

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

COURSE NUMBER	MET 302
COURSE NAME	Analysis & Design of Machine Elements II
COURSE STRUCTURE	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/INSTRUCTOR	Dr. J. Sodhi/ Ahmed Belal
COURSE DESCRIPTION	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.
PREREQUISITE(S)	MET 301
COREQUISITE(S)	
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
REQUIRED MATERIALS	Text: Design of Machine Elements, 8 th Ed. by M.F. Spotts, T.E. Shoup and L.E. Hornberger, Prentice-Hall, 2004, ISBN 9780130489890
COMPUTER USAGE	
COURSE LEARNING OUTCOMES (CO)	<p>By the end of the course students should be able to:</p> <ol style="list-style-type: none"> 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. 2. Calculate permissible values of maximum and minimum loads, if a helical spring is carrying fluctuating load. 3. Calculate the stress in a bolt when it is designed to carry an impact load. 4. Determine the pitch of a power screw to raise a given load at a given speed with a given power consumption. 5. Determine the torque a cone clutch can exert, the engaging force required for steady operation and the friction power for a given speed. 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. 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 & fluctuating) eccentrically. 8. Find the permissible load for a riveted joint if the resultant shearing stress for the most highly stressed rivet is given. 9. Evaluate load carrying capacity of 120°, 180° and 360° central partial journal bearings. 10. Compute rating life of a ball bearing subjected to steady load and variable load.

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11. Find the contact ratio for a spur gear pair if diametral pitch and pressure angle are specified.
12. Find the helix angle of a worm gear set if worm and wheel pitch diameters are given.
13. Find the value of the diametral interference between the shaft and the hub when they are press fitted.
14. 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	15 %
Tests	54 %
Final Exam	31 %

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

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

ACADEMIC INTEGRITY

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: NJIT Academic Integrity Code.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any

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student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

GENERATIVE AI

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the assignments noted by the instructor, as doing so would undermine student learning and achievement of course learning outcomes. Additionally, if and when students use AI in this course, the AI must be cited as is shown within the [NJIT Library AI citation page](#) for AI. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

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

Ahmed Belal / Dr. J. Sodhi

COURSE COORDINATED BY

Dr. J. Sodhi

CLASS HOURS

Tuesday 6:00 PM – 8:50 PM KUPF 210

OFFICE HOURS:

By Appointment: asb62@njit.edu

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HOMEWORK - IMPORTANT

Homework is due the week following the date they are assigned (see syllabus), and must be given to the instructor.

GRADING LEGEND

GRADE	NUMERIC RANGE
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

- Canvas: <https://canvas.njit.edu/>
- Zoom: <https://njit-edu.zoom.us/>
- Online Proctoring: <https://ist.njit.edu/online-course-exam-proctoring>

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COURSE OUTLINE

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