

School of Engineering and Computer Science
Mech 414: Machine Design

Catalog Data:	MECH 414 Machine Design; 3 credits Combined stresses, static and fatigue failure theory and analysis, design and selection of machine elements such as shafts, fasteners, springs, gears and bearings.
Class Schedule:	Three 50-minute lecture sessions per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	Certified Mech Major, Mech 215, Mech 309, Mech 314
Prerequisites by Topic:	Strength of Materials, Dynamics/Dynamics of Machinery
Required Text:	Shigley, J.E., Budynas, R.G., and Nisbett, J.K., <i>Mechanical Engineering Design</i> , 8 th Edition, 2008, McGraw-Hill Publishing Company.
Reference(s)	Norton, Robert, <i>Machine Design, An integrated Approach</i> , Second Edition, 2000, Prentice-Hall Publishing Company. Juvinall, Robert, C. and Marshek, Kurt, M. <i>Fundamentals of Machine Components Design</i> , Third Edition, 2003, John Wiley Publishing Company.
Course Coordinator:	Dr. Hamid Rad
Course Objectives:	<ol style="list-style-type: none"> 1. Analyze and select machine elements/components. 2. Design of machine elements such as shafts, fasteners, springs, bearings, and power transmitting elements like gears, belts and chains. Design of clutches and brakes. 3. Solve open-ended design problems by integrating various machine elements and components.
Topics Covered:	<ol style="list-style-type: none"> 1. Design of mechanical components such as shafts to transmit power, springs, fasteners, etc. 2. Selection/design of mechanical elements such as belts, chains, and bearings. 3. Fundamentals of gears, spur, helical, bevel, and worm gear set. Their applications, advantages and disadvantages of one over the other. 4. Design of different types of gears, spur, helical, bevel and worm set for the purpose of power transmission. 5. Design of clutches and brakes.
Lab Experiments and Activities:	None

Course Outcomes:	Students will be able to:		
	Assessed for Program Outcomes	A-2	Demonstrate knowledge of fundamental scientific and/or engineering principles.
		A-3.	Apply engineering principles in analysis and design of mechanical components/systems to meet desired needs.
C-2.		Carry out design process (such as concept generation , modeling, evaluation, iteration) to satisfy the project requirements.	
C-3.		Can work within realistic constraints, (such as economical, environmental, social, political, manufacturability, health and safety, ethical, and sustainability) in realizing systems.	
F-1.		Evaluate ethical issues that may occur in professional practice using professional codes of ethics.	
Other	A-4.	Apply statistical methods in analyzing data.	
	E-2.	Examine alternatives using mathematical, scientific, and engineering knowledge to formulate solutions.	
	E-3.	Use analytical, computational, and/or experimental methods to obtain solutions to design problems.	
Required or Elective Course:	Required		
Contribution to Professional Component:	Engineering Topics		
Relationship of Course to Program:	Meets: Educational Objectives <u>1, 2, 3</u> Program Outcomes <u>A, C, E, F</u>		
Prepared by:	Dr. Hamid Rad	Date:	October 10, 2008
Approved by CAC:			