A.W. Mechanism of the car, Chapman and Halls Ltd., London1986.
2. Giles.J. G, Steering Suspension and tires, Illiffe Book Co., London, 1988.
3. AUTOMOTIVE TECHNOLOGY A SYSTEMS APPROACH Jack Erjavec

SECOND: PROFESSIONAL INFORMATION

COURSE DESCRIPTION

This course specifies a theoretical knowledge of introduction, engine operation, engine systems, transmission unit [transmission, transaxle (manual and automatic), drive shaft, joints, final drive, differential and axles], suspension system, steering system, wheel alignment and braking systems

COURSE OBJECTIVES

The objective of this course is to enable the student to do the following:

Explain the fundamentals of engine, construction and operation, Starting and Traction Motor Systems, Lubricating and Cooling Systems.

Explain Automotive transmission and Transaxles, Drive Axles and Differentials, Suspension system

Explain Tires, Wheels, Automotive brake system, Steering system and Wheel alignment

Explain Automotive electric and electronic systems

COURSE LEARNING OUTCOMES

By the end of the course, the students will be able to:

CLO1. Explain the fundamentals of **engine** construction and operation

CLO2. Explain **starting** and **traction motor systems**

CLO3. Explain **lubricating** and **cooling systems**

CLO4. Explain **automotive** transmission and **transaxles**

CLO5. Explain **drive axles** and **differentials**

CLO6. Explain **suspension** system

CLO7. Explain **tires** and **wheels**

CLO8. Explain **automotive** brake system

CLO9. Explain **steering** system and **wheel** alignment

CLO10. Explain **automotive** electric and electronic systems

COURSE SYLLABUS

| Week | Unit | Content | Related LO and Reference (Chapter) | Proposed Assignments |
|------|--|--|------------------------------------|----------------------|
| 1 | Fundamentals of engine, construction and operation | <ul style="list-style-type: none"> • Engine Classifications • Engine Parameters • Basic Engine Cycles Four and Two • Engine disassembly • Engine parts explained • Engine assembly | CLO1 | |
| 2 | Starting and Traction Motor Systems | <ul style="list-style-type: none"> • Starting Motors • Starting System • Starter Circuit | CLO2 | |
| 3 | Engine systems | <ul style="list-style-type: none"> • Fuel Delivery Systems • Fuel Injection System • Ignition Systems • Emission Control Systems | CLO3 | |
| 4 | Lubricating and Cooling Systems | <ul style="list-style-type: none"> • Lubrication and cooling System • Inspection of Cooling and Lubrication System • Testing for Leaks | CLO3 | |
| 5 | Automotive transmission system Clutches | <ul style="list-style-type: none"> • Clutch Disc • Pilot Bushing/Bearing • Pressure Plate Assembly | CLO3 | |

