

New Jersey Institute of Technology
Department of Engineering Technology
MET 314 Dynamics of Machinery

COURSE NUMBER	MET 314
COURSE NAME	Dynamics of Machinery
COURSE STRUCTURE	2-2-3 (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. A. Sengupta/ Mina Botros
COURSE DESCRIPTION	Acquaints students with motion and forces in machines. Topics include velocity and accelerations in linkages, gears, cam and gear trains, static and dynamic forces, and torques in linkages.
PREREQUISITE(S)	MET 236 or MECH 236, and MATH 238 or MATH 112, and MET 105 or FED 101
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
REQUIRED MATERIALS	Design of Machinery, 6th Ed. by Robert Norton, McGraw Hill, 2019, ISBN 9781260113310
COMPUTER USAGE	Microsoft Office; Instructor Specified
COURSE OUTCOMES (CO)	By the end of the course students should be able to: <ol style="list-style-type: none">1. Analyze motion of points on a four-bar linkage, and forces due to inertial loading.2. Determine contact ratio and interference on spur gears.3. Determine drive train ratios.4. Measure speed of rotating machinery components.
CLASS TOPICS	Introduction, Mechanisms and Machines, Motion in Machinery, Velocity Analysis -Analytical and Graphical methods, Acceleration Analysis, Static Forces on Mechanism, Spur Gears-Contact Ratio and Interference, Drive Trains. Project: Designing a successful moving mechanism.
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;

Related CO – 1,2,3

Student Outcome (3) - an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature

Related CO – 4

Student outcome (4) - an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;

Related CO – 4

Student outcome (5) - an ability to function effectively as a member as well as a leader on technical teams.

Related CO – 4

GRADING POLICY

Homework	15 %
Tests (2 @ 15% ea.)	30 %
Laboratory	10%
Project / Project Presentation	15%
Final Exam	30%

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>

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.

**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

Mina Botros

**COURSE COORDINATED
BY**

Dr. A. Sengupta

CLASS HOURS

Tuesday 6:00 PM – 7:55 PM FMH 308

Tuesday 8:05 PM – 10:00 PM ME 214

OFFICE HOURS:

By appointment E-mail: mns34@njit.edu.

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

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

COURSE OUTLINE

Week	Date	Topics	Reading Assignment	Homework Assignment
1	1/17	Introduction (1.0-1.4, 1.10) Kinematics Fundamentals (2.0-2.7, 2.12-2.13, 2.18)	pp. 3-7, 17-20 pp. 30-46 pp 53-62 pp. 69-73	Special Problems
2	1/24	Graphical Linkage Synthesis (3.0-3.6, 3.8)	pp. 98-133 pp.141-148	Special Problems
3	1/31	Positional Analysis (4.0-4.5)	pp. 178-195	Special Problems
4	2/7	Positional Analysis (4.6-4.13) Homework Package #1 Due	pp. 196-213	Special Problems
5	2/14	Velocity Analysis (6.0-6.4) Lab. # 1 Oscilloscope	pp. 291-313	Special Problems
6	2/21	Velocity Analysis (6.7 & 6.9) Midterm #1	pp. 321-330 pp. 331-333	Special Problems
7	2/28	Acceleration Analysis (7.0-7.2) Homework Package #2 Due Lab #1 Due	pp.357-365	Special Problems
8	3/7	Acceleration Analysis (7.3 & 7.5)	pp.365-379 pp. 380-382	Special Problems
NO CLASS 3/14 SPRING BREAK				
9	3/21	Dynamic Force Analysis (11.0-11.4)	pp.589-605	Special Problems
10	3/28	CAM Design (8.0-8.3) Midterm #2	pp. 409-442	Special Problems
11	4/4	CAM Design (8.6-8.7) Lab. # 2 Speed Measurements	pp.460-478	Special Problems
12	4/11	Gear Trains (9.0-9.8)	pp. 490-520	Special Problems
13	4/18	Gear Trains (9.9-9.10) Lab #2 Due Homework Package #3 Due	pp. 520-532	Special Problems
14	4/25	Balancing (12.0-12.2) Project Presentation Review (Project Due)	pp. 642-650	
15	TBD	FINAL EXAM		