

Module (Machine Design I) Catalogue 2022-2023

College/ Institute	Erbil Technical Engineering College	
Department	Mechanical and Energy Engineering Techniques	
Module Name	Machine Design I	
Module Code	MAD705	
Degree	Technical Diploma <input type="checkbox"/>	Bachelor <input checked="" type="checkbox"/>
	High Diploma <input type="checkbox"/>	Master <input type="checkbox"/> PhD <input type="checkbox"/>
Semester	Seven	
Qualification	PhD in Mechanical Engineering	
Scientific Title	Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>
Weekly hours	3 hrs	
Weekly hours (Theory)	(3) hr Class	(165) Total hrs Workload
Weekly hours (Practical)	() hr Class	() Total hrs Workload
Number of Weeks	12 weeks	
Lecturer (Theory)	Dr. Dlair O. Ramadan	
E-Mail & Mobile NO.	Dlair.o.ramadan@epu.edu.iq , 07702374010	
Lecturer (Practical)		
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	<p>Machine Design I is the first course in an in-depth, two-course series focusing on machine design. The series covers fundamental mechanical design topics, such as static and fatigue failure theories, the analysis of shafts, fasteners, and gears, and the design of mechanical systems, such as gearboxes. In this first course, you will learn robust analysis techniques to predict and validate design performance and life. You will start by reviewing critical material properties in design, such as stress, strength, and the coefficient of thermal expansion. Next, you will learn about static failure theories, such as von Mises theory. Finally, you will discover fatigue failure criteria for designs with dynamic loads, such as the input shaft in the transmission of a car.</p> <p>It is very important to emphasize that this is a problem-oriented class and the only way that the material can be mastered is with practice solving problems in addition to homework problems.</p>
Course objectives	<p>The information provided in this course aims to introduce you to the:</p> <ul style="list-style-type: none">• Design of mechanical systems comprising such core machine elements, requiring analysis of motion, forces, and moments at the system level as well as design of individual components.• Design of core machine elements such as shafts, bearings, fasteners, belts, pressure vessels, springs, and gears <p>To achieve this, we will review the general concepts of force, stress, motion, and failure analysis first, followed by topics in the design of specific machine elements. There will be a decent amount of problem solving by hand calculations, followed by design of a mechanical system as a group project through hand and computer-assisted calculations.</p>

Student's obligation	<ul style="list-style-type: none"> • Homework will be assigned periodically. • Students are responsible to do homework on their own. • There will be several quizzes during the academic year, not necessarily announced. The quiz contains the materials covered in previous lectures, homework or to be covered that day. • Any quiz or test missed without a supported documented and excused absence will represent a zero. • Attendance and participation in the lecture are mandatory and will be considered in the grading. • Students should bring calculators, rulers, pen and pencils to be used during the lectures. 				
Required Learning Materials	Data show and whiteboard are used throughout the lectures and the lecture notes will be uploaded to the Moodle or Telegram platform before the lecture day.				
Evaluation	Task	Weight (Marks)	Due Week	Relevant Learning Outcome	
	Paper Review				
	Assignments	Homework	10%	2/11	
		Class Activity	2%		
		Report	8%	30/11	
		Seminar	8%	4/12	
		Essay			
		Project			
	Quiz		8%	Every Lecture	
	Lab.				
	Midterm Exam		24%	5/11-10/11	
	Final Exam		40%	11/12-22/12	
Total		100%			
Specific learning outcome:	<p>By the end of the year, the student should be able to demonstrate ability to:</p> <ul style="list-style-type: none"> • Apply knowledge of mathematics, science, and engineering • Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, 				

	<p>social, political, ethical, health and safety, manufacturability, and sustainability.</p> <ul style="list-style-type: none"> • Function on multi-disciplinary teams. • Identify, formulate, and solve engineering problems. • Use the techniques, skills, and modern engineering tools necessary for engineering practice. • Understand professional and ethical responsibility. 	
Course References:	<ul style="list-style-type: none"> • Shigley's Mechanical Engineering Design • Machine Design: An Integrated Approach by Norton 	
Course topics (Theory)	Week	Learning Outcome
Introduction to Mechanical Engineering Design	1	
Materials	2-3	
Load and Stress Analysis	4-6	
Deflection and Stiffness	7-8	
Failures resulting from static loading	9-11	
Fatigue Failure resulting from Variable loading	12-15	
Practical Topics	Week	Learning Outcome

Questions Example Design

Q1: A rod with a cross-sectional area of A and loaded in tension with an axial force of $P=2000$ lbf undergoes a stress of $\sigma = P/A$. Using a material strength of 24 kpsi and a design factor of 3.0, determine the minimum diameter of a solid circular rod. Using Table A–17, select a preferred fractional diameter and determine the rod's factor of safety. (8 marks)

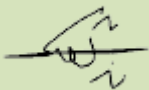
Extra notes:

External Evaluator

This module catalogue is well organised, covered a wide range of assignment methods which makes it sufficient for students' understanding and knowledge.

- 1- The course objective is quite clear. It meets the standard requirement for engineering competences by international mechanical engineering organisations; for example, Institute of Mechanical Engineers (IMechE) -the UK.
- 2- The references are up to dated references.
- 3- All course topics included in this catalogue is essential for further understanding of Mechanical Engineering and practise them during engineering projects.

Hereby, I confirm that this module catalogue is extremely useful and sufficient in terms of scope and quality for the first-year students in the Department of Mechanical and Energy Engineering at Erbil Polytechnic University.



Dr. Zhwan Dilshad Ibrahim
11/09/2022