

Module (Machine Design II) Catalogue 2022-2023

College/ Institute	Erbil Technical Engineering College	
Department	Mechanical and Energy Engineering Techniques	
Module Name	Machine Design II	
Module Code	MAD803	
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	Eight	
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	
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Lecturer (Practical)		
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	<p>As mentioned in the first Module Catalogue, machine design 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 the first course, these topics were covered such as reviewing critical material properties in design, deflection and stiffness, and static failure theories of ductile materials and many other topics. In this course (Machine Design II), you will learn about static failure theories of brittle materials, fatigue failure resulting from variable loading, as well as the design of some mechanical elements such as shafts, screws, springs, and rolling contact bearings.</p> <p>It is very important to emphasize that this course is similar to the first, which 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</p>

	system as a group project through hand and computer-assisted calculations.				
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%		
		Class Activity	2%		
		Report	8%		
		Seminar	8%		
		Essay			
		Project			
	Quiz	8%			
	Lab.				
	Midterm Exam	24%			
	Final Exam	40%			
	Total	100%			
Specific learning outcome:	By the end of the year, the student should be able to demonstrate ability to: <ul style="list-style-type: none"> • Apply knowledge of mathematics, science, and engineering 				

	<ul style="list-style-type: none"> • Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, manufacturability, and sustainability. • Identify, formulate, and solve engineering problems. • Use the techniques, skills, and modern engineering tools necessary for engineering practice.
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Course References:	<ul style="list-style-type: none"> • Shigley’s Mechanical Engineering Design • Machine Design: An Integrated Approach by Norton
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Course topics (Theory)	Week	Learning Outcome
Design of Mechanical Elements- Shafts and Shaft Components	1	
Design of Mechanical Elements- Mechanical Springs	2-3	
Design of Mechanical Elements- Rolling-Contact Bearings	4-6	
Design of Mechanical Elements- Lubrication and Journal Bearings	7-8	
Design of Mechanical Elements- Gears	9-11	
Design of Mechanical Elements- Clutches, Brakes, Couplings, and Flywheels	12-15	
Practical Topics	Week	Learning Outcome

Questions Example Design

Q^1 : At a machined shaft shoulder the small diameter d is 1.100 in, the large diameter D is 1.65 in, and the fillet radius is 0.11 in. The bending moment is 1260 lbf · in and the steady torsion moment is 1100 lbf · in. The heat-treated steel shaft has an ultimate strength of $S_{ut} = 105$ kpsi and a yield strength of $S_y = 82$ kpsi. The reliability goal is 0.99.

(a) Determine the fatigue factor of safety of the design using each of the fatigue failure criteria described in this section.

(b) Determine the yielding factor of safety.

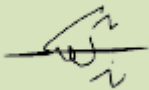
Extra notes:

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
11/01/2023