

ME 3180 Mechanical Design and Analysis (Either ME 3180 or ME 4315 is required)

Catalog Description: ME 3180 Machine Design (3-0-3)
Prerequisites: ME/CE 1770 Introduction to Engineering Graphics and Visualization, ME 2110 Creative Decisions and Design, and COE 3001 Deformable Bodies
The analysis, selection and synthesis of machine components, as applied to springs, bearings, shafts, gears, fasteners, and other elements in a mechanical system.

Textbook: Charles Mischke, and Richard Budynas, *Shigley's Mechanical Engineering Design*, 8th Edition, McGraw-Hill, 2007.

Topics Covered:

Specific mechanical components to be covered are:

1. Review of Static Failure Mechanisms in the Context of Machine Design
2. Fatigue Failure Mechanisms
3. Spring Design
4. Joining and Fastening Methods
5. Shafts, Keys, and Couplings
6. Bearings and Lubrication
7. Gear Trains
8. Spur Gears
9. Helical, Bevel, and Worm Gears
10. Optional Topics including System Design and Optimization, Design with Microcomputers, and Projects.

Course Outcomes:

Outcome 1: To illustrate to students the variety of mechanical components available and emphasize the need to keep learning.

1.1 Students will demonstrate the ability to seek and learn new material outside the class topics through the completion of an open-ended homework, report, term paper, computer assignment and/or project. The amount as well as depth of new material identified and used by the students are measurable indicators of the student's performance.

Outcome 2: To enable students to learn how to identify and quantify the specifications and trade-offs for the selection and application of components which are commonly used in the design of complete mechanical systems.

2.1 Students will demonstrate the ability to take technical, economical, safety, quality, legislative and other issues (such as environmental) into account when selecting and/or designing mechanical components. The breadth and depth of the issues taken into account by students are measurable indicators of their performance.

Outcome 3: To teach students how to apply the fundamentals of engineering science to analyze and design commonly used mechanical components to meet specifications.

3.1 Students will demonstrate the ability to apply fundamentals of engineering science to make proper assumptions, perform correct analyses, and draw upon different mechanical engineering

subject areas in the analysis of bolted joints, shafts, bearings, springs, gears, and other components covered.

3.2 Students will demonstrate the ability to design mechanical components using the analyses mentioned above.

Outcome 4: To develop in students an ability to select, configure, and synthesize mechanical components into complete systems.

4.1 Students will demonstrate the ability to select, configure, and synthesize mechanical components into assemblies using engineering science fundamentals to meet specifications as described in 2.1 above.

Outcome 5: To let students apply modern computer-based techniques in the selection, analysis, and synthesis of components and their integration into complete mechanical systems.

5.1 Students will demonstrate their ability to use existing computer-based techniques and algorithms for the analysis and synthesis of mechanical components and systems, in particular with respect to those components and systems defined in the topical areas. The maturity, completeness and efficiency of their approach are indicators for their performance.

Correlation between Course Outcomes and Program Educational Outcomes:

ME 3180												
	Mechanical Engineering Program Educational Outcomes											
Course Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
Course Outcome 1.1	X			X	X	X	X		X	X	X	X
Course Outcome 2.1	X		X	X	X	X		X	X	X	X	X
Course Outcome 3.1	X		X	X	X	X				X	X	X
Course Outcome 3.2	X		X	X	X	X				X	X	X
Course Outcome 4.1	X		X	X	X	X		X	X	X	X	X
Course Outcome 5.1	X		X	X	X	X	X			X	X	X