Mechanical Design II
The University of Toledo
College of 4200 - 901 / Summer 2019

Instructor:	*Dr. Carmen Cioc*	**Office Location**:	NE 1609
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Office Hours:		**Class Location**:	DL Online
Mondays: 1:00 pm to 3:00pm		**Class Day/Time**:	DL Online
Thursdays: 9:30am to 1:30pm		**Credit Hours**: 3.0	
Or by appointment			

COURSE/CATALOG DESCRIPTION

Design and application of mechanical components and machine elements including shafts, gears, gear drives, belt drives, chain drives, fasteners, power screws, clutches, brakes and machine frames.

COURSE OVERVIEW
The class is building on the introductory mechanical design course, extending to a more detailed analysis of several types of gears and gear-based machines.

STUDENT LEARNING OUTCOMES
At the end of the course the students will be able to:
- *Analyze and design gear drive systems (LO1);*
- *Analyze various types of bearings and be able to select commercially available bearings (LO2);*
- *Analyze the performance of springs and welded joints loaded in different ways (LO3);*
- *Design a power transmission (LO4);*
- *Analyze the performance of fasteners and select suitable types and sizes (LO5);*
- *Analyze and design clutches and brakes (LO6).*

TEACHING STRATEGIES

This is an active, fully online, learning course that will require students to be fully engaged. This course is designed to stimulate learning through engagement and participation. I will assign homework each week and I will give special assignments related to design problems. Please check the Course Expectation part for details about the course setup.

Recommendations for success:
o *Read the pages from the textbook on the material to be presented – it will help you focus on the lecture and to better understand the concepts;*
o *Read your notes and handouts;*
o *Redo on your own the practice problems discussed during the lectures;*
o *Try to do the assigned homework (alone); If you do not know how to do the homework, ask for guidance (email or Discussion Board);*
o *Actively participate to discussions posted on the Discussion Board;*
o *Before a test: download the homework solutions, compare them with your own solution (not just the final results), and make sure you go again through all homework problems, practice problems, and examples from the textbook; ask for help if needed;*
o *If you do not understand something, there is a good chance that others have the same problem. Never be embarrassed to ask for help if you find something confusing;*
o *A professional attitude is expected at all time.*

PREREQUISITES AND COREQUISITES

The required prerequisites to be successful in this class are: MET 3200 Mechanical Design I, MET 2310 Applied Materials Science, and MET 2320 Applied Materials Science Laboratory.

REQUIRED TEXTS AND ANCILLARY MATERIALS
> *Machine Elements in Mechanical Design, by Mott 6th Edition*
> *ISBN-13: 978-0134441184*
> *ISBN-10: 0134441184*

TECHNOLOGY EXPECTATIONS

> *Web assist - Blackboard https://blackboard.utdl.edu/*

The technical skills required to be successful in this course are: proficient in Blackboard and proficient in Excel.

To succeed in this course, it will be important for learners to possess the following technical skills:

1. Rename, delete, organize, and save files.
2. Create, edit, and format word processing and presentation documents.
3. Copy, paste, and use a URL or web address.
4. Download and install programs and plug-ins.
5. Locate and access information using a web search engine.
6. Use a learning management system.

Browser Check Page *- Students need to have access to a properly functioning computer throughout the semester.* The Browser Check Page *will enable you to perform a systems check on your browser, and to ensure that your browser settings are compatible with Blackboard, the learning management system that hosts this course.*

Internet Service *- High-speed Internet access is recommended; This course may contain streaming audio and video content.*

Use of Public Computers *- If using a public library or other public access computer, please check to ensure that you will have access for the length of time required to complete tasks and tests. A list and schedule for on-campus computer labs is available on the* Open Lab for Students *webpage.*

UT Virtual Labs *- Traditionally, on-campus labs have offered students the use of computer hardware and software they might not otherwise have access to. With UT's Virtual Lab, students can now access virtual machines loaded with all of the software they need to be successful using nothing more than a broadband Internet connection and a web browser.*

The virtual lab is open 24/7 and 365 days a year at VLAB: The University of Toledo's Virtual Labs*.*

Accessibility Policies

Blackboard - https://www.blackboard.com/accessibility/index.html
Microsoft - https://www.microsoft.com/en-us/accessibility

UNIVERSITY POLICIES
 The University is an equal opportunity educational institution. Please read The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance*.*

Academic Accommodations
The University of Toledo is committed to providing equal opportunity and access to the educational experience through the provision of reasonable accommodations. For students who have an

accommodations memo from Student Disability Services, it is essential that you correspond with me as soon as possible to discuss your disability-related accommodation needs for this course. For students not registered with Student Disability Services who would like information regarding eligibility for academic accommodations due to barriers associated with a potential disability, please contact the Student Disability Services Office.

