

Syllabus

COURSE: Machine Design II (MECH 316)
TIME/PLACE: Online
TEXTBOOK: *Fundamentals of Machine Component Design, 5/E* (Juvinall & Marshek)
You will need the text for this course and exams will be open book. It is STRONGLY RECOMMENDED that you acquire a paper copy of the text. The online versions are NOT RECOMMENDED as you may not be able to use it on proctored exams.

INSTRUCTOR: John C. Anderson (john.anderson@oit.edu)
OFFICE HOURS: TBA (There will generally be a group video conference once a week where students can discuss issues with the material and get help.)

Course Description

- The second course of a two-term sequence that covers the design of machine components.
- The topics covered in this course are roughly organized into the following modules:
 - Shaft Design
 - Spur Gears
 - Gear tooth force & stress analysis
 - Gear tooth bending stress
 - Failure criteria in bending, static and fatigue loading
 - Gear tooth bending stress
 - Gear tooth surface fatigue analysis
 - Surface fatigue failure criteria
 - Gear materials selection
 - Helical, Bevel, & Worm Gears
 - Gear tooth force & stress analysis
 - Gear tooth bending stress
 - Failure criteria in bending, static and fatigue loading
 - Gear tooth bending stress
 - Gear tooth surface fatigue analysis
 - Surface fatigue failure criteria
 - Belt Drives
 - Design considerations for selection of belt drive components
 - Use of manufacturers literature in selection of components
 - Chain Drives
 - Design considerations for selection of chain drive components
 - Use of manufacturers literature in selection of components
 - Fasteners
 - Types and selection of mechanical fasteners
 - Design of threaded fasteners
 - Selection and sizing of threaded fasteners
 - Failure criteria for threaded fasteners
 - Weldments
 - Types of welds
 - Structure and significance of the heat affected zone
 - Calculating the required size of welds based on loading
 - Clutches
 - Types of clutches

- Selection of clutch size and design based on load requirements
- Design Project
 - Integrates calculation of loads in a power transmission device with selection of actual components
 - Calculation of stress and strength in each component and applying an appropriate factor of safety
 - Integration of fabricated and purchased items in an assembly
 - Includes FMEA analysis
 - Includes cost analysis
- Most of these topics are covered in certain chapters of the textbook. Some of the topics may be covered by means of supplementary materials.
- Design Project – There will be a comprehensive design project at the end of the course. Typically this design is of a power transmission system. Students will be required to design/analyze all components including shafting, gears, bearings, and housing. Students will be required to submit a design report at the end of the term with all calculations. In addition the students will be required to select components from catalogs and estimate total cost and do a Failure Modes and Effects Analysis (FMEA).
- Course Prerequisites: MECH-315 Machine Design I
- Course Objectives
 - Ability to determine stresses in machine elements
 - Ability to determine the strength of machine elements
 - Ability to perform static stress analyses
 - Ability to perform fatigue stress analyses
 - Ability to analyze and design belt and chain drives
 - Ability to analyze and design shafts (for transmission of power)
 - Ability to select and size threaded fasteners
 - Ability to specify correct type and size of welds
 - Ability to select components based on performance, resistance to failure, cost, compatibility with other components in an assembly, and other factors

Completion of programmed materials

- Watching and/or reading the materials presented in Blackboard in a timely manner is essential for your success in this course.
- You should have the textbook and a scientific calculator available while watching the videos that make up this course.
- You will be held accountable for anything presented, discussed, or assigned in every video or module.

Homework Assignments

- Homework exercises will be assigned for each module in the course. These exercises will allow the student to develop and hone the techniques necessary to design machine components. Answers to the homework exercises are posted in Black Board.
- Homework will not be collected or graded by the instructor.

Examinations

- The course grades will be calculated as indicated below:
 - Average of Exams 1, 2, 3, & 4 – 70%
 - Final Exam – Comprehensive exam over the entire course, 30%
- The exams will be a mixture of multiple choice questions where the student must perform some

calculations and select the best answer, and “essay” type questions where the student will demonstrate the analysis, computation, and an overall design solution. The later type of question will be scanned and sent to the instructor in a “.pdf” file for grading.

- In order to receive full credit for “essay” type problems, you must show all work. In general, partial credit will be given for incomplete or incorrect work.
- ***A penalty of 10% of the value of any problem will be subtracted if the following problem solution format is not followed.***
 - Goal – What are you trying to accomplish? (end result / answer/ objective/etc.)
 - Known – What is known?
 - Assumptions – What simplifying assumptions, specific to this problem, can you make?
 - Solution –
- The exams will be reasonable if the material covered in each lecture has been both studied and well-understood, and all assignments have been properly completed.
- Typically, you are allowed to utilize only the assigned text on any exam. If this provision is removed, then this stipulation will be announced before the exam occurs.
- All graded exams and homework will be returned to the student in a digital format.
- All exams will be administered at the Student Success Center on the Klamath Falls or Wilsonville OIT campus, or through the use of ProctorU remote proctoring. There is an additional cost to the student to use the ProctorU service.
- Exams should be taken at the time and date specified in the class schedule on BlackBoard. Unless prior arrangements have been made, missed exams may not be taken at a later time. If you anticipate being unable to be present for an exam, then either see the instructor or leave a message before the exam begins. However, whether or not you will be allowed to postpone the exam will be decided by the instructor, and this decision will be based upon the circumstances of and reasons for your situation.

Grading Policy

- The course grades will be calculated as indicated below:
 - Average of Exams 1, 2, 3, & 4 – 70%
 - Design Project – Comprehensive exam over the entire course, 30%
- The course grade that you will receive is determined by the points that you have earned on the exams.
- These points are used to calculate the earned percentage (EP) of the total possible points, which then determines your course grade by the grading scheme indicated below:

<u>Percentage Range</u>	<u>Course Grade</u>
$90 \leq EP \leq 100$	A
$80 \leq EP \leq 90$	B
$70 \leq EP \leq 80$	C
$60 \leq EP \leq 70$	D
$0 \leq EP \leq 60$	F

- This scheme may be relaxed to give you a course grade higher than that indicated above at the discretion of the instructor.

General Information

- This course is based upon an online format. As a result, the extent of interaction that occurs in

class will be different from that which you have experienced in other courses. One hour per week will be set aside for an online video conference with the class. This time will be used to answer questions. Submitting questions prior to the video conference will expedite the process.

- Students may also submit questions to the instructor through email. Emails will generally be answered within 24 hours.
- Graphing calculators can be beneficial but are not required for success in this course — a calculator with the elementary functions (and their inverses) and scientific notation capabilities is absolutely required.
- If you decide to drop the course, then it is your responsibility to officially withdraw from the class through the Office of Registration and Records.
- In general, you will not be allowed to change to an “Audit” enrollment status in this course after the fifth week of classes of the current academic term.
- The instructor reserves the right to make changes to the policies and/or schedules described in this course syllabus (with reasonable accommodations for the affected students).

Disability Accommodation

Students with a documented disability who require assistance or academic accommodations should contact the office of Disability Services immediately to discuss eligibility. Disability Services staff are located on both the Klamath Falls and Wilsonville campuses and arrangements can be made to meet with students on any campus. Meetings are by appointment only, so please contact the Disability Services office by calling Drew Tessler, the Disability Services Specialist at **(541) 851-5227** or emailing him at drew.tessler@oit.edu. Specific information and Disability Services forms can be found at www.oit.edu, then go to “Academics” and click on “Student Success Center” and then “Disability Services.” This link leads to the department’s website: <http://www.oit.edu/academics/ssc/disability-services>

Academic Dishonesty: Plagiarism and Cheating

Both plagiarism and cheating are very serious academic offenses. For further information on the consequences of such actions, refer to the Academic Dishonesty policy of OIT.

It is the responsibility of each student to be familiar with and to abide by this pol