Module(Course Syllabus)Catalogue

2023-2024

College/ Institute	Technology college	
Department	Automotive Technology Engineering	
Module Name	FEA	
Module Code		
Degree	Technical Diploma ☐ Bachelor ☐ High Diploma ☐ Master ☐ PhD ☐	
Semester	seven	
Qualification		
Scientific Title		
ECTS (Credits)		
Module type	Prerequisite ☐ Core ☐ Assist. ☐	
Weekly hours		
Weekly hours (Theory)	(2)hr Class	(2)Total hrs Workload
Weekly hours (Practical)	(2)hr Class	(2)Total hrs Workload
Number of Weeks	12	
Lecturer (Theory)	Prof.Dr.Basim Mohammed Fadhil	
E-Mail& Mobile NO.	Basim.fadhil@epu.edu.iq	
Lecturer (Practical)	Mustafa	
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	(FEM) is a numerical approach by which partial differential equations can be solved approximately. From an engineering standpoint, the FEM is a method for solving engineering problems such as stress analysis, heat transfer, fluid flow and electromagnetics by computer simulation.
Course objectives	Upon completion of this course, students will be able to: Understand and solve the problems of FEM by direct method using spring element and by bar and beam element in 1 D, 2D, and 3D problems.
Student's obligation	The student's obligations are: 1-attending the lectures in the class and online, 2-doing homework, 3- doing assignments and quizzes.4- doing examinations.
Required Learning Materials	

Evaluation

	Task	Weight (Marks)	Due Week	Relevant Learning Outcome
	Paper Review			
Assignments	Homework	10%	4,8	
Assignments	Class Activity	2%	15	
Assignments	Report	8%	7	
Assignments	Seminar	8%	10	
Assignments	Essay			
Assignments	Project			
	Quiz	8%	4,6,10	
	Lab.			
	Midterm Exam	24%		
	Final Exam			
	Total			

Specific learning outcome:	

Course References:	A First Course inFinite Elements ,Jacob Fish

Course topics (Theory)	Week	Learning Outcome
Introduction,\basic concepts, why FEM, applications of FEM in Eng.,FEM in Structural analysis, Objective of This course.	1	
Review of matrix algebra, spring Element ,one spring element,spring system,	2,3	
Bar and beam element (linear static analysis, bar element ,stiffness matrix ,direct method,formal approach	4,5	
Distributed load, bar element in 2D and 3D,stiffness matrix in the 2D space	6,7	
Beam element, direct method ,formal approach,3D beam element	8,9	
FE analysis of frame structure,	10,11	
2D Problems,plane 2D problems,stress-straintemp.relations,strain and displacement relations,boundary conditions	12,13	
FE for 2D problems,general formula for the stiffness matrix,linear strain triangle ,linear quadrilateral element,quadratic quadrilateral element.	14,15	

Practical Topics	Week	Learning Outcome
ANSYS, introduction ,Mechanical APDL, work bench	1	

MECHANICAL APDL:Project planning , modeling procedure	2	
Building the model	3,4	
Material setting	5	
Element choosing and mesh	6	
Loads and Boundary conditions	7	
Solution,examples	8,9	
ANSYS workbench,introduction , building the model	10,11	
ANSYS workbench, examples	12,13	

Questions Example Design

Extra notes:

External Evaluator