

## ME 316: Mechanical Component Analysis and Design

<i>Course description:</i>	Optimal design of machinery; analysis for prevention of machine elements failure.
<i>Number of credits:</i>	3
<i>Course Coordinator:</i>	Lloyd Smith
<i>Prerequisites by course:</i>	CE 215; ME216 or c//; ME220 or c//; certified major in Mechanical Engineering
<i>Prerequisites by topic:</i>	<ol style="list-style-type: none"><li>1. Concepts of stress, strain and their relationships</li><li>2. Axial, bending, torsion, shear loads and their combinations</li></ol>
<i>Postrequisites:</i>	ME 415
<i>Textbooks/other required materials:</i>	<ol style="list-style-type: none"><li>1. Budynas, R.G. and Nisbett, J.K. <i>Shigley's Mechanical Engineering Design</i>. McGraw-Hill, 9/e.</li></ol>
<i>Course objectives:</i>	<ol style="list-style-type: none"><li>1. Review concepts of statics and strength of materials used to determine the stress, strain and deflection of one-dimensional structures.</li><li>2. Learn fundamental approaches to failure prevention for static and repeated loading.</li><li>3. Consider the design of common machine elements such as fasteners, springs, bearings and gears.</li><li>4. Solve an open-ended design problem involving cost, drawings, and structural analysis.</li></ol>
<i>Topics covered:</i>	<ol style="list-style-type: none"><li>1. 2-D stress</li><li>2. 1-D deflection and stiffness</li><li>3. Shafts and shafts components</li><li>4. Failure criteria</li><li>5. Fatigue</li><li>6. Fasteners</li><li>7. Springs</li><li>8. Bearings</li><li>9. Gears</li></ol>
<i>Expected student outcomes:</i>	<ol style="list-style-type: none"><li>1. Determine the stress, strain and deflection of simple machine elements.</li><li>2. Estimate safety factors of simple structures exposed to static and repeated loads.</li><li>3. Determine performance requirements in the selection of commercially available machine elements.</li><li>4. Solve simple, open-ended design problems.</li></ol>
<i>Class schedule:</i>	Three 50-minute lectures per week, for one semester
<i>Laboratory schedule:</i>	None
<i>Contribution to meeting the professional component:</i>	Engineering Topic
<i>Relationship of course to program objectives:</i>	Meets: <ol style="list-style-type: none"><li>1. School of MME ME educational objectives: 1, 2</li><li>2. School of MME ME program outcomes: 1, 2</li><li>3. ABET EC2019, Criterion 3 program outcomes: 1, 2</li></ol>

*Prepared by:* Andrea Butcherite and L. V. Smith

*Date:* May 30, 2018

## **POLICIES**

**A. Reasonable Accommodation** (the nature of the particular course determines which one applies):

- **Pullman Campus.** Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.
- **WSU Online Course.** Reasonable accommodations are available in online classes for students with a documented disability. All accommodations must be approved through your WSU Disability Services office. If you have a disability and need accommodations, we recommend you begin the process as soon as possible. For more information contact a Disability Specialist on your home campus: Pullman or WSU Online (<http://accesscenter.wsu.edu>), Spokane (<http://spokane.wsu.edu/students/current/studentaffairs/disability/>), Tri-Cities (<http://www.tricity.wsu.edu/disability>), Vancouver (<http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services>).

## **B. Academic Integrity**

WSU expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The Standards of Conduct for Students can be found at <http://conduct.wsu.edu>.

## **C. WSU Safety**

WSU is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, <http://safetyplan.wsu.edu>. It is highly recommended that you visit this web site as well as the University emergency management web site at <http://oem.wsu.edu/> to become familiar with the information provided.