| Week | Unit | Content | Related LO and Reference (Chapter) | Proposed Assignments |
|------|--|--|------------------------------------|----------------------|
| | | <ul style="list-style-type: none"> • Coil and Diaphragm Spring Pressure Plate Assembly • Clutch Fork and Linkage • Hydraulic-Operated Clutch Linkage. | | |
| 6 | Manual Transmissions and Transaxles 1 | <ul style="list-style-type: none"> • Transmission Versus Transaxle • Basic Gear Theory • Transaxle Design • Synchronizers • Gearshift Mechanisms • Gears and Overall Ratios | CLO4 | |
| 7 | Automatic Transmissions and Transaxles 2 | <ul style="list-style-type: none"> • Lockup Torque Converter • Planetary Gears • Compound Planetary Gear Sets • Continuously Variable Transmissions (CVT) • Planetary Gear Controls • Transmission Clutches | CLO4 | |
| 8 | Midterm Exam | | | |
| 9 | Drive Axles and Differentials | <ul style="list-style-type: none"> • Front-Wheel-Drive (FWD) Axle, • Types of Joints • Front-Wheel-Drive Applications • Rear Wheel Drive Shafts • Operation of Joints, and Types • Diagnosis of Drive Shaft and Joint Problems • Differentials and Drive. | CLO5 | |
| 10 | Suspension system | <ul style="list-style-type: none"> • Frames • Suspension System Components • Independent Front Suspension • Basic Front-Suspension Diagnosis • Rear-Suspension Systems | CLO6 | |
| 11 | Tires and Wheels | <ul style="list-style-type: none"> • Wheels, Tires • Tire Ratings and Designations • Tire/Wheel Runout, Tire Replacement, Tire Repair • Wheel Bearings | CLO7 | |
| 12 | Automotive brake system | <ul style="list-style-type: none"> • Friction, Principles of Hydraulic Brake Systems • Hydraulic Brake System Components • Master Cylinders, and Operation Hydraulic Tubes and Hoses, Hydraulic System Safety Switches and Valves • Drum and Disc Brake Assemblies, Hydraulic System Service, Power Brakes, Push rod Adjustment Hydraulic Brake Boosters | CLO8 | |
| 13 | Wheel alignment | <ul style="list-style-type: none"> • Alignment Geometry • Pre alignment Inspection • Wheel Alignment Equipment • Alignment Machines, Performing an Alignment • Four-Wheel-Drive Vehicle | CLO9 | |
| 14 | Steering system | <ul style="list-style-type: none"> • Objectives • Manual-Steering Systems • Power-Steering Systems • Electronically Controlled Power-Steering Systems | CLO9 | |

| Week | Unit | Content | Related LO and Reference (Chapter) | Proposed Assignments |
|------|--|--|------------------------------------|----------------------|
| | | <ul style="list-style-type: none"> Steering System Diagnosis, Steering System Servicing Power-Steering System Servicing Four-Wheel Steering Systems | | |
| 15 | Automotive electric and electronic systems | <ul style="list-style-type: none"> Lighting Systems Electrical Instrumentation Batteries Starting and Traction Motor Systems Charging Systems | CLO10 | |
| 16 | Final Exam | | | |

COURSE LEARNING RESOURCES

The effectiveness of teaching in this course depends on making students familiar with the components of an automobile transmission units, the clutch, components and their functions, the operation of a front wheel-drive axle, a rear-wheel-drive axle, a differential and drive axle, main driving gears, drive pinion gear, and ring gear, the difference between CV joints and universal joints, suspension system, wheel alignment and braking systems.

Teaching methods:

- Lectures and Home Works: using PowerPoint for, example, by the teacher to provide the students with the all information that they need, and to give them a home work as a research method or/and reports.
 - Online research skills, watching related videos such as you tube, on topics related to course objectives and recent developments in the field of specific work.
- Learning skills and adaptability: Developed by transferring students and reconfiguring work teams to enable them to adapt to other individuals from time to time.

ONLINE RESOURCES

<https://www.barnesandnoble.com/w/automotive-technology-james-d-halderman>

ASSESSMANT TOOLS

(Write assessment tools that will be used to test students ability to understand the course material and gain the skills and competencies stated in learning outcomes)

| ASSESSMENT TOOLS | % |
|------------------------|------------|
| Quizzes | 12 |
| Researches and Reports | 8 |
| Mid Exam | 30 |
| Final Exam | 50 |
| TOTAL MARKS | 100 |

THIRD: COURSE RULES

ATTENDANCE RULES



Attendance and participation are extremely important, and the usual University rules will apply. Attendance will be recorded for each lab. Absence of 10% will result in a first written warning. Absence more than 15% of the course with or without medical reasons will result in forfeiting the course and the student will not be permitted to attend the final examination

GRADING SYSTEM

Example:

0 – 49 Fail
50 – 100 Pass

REMARKS

{ The instructor can add any comments and directives such as the attendance policy and topics related to ethics }

COURSE COORDINATOR

Course Coordinator: Dr. Waleed Momani
Signature:
Date:

Department Head:
Signature:
Date: