

**Sample syllabus for  
EME 150B – Mechanical Design**

**Objectives**

This course introduces principles of engineering mechanics applied to the design and selection of mechanical components. Mechanical components in the focus of this course are shafts, rolling bearings, journal bearings, springs, gears, screws, amongst others. The students will work on design projects, which concentrate on conceptual design, engineering analysis, methods of manufacture, material selection, and cost. Furthermore, the course introduces Computer-Aided Design.

The course consists of lectures and discussions. In addition, the students will work on a class project (in teams), homework, and two exams.

**Prerequisites**

C- or better in course 150A

**Textbook**

The required textbook for this course is Shigley's Mechanical Engineering Design, R.G. Budynas and J.K. Nisbett, 11<sup>th</sup> edition or earlier, McGrawHill. EME 150B covers (a subset of) Part 3 of this book. Parts 1 and 2 were covered in EME 150A.

**Course Outcomes**

- Develop conceptual design skills to guide the selection and integration of basic mechanical components into working systems.
- Understand principles governing the function and sizing of machine elements such as shafts, gears, bearings, springs, and mechanical fasteners.
- Employ principles of stress and fatigue analysis to ensure desired function, reliability, and longevity for components of mechanical systems.
- Apply engineering problem-solving skills in a practical mechanical design context.
- Develop teamwork skills through team design projects that illustrate the selection and integration of machine components to satisfy a prescribed functional specification.

**Tentative Schedule (Content and schedule are subject to change)**

<b>Week</b>	<b>Lecture</b>	<b>Class project</b>
1	Course information, class project Gears & gear trains	Team building
2	Gears & gear trains Gears & gear trains	Train value calculation (example assignment)
3	Gears & gear trains Shaft elements	First CAD model (example assignment)
4	Shaft design Shaft design	Revised CAD model (example assignment)
5	DC Motor DC Motor	Shaft analysis (example assignment)
6	<b>Midterm</b> Rolling contact bearings	
7	Rolling contact bearings Springs	Prototype (example assignment)
8	Springs Mechanical fasteners	Test report (example assignment)
9	Mechanical fasteners Journal bearings	
10	Journal bearings Review	<b>Final project presentation and report</b>
11	<b>Final exam</b>	

**More Reading Material:**

- K. S. Edwards and R. B. McKee, Fundamentals of Mechanical Component Design, McGraw-Hill (1991).
- R. C. Juvinall, K. M. Marshek, Fundamentals of Machine Component Design, Wiley (2011).
- R. L. Norton, Machine Design: An Integrated Approach, Prentice-Hall (2013).
- M. F. Spotts, Design of Machine Elements, Prentice-Hall (2003).
- H. Petroski, To Engineer Is Human: The Role of Failure in Successful Design, Vintage (1992)