Policy Statement on Academic Dishonesty

As a reminder, "MISCONDUCT: Students may work together on homework problems or assigned papers, but must submit their own work. Students are not allowed to work together on exams". Any occurrence of academic misconduct will result in a grade of F in the course. Students that receive a reduced course grade as a result of academic misconduct will not be allowed to withdraw from the course and may not petition for a GPA recalculation after retaking the course. Please refer to the Academic Dishonesty and Academic Grievance policies for more details

Academic dishonesty will not be tolerated. Please read The University's Policy Statement on Academic Dishonesty.

For Blackboard Privacy Policy, please check https://help.blackboard.com/Privacy_Statement

COURSE EXPECTATIONS

Lecture: On Monday morning of each week I will post the class notes, a series of solved problems, and the homework / project for that week. Please read all the posted files under each module in the order they are presented. Start with Module Objective, and end with the Homework Submission.

Homework / Project: I will assign a homework / project problem(s) each week to help you better understand the material covered and as preparation for the final examination. I expect to be a total of 10 weekly homework / project problems. As a general rule, there will be several problems assigned as homework each week, but only two of them will be graded, called selective grading, for a total of 10 points per each week (each problem is valued at 5 points, unless otherwise specified), resulting to a total number of points by the end of the semester of 100. Please check

the Grading Criteria rubric for details regarding the homework grading. Each homework or project will have a due date and in general will always be similar with the sample problems discussed during the weekly modules. _Please submit your work before the due date. Late submissions will not be accepted_. I will grade your homework submission in less than 48 hours and I will provide you with feedback to improve your score. You will have an additional two days afterwards to resubmit your homework / project for a better score grade.

There will be the opportunity of extra credit in the form of a comprehensive design of a power transmission. This extra credit will be valued at 10 points maximum and it will be added to the total of HW / Project score. Please check the Grading Criteria for details regarding the extra credit grading.

This is a fully online course, attendance will not be taken, but for your success, I recommend to login several times per week and to collaborate with your classmates. Collaboration in the form of shared knowledge, not excel files or solutions, is accepted. There are two Discussion Board – Student Lounge and Mech Design II pages dedicated for your daily interactions with your peers as well as your instructor.

Test_: There will be one final, comprehensive test at the end of this semester, for a total of 100 points. On Monday morning of the July 29 week, I will post the test online. You will have two days (until July 31) to solve and submit the test back to me. I will provide you with sample problems and homework problems in preparation for the test. The test problems will be similar with the sample problems discussed and the assigned homework. Please submit your test before the due date. Late submissions will not be accepted_. I will grade it and send it back to you in less than 24 hours. You will receive my feedback on each of the test problems. Please check the Grading Criteria for details regarding the test grading. No collaboration is accepted for the test.

COMMUNICATION GUIDELINES

 Email: Please check your UT email account frequently for important course information. If you have any issues with the material discussed or the homework, please let me know and I will do my best to respond to your email within 24 hours.
Discussion: In this fully online course, participation is vital to your success, and your active engagement during weekly discussion is crucial to learning.   On Monday morning of each week, I will post the class notes, a series of solved problems, and the homework for that week. The homework is due by the end of that week. Try to engage in the discussion board. I will participate also in these spaces, and I will respond to discussion questions within 24 to 48 hours.

Real-Time Communication: A link to a real-time communication or chat tool has been added to the Course Menu. We will not be using this tool as part of our course assignments; however, the tool is available for you to use if and when you need it. To that end, I would be happy to arrange a time to meet with you in a chat room if you feel that you have questions that would best be answered in real-time. Conversely, you could also use the tool to meet with fellow students online in order to enhance your understanding of course concepts.

Netiquette:

It is important to be courteous and civil when communicating with others. Students taking online courses are subject to the communication regulations outlined in the Student Handbook. To ensure your success when communicating online, take time to familiarize yourself with the "dos" and "don'ts" of Internet etiquette.

