

**ME 10301 Machine Design  
Fall 2020**

<b>Instructors:</b>	Dr. Amir K. Miri
<b>Office:</b>	Rowan Hall <b>138</b>
<b>Phone:</b>	856-256-5349
<b>Email:</b>	<a href="mailto:miri@rowan.edu">miri@rowan.edu</a>
<b>Office Hours:</b>	T 12:00-13:00 or by appointment ( <a href="#">website</a> ) <a href="https://calendly.com/akmiri">https://calendly.com/akmiri</a>
<b>Lab Assistant:</b>	Matthew W. Malpica (email: <a href="mailto:malpicam8@students.rowan.edu">malpicam8@students.rowan.edu</a> )
<b>Time/Locations:</b>	T 8:00-10:45, Engineering Hall 321 (Partial Physical) M 12:30-15:15, Rowan Hall 146 ( <b>Remote</b> )
<b>Textbook:</b> (Required)	<i>Shigley's Mechanical Engineering Design</i> , Tenth Edition (or Eleventh Edition) Richard G. Budynas and J. Keith Nisbett, McGraw-Hill Education, 2015 ISBN: 0073398209
<b>Prerequisite:</b>	ENGR 01291 (Dynamics), ENGR 01273 (Strength of Materials)

**Course Description:**

This course introduces students to machine design. It deals with the design and selection of machine elements such as shafts, couplings, bearings, gears, springs, screws and fasteners. Significant emphasis will be placed upon stress analysis and failure theories. Laboratory experience will include computer simulation and analysis. Design experience will be integrated throughout the curriculum and culminate in a design project. 4 credit hours.

**Course Objectives:**

Students should demonstrate the ability to:

1. Calculate the external loadings;
2. Perform stress analysis on beams with different load distributions and support styles;
3. Calculate the dimension and structure of a part based on the load or vice versa;
4. Predict life span of a part using fatigue failure analysis;
5. Understand the basics of fracture mechanics;
6. Select and use proper type and size off-the-shelf mechanical components in designs;
7. Design and simulate a simple machine with proper load, strength, and reduction calculation.

**Topics Covered:**

- Failure theories and prevention
  1. Simple and complex stress evaluation
  2. Steady loading
  3. Variable loading
- Mechanical Components: shafts, gears, screws and fasteners, and bearings

**Software:**

SolidWorks, Mathcad or MATLAB, COMSOL

**Relationship of Course to Student Outcomes:**

Of the 11 ME student outcomes, this course strives to achieve the following:

- 1) be able to apply broad scientific, mathematical and engineering knowledge in order to be able to identify, formulate and solve problems in thermal and mechanical systems; (*a, e, l, n*)
- 2) be able to design a system, component, process or experiment and analyze and interpret data; (*b, c, m*)
- 3) be able to use modern tools, hardware and software in problem solving process; (*k, q*)
- 4) be effective communicators; (*g*)
- 5) be bold and creative problem solvers; (*o*)

**Grading:**

Homework	10%
Quizzes (five)	20%
Mid-Term Exam	15%
Final Exam	20%
Project	25%
<b>Class Activity</b>	<b>12%</b>
<b>Total</b>	<b>102%*</b>

A	92-100%	A-	90-92%	B+	88-90%	B	82-88%
B-	80-82%	C+	78-80%	C	72-78%	C-	70-72%
D+	68-70%	D	62-68%	D-	60-62%	F	0-60%

**Late Return Policy:**

All assignments are due on the specified due date in class (and Blackboard). No late returns will be accepted. Five (or more) quizzes will be given irregularly throughout the semester, and **may or may not** be announced ahead of time. No make-up quizzes will be given.

**Make-up Exam/Assignment Policy:**

No make-up exams or assignments will be given unless a medical or other verified emergency is the reason for missing the exam or the assignment.

**Attendance Policy:**

Attendance is mandatory for all sessions (Monday & Tuesday). The attendance will be recorded via a Google questionnaire collected at the end of each session (this is a part of recently-funded NSF project). A link will be sent via email and you will have five minutes to answer four multi-option questions and one descriptive question.

**Academic Integrity Policy / Classroom Behavior Policy:**

For Academic Integrity Policy and Classroom Behavior Policy, please refer to the Student Information Guide and Student Handbook.

**Disability Accommodation:**

Your academic success is important. If you have a documented disability that may have an impact upon your work in this class, please contact me. Students must provide documentation of their disability to the Academic Success Center in order to receive official University services and accommodations. The Academic Success Center can be reached at 856-256-4234. The Center is located on the 3rd floor of Savitz Hall. The staff is available to answer questions regarding accommodations or assist you in your pursuit of accommodations. We look forward to working with you to meet your learning goals.

**Cell Phones in Class:**

In order to avoid disruption during class, please silence your cell phones before entering the classroom. No talking, texting, videotaping, or web browsing on cell phones during class (unless allowed by the instructor). No use of notebooks/laptops (unless allowed or announced by the instructor). Any of such actions will be subjected to **1% reduction** from the grade of class activity (**5%**).

**Course Schedule:**

Week	Topics	Reading	Project (M 12:30-15:15)
1 (08/31)	Introduction	Ch. 1	-
2 (09/07)	Mohr's Circle, Principal Stresses	Ch. 3-4	Holiday
3 (09/14)	Failure from Static Loading (& Quiz 1)	Ch. 5	Class + ANSYS
4 (09/21)	Failure from Variable Loading	Ch. 6	Class + ANSYS
5 (09/28)	Gears-General (& Quiz 2)	Ch. 13	ANSYS, <b>Project (Assigned)</b>
6 (10/05)	Gears-General (& Quiz 3)	Ch. 13	ANSYS, <b>Project</b>
7 (10/12)	Problem Solving		ANSYS, <b>Project</b>
8 (10/19)	Spur and Helical Gears	Ch. 14	<b>Mid-Term Exam</b>
9 (10/26)	Spur and Helical Gears (& Quiz 4)	Ch. 14	ANSYS, <b>Project</b>
10 (11/02)	Shafts and Shafts Components	Ch. 7	ANSYS, <b>Project Review</b>
11 (11/09)	Shafts and Shafts Components	Ch. 7	<b>Project</b>
12 (11/16)	Screws and Fasteners	Ch. 8	<b>Project</b>
13 (11/23)	Screws and Fasteners	Ch. 8	<b>Project</b>
14 (11/30)	Bearings	Ch. 11	<b>Project Test</b>
15 (12/07)	Problem Solving		<b>Project Report</b>
16 (12/14)	<b>Final Exam (TBD)</b>		
<b>This schedule is preliminary and subject to change.</b>			