COURSE NUMBER	**ME 316**
COURSE TITLE	**Machine Design**
COURSE STRUCTURE	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR	Yazan Manna
COURSE DESCRIPTION	Aspects of the design process and design of machine elements. Mini-projects are used to introduce engineering design procedures
PREREQUISITE(S)	ME 231 Kinematics of Machinery, ME315 Stress Analysis.
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
REQUIRED MATERIALS	Machine Design, 5th edition, Robert L. Norton, Pearson Prentice Hall 2014.
Other supplemental materials (not Required)	Handouts prepared by instructor.
COMPUTER USAGE	Machine design analysis software.

COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:

Course Learning Outcomes: Upon completing this course, students will be able to:	SOs*	Expected Performance Criteria
1 **Demonstrate** a thorough understanding of fundamental principles of strength of materials and solid mechanics as they pertain to the design of machine elements	1	**Exam Question** (80% of students will earn a grade of 70% or better on this question)
2. **Design** new components while considering their functional requirements and constraints placed over them	1,2,3, and 5	**Design Project** (80% of students will earn a grade of 70% or better on this project)
3. **Apply** appropriate theories of failure in the design of new machine components under both static and dynamic loading	1, 2	**Exam Question** (80% of students will earn a grade of 70% or better on this question)
4. **Select** a component from available designs such as bearings, gears, fasteners and springs	1, 2	**Exam Question** (80% of students will earn 70% or better on this question)

	5. **Describe** the impact of issues such as safety legislation, design codes and the environment on the mechanical design process and on the profession,	2,3, and 5	**Report** (Concepts so important to practicing engineers that nearly 100% of students must show understanding)
	6. **Select** appropriate materials for the designed components	1,2,3, and 5	**Project** (80% of students will earn a grade of 70% or better on this project)
	7. **Explain** the manufacturing process required for producing the desired part	1,3, and 5	**Project** (80% of students will earn a grade of 70% or better on this project)
	8. **Define** tolerances and clearances for the designed part	1	**Homework Assignment or Project** (80% of students will earn at grade of 70% or better on this problem)
	9. **Use** of existing engineering analysis software to assist in the design of mechanical components.	1,2,3, and 5	**Project** (80% of students will earn a grade of 70% or better on this project)

CLASS TOPICS

1. Kinematics and load determination
2. Stress, strain, and deflection
3. Static failure theories
4. Fatigue failure theories
5. Shafts, keys, and couplings
6. Bearings and lubrication
7. Ball and roller bearings
8. Surface failure theories
8. Screws and fasteners
9. Weldments
10. Gears (Spur, helical, and worm)
11. Clutches and brakes
12. Springs
13. Miscellaneous Machine Elements

STUDENT OUTCOMES (SCALE: 1-3)

1	**2**	**3**	**4**	**5**	**6**	**7**
3	3	2		2		

3 – Strongly supported 2 – Supported 1 – Minimally supported

* Student Outcomes.