GENERAL ACCESSIBILITY STATEMENT ON COURSE TECHNOLOGY

In conjunction with The University's commitment to ensuring equal access to all technology-based information, this course contains technologies that learners can use regardless of age, ability, or situation. The course's platform, Blackboard Learn, is a certified web-accessible platform, satisfying Level AA conformance criteria of Web Content Accessibility Guidelines (WCAG 2.0). External sites used in the course, such as Blackboard Ultra, are compliant with Section 508 standards, and the media players used in the course support closed captioning, are keyboard operable, and compatible with screen reading software.

GRADING Criteria

Strategy to Evaluate the Homework	Points
90-100% of the steps (formulas) and calculations have no mathematical errors.	5
Almost all (85-89%) of the steps and calculations have no mathematical errors.	4
Most (75-84%) of the steps and calculations have no mathematical errors.	2
More than 75% of the steps and calculations have mathematical errors.	0

Strategy to Evaluate the Extra Credit – Excel File	Points
All formulas correctly added in Excel and all the values from tables and graphs correctly selected; the excel is proper used as a simulation tool	10
All formulas correctly added in Excel and one or two errors regarding the values from tables and graphs improper selected; the excel is proper used as a simulation tool	8
One or two formulas incorrectly added in Excel and all the values from tables and graphs correctly selected; the excel is proper used as a simulation tool	6

Strategy to Evaluate the Extra Credit – Excel File	Points
One or two formulas incorrectly added in Excel and one or two errors regarding the values from tables and graphs improper selected; the excel is proper used as a simulation tool	4
Solving the problem 100% correctly (steps and calculations) by hand calculation but not using Excel	5
Otherwise	0

Strategy to Evaluate Each Problem from Test	Allocated Points
90-100% of the steps (formulas) and calculations have no mathematical errors.	100 % of allocated points
Almost all (85-89%) of the steps and calculations have no mathematical errors.	75 % of allocated points
Most (75-84%) of the steps and calculations have no mathematical errors.	50% of allocated points
More than 75% of the steps and calculations have mathematical errors.	0%

*The following parts will be considered when calculating the **final grade**:*

Assignments/Assessments	% of Final Grade
10 Homework x 10 points each =100 points	50
1 Test x 100 points =100 points	50
Total (200 points)	100%

If extra credit is submitted it will be consider under the Weekly project rubric to increase the maximum possible of points to 110.

Midterm Grading - *The midterm grading will be based on the homework / project score only at the midterm grade due date.*

Final Grading
The final grade will be determined using a straight scale as follows:

Numerical Average	Grade
≥ 93.00	A
$89.33 - 92.99$	A$-$
$85.67 - 89.32$	B+
$82.00 - 85.66$	B
$78.33 - 81.99$	B$-$
$74.67 - 78.32$	C+
$71.00 - 74.66$	C
$67.33 - 70.99$	C$-$
$63.67 - 67.32$	D+
$60.00 - 63.66$	D
≤ 60.00	F

ACADEMIC SUPPORT SERVICES

Besides using my office for institutional support, the university offers additional support, like free tutoring or support, through:

- o *Engineering Technology Department - NE 1604 & NE 1606*
- o *University of Toledo – Learning Enhancement Center - http://www.utoledo.edu/success/lec/ or http://www.utoledo.edu/studentaffairs/support.html*
- o *Disability Services Office https://www.utoledo.edu/offices/student-disability-services/*
- o *Counseling Center https://www.utoledo.edu/studentaffairs/counseling/*

SAFETY AND HEALTH SERVICES FOR UT STUDENTS

A comprehensive list of safety and health services available to you as a UT student, can be found at http://www.utoledo.edu/offices/provost/utc/docs/CampusHealthSafetyContacts.pdf

COURSE SCHEDULE - Tentative

Week	Date	Topic	Chapter	Learning Outcomes
1	5/13	Kinematics of Gears - Review	8	LO1
2	5/20	Spur Gear Design - Review	9	LO1
3	5/27	Helical Gears, Bevel Gears and Worm Gearing - Review	10	LO1
4	6/3	Keys, Couplings, and Seals	11	LO1
5	6/10	Shaft Design	12	LO1, LO4
6	6/17	Rolling Contact Bearings	14	LO2
7	6/24	Design of a Power Transmission	15	LO1, LO2, LO4
8	7/1	Plain Surface Bearings	16	LO2
9	7/8	Springs & Fasteners	18,19	LO3,LO5
10	7/15	Machine Frames, Bolted Connections and Welded Joints Fasteners	20	LO5
11	7/22	Motion Control: Clutches and Brakes	22	LO6