

**The University of Jordan  
School of Engineering**



Department	Course Name	Course Number	Semester
Mechanical Engineering	Machine Design I	0904435	

**2019 Course Catalog Description**

Meaning, phases, evaluation, considerations of design, stress analysis, deflection analysis, static strength and theories of failure, fatigue strength. Design of fasteners and connections, riveted joints, bolts and screws, force-deflection diagrams of bolted connections. Welded joints. Mechanical springs, helical, leaf, torsional spring shafts. Case studies and applications.

**Instructors**

Name	E-mail	Sec	Office Hours		Lecture Time	

**Text Books**

<b>Title</b>	Shigley's Mechanical Engineering Design
<b>Author(s)</b>	R. G. Budynas and J. K. Nisbett
<b>Publisher, Year, Edition</b>	McGraw Hill, 2011, 10 <sup>th</sup> ed., (SI Units)

**References**

<b>Books</b>	<ol style="list-style-type: none"> <li>R. C. Juvinall and K. M. Marshek (2006) Fundamentals of Machine Component Design, 4<sup>th</sup> Ed. John Wiley &amp; Sons.</li> <li>R. L. Mott (1999) Machine Elements in Mechanical Design, 3<sup>rd</sup> Ed. Prentice Hall.</li> </ol>
<b>Journals</b>	ASME Journal of Mechanical Design
<b>Internet links</b>	<a href="http://highered.mcgraw-hill.com/sites/0073529281/student_view0/">http://highered.mcgraw-hill.com/sites/0073529281/student_view0/</a> (publisher web site)

**Prerequisites**

<b>Prerequisites by topic</b>	Strength of Materials
<b>Prerequisites by course</b>	Strength of Materials, 0904372
<b>Co-requisites by course</b>	-
<b>Prerequisite for</b>	Machine Design II (0904436)

**Topics Covered**

Week	Topics	Chapter in Text	Sections
1-4	Introduction to Mechanical Engineering Design, Load and Stress Analysis.	Chapter 1 Chapter 3	All sections All Sections except 3.3
5-6	Deflection and Stiffness	Chapter 4	4.1,2,4,7,8,10,11,12,13
7-8	Failures Resulting from Static Loading	Chapter 5	5.1,2,3,4,5,7,8,10,11
9-10	Fatigue Failure Resulting from Variable Loading	Chapter 6	6.1,2,3,4,7,8,9,10,11,12,13,14
11-12	Screws, Fasteners, and the Design of Nonpermanent Joints	Chapter 8	8.1-8.9
13-14	Welding, Bonding, and the Design of Permanent Joints	Chapter 9	9.1-9.6
15-16	Springs	Chapter 10	10.1-10.7

<b>Mapping of Course Outcomes to ABET Student Outcomes</b>							
<b>SOs</b>	<b>Course Outcomes</b>						
1	1. Ability to perform load, stress-strain, deflection and stiffness design analysis. 2. Ability to conduct static and fatigue failure analysis and recognize the differences between the different failure theories						
2	3. Ability to design power screws and spring. 4. Ability to perform design analysis for bolted, screwed, riveted and welded joints.						
<b>Evaluation</b>							
<b>Assessment Tools</b>			<b>Expected Due Date</b>			<b>Weight</b>	
<b>Quiz</b>						10%	
<b>1<sup>st</sup> Midterm Exam</b>						20%	
<b>2<sup>nd</sup> Midterm Exam</b>						20%	
<b>Final Exam</b>						50 %	
<b>Contribution of Course to Meet the Professional Components</b>							
The course contributes to building the skills of design and selection of basic machine components, dealing with engineering standards and converting open-ended problems into a set of design specifications.							
<b>Relationship to Student Outcomes</b>							
<b>SOs</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Availability</b>	X	X					
<b>Relationship to Mechanical Engineering Program Objectives (MEPOs)</b>							
<b>MEPO1</b>	<b>MEPO2</b>	<b>MEPO3</b>	<b>MEPO4</b>	<b>MEPO5</b>			
<b>ABET Student Outcomes (SOs)</b>							
<b>1</b>	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics						
<b>2</b>	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors						
<b>3</b>	An ability to communicate effectively with a range of audiences						
<b>4</b>	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts						
<b>5</b>	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives						
<b>6</b>	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions						
<b>7</b>	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies						
<b>Updated by ABET Committee, 2021</b>							