

**New Jersey Institute of Technology**  
**Department of Engineering Technology**  
**MET 302 Analysis & Design of Machine Elements II**

<b>COURSE NUMBER</b>	MET 302
<b>COURSE NAME</b>	Analysis & Design of Machine Elements II
<b>COURSE STRUCTURE</b>	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)
<b>COURSE COORDINATOR/INSTRUCTOR</b>	Dr. A. Sengupta/ Dr. S. Lieber
<b>COURSE DESCRIPTION</b>	A continuation of MET 301, including analysis and design of power screws, brakes, clutches, belts, chain drives, gears, gear trains, bearings, and other machine elements.
<b>PREREQUISITE(S)</b>	MET 301
<b>COREQUISITE(S)</b>	
<b>REQUIRED, ELECTIVE OR SELECTED ELECTIVE</b>	
<b>REQUIRED MATERIALS</b>	Text: Design of Machine Elements, 8 <sup>th</sup> Ed. by M.F. Spotts, T.E. Shoup and L.E. Hornberger, Prentice-Hall, 2004, ISBN 9780130489890
<b>COMPUTER USAGE</b>	
<b>COURSE LEARNING OUTCOMES (CO)</b>	By the end of the course students should be able to: <ol style="list-style-type: none"><li>1. Design a helical spring (to determine standard wire diameter, mean helix radius, minimum volume of spring material and number of active coils) if maximum stress, static load and deflection are given.</li><li>2. Calculate permissible values of maximum and minimum loads, if a helical spring is carrying fluctuating load.</li><li>3. Calculate the stress in a bolt when it is designed to carry an impact load.</li><li>4. Determine the pitch of a power screw to raise a given load at a given speed with a given power consumption.</li><li>5. Determine the torque a cone clutch can exert, the engaging force required for steady operation and the friction power for a given speed.</li><li>6. Determine angle of contact between lining and drum of a band brake exerting certain amount of torque, if the maximum pressure between the lining and the drum and the coefficient of pressure are given.</li><li>7. Find the length of leg of a system of fillet welds used to weld a bracket/beam to a support, if the bracket/beam is loaded (steady &amp; fluctuating) eccentrically.</li><li>8. Find the permissible load for a riveted joint if the resultant shearing stress for the most highly stressed rivet is given.</li><li>9. Evaluate load carrying capacity of 120°, 180° and 360° central partial journal bearings.</li><li>9. Compute rating life of a ball bearing subjected to steady load and variable load.</li></ol>

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10. Find the contact ratio for a spur gear pair if diametral pitch and pressure angle are specified.
11. Find the helix angle of a worm gear set if worm and wheel pitch diameters are given.
12. Find the value of the diametral interference between the shaft and the hub when they are press fitted.
13. Evaluate the maximum stress in the material of a disk fly wheel and the kinetic energy delivered due to fluctuation of speed.

**CLASS TOPICS**

Springs, Screws, Belts, Clutches, Brakes and Chains, Welded Connections, Riveted Connections, Lubrication, Ball Bearings, Spur Gears, Helical, Bevel and Worm Gears, Shrink fit, Disk Flywheel

**STUDENT OUTCOMES**

The Course Outcomes support the achievement of the following MET Student Outcome.

**Student outcome (1)** - an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline

**Course Outcome** – 4, 5, 9

**Student Outcome (2)** - an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;

**Course Outcome** – 1 to 13

**GRADING POLICY**

Homework/Quiz	15 %
Exams	54 %
Final Exam	31 %

Note: Grading Policy may be modified by Instructor for each Section in the Course)

**Note:** Cannot pass course if you having failing grades on exams and final exam.

There are three exams during the semester. The lowest grade will be dropped. However, if you achieve an A for all three exams, you will not be excused from the final. There will be no makeup exams – if you miss one exam, then that is the test you will drop.

**ACADEMIC INTEGRITY**

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to <http://www.njit.edu/academics/honorcode.php>

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**STUDENT BEHAVIOR**

- No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories.
- Cellular phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate.
- No headphones can be worn in class.
- Unless the professor allows the use during lecture, laptops should be closed during lecture.
- During laboratory, if you are finished earlier, you must show the professor your work before you leave class
- Class time should be participative. You should try to be part of a discussion

**MODIFICATION TO COURSE**

The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline.

**PREPARED BY**

Samuel C. Lieber

**COURSE COORDINATED BY**

Dr. A. Sengupta

**CLASS HOURS**

Monday	8:30 AM – 9:50 PM	CKB 226
Wednesday	8:30 AM – 9:50 PM	CKB 226

**OFFICE HOURS:**

Wednesday 10:30 AM – 11:30 AM GITC 2100

By Appointment: [samuel.lieber@njit.edu](mailto:samuel.lieber@njit.edu)

**HOMEWORK - IMPORTANT**

- Homework assigned by the instructor is due the week following the date they are assigned, and must be given to the instructor.
- There are no makeup Quizes.

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**GRADING LEGEND**

<b>GRADE</b>	<b>NUMERIC RANGE</b>
A	90 to 100
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
D	60 to 69
F	0 to 59

**NJIT ONLINE INFORMATION**

The instructor will discuss these requirements on the first day of the course and/or post on their Learning Management System (LMS). Please become familiar

- Webex: <http://ist.njit.edu/webex>
- Online Proctoring: <https://ist.njit.edu/online-course-exam-proctoring>

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**COURSE OUTLINE**

WEEK	DATE	TOPICS	SECTIONS	ASSIGNMENTS
1	1/18 1/23	Springs	4-1 thru 4-12, 4-17	4.1, 4, 9, 10, 12
2	1/25 1/30	Screws	5-1 thru 5-9	5.2, 3, 4, 9, 16
3	2/1 2/6	Belts, Clutches, Brakes, and Chains	6-1 thru 6-8	6.1, 3, 8, 10, 11
4	2/8 2/13	Belts, Clutches, Brakes, and Chains, (Cont.) <b>Exam No. 1</b>	6-9 thru 6-18	6.13, 15, 27, 28
5	2/15 2/20	Welded Connections	7-1 thru 7-12	7.2, 3, 5, 8, 9
6	2/22 2/27	Riveted Connections	7-13 thru 7-18	7.15, 17, 19, 20, 27
7	3/1 3/6	Lubrication <b>Exam No. 2</b>	8-1 thru 8-10	8.1, 2, 3, 5, 7
8	3/8 3/20	Lubrication (Cont.)	8-11 thru 8-17	8.10, 15, 19, 25
<b>NO CLASS 3/13 &amp; 3/15 SPRING BREAK</b>				
9	3/22 3/27	Ball and Roller Bearings	9-1 thru 9-15	9.1, 5, 6, 9
10	3/29 4/3	Spur Gears	10-1 thru 10-16	10.3, 5, 6
11	4/5 4/10	Spur Gears (Cont.)	10-18 thru 10-22	10.10, 13, 25
12	4/12 4/17	Helical, Bevel and Worm Gears <b>Exam No. 3</b>	11-1 thru 11-8	11.4, 12, 16, 19, 21
13	4/19 4/24	Impact Stress Curved Beams	12.7 to 12.10 12.14 to 12.16	12.20, 21, 22, 29
14	4/26 5/1	Shrink & Press Fits Gaskets & Seals	12-2 12-11	
	TBD	<b>FINAL EXAM</b>		