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. J. Sodhi/ Prof. 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 TEXT	Motion Simulation and Mechanism Design with SOLIDWORKS Motion 2025, 14th edition. SDC Publications. Print ISBN: 9781630577131. eText ISBN:9781630569563 Kinematics and Dynamics of Machinery by Robert Maxwell (Open Access) Mechanisms and Mechanical Devices Sourcebook by Neil Sclater, 5th Edition. ISBN: 9780071704427. Available via Access Engineering for free Kinematics and Dynamics of Mechanical Systems: Implementation in MATLAB and Simscape Multibody by Russell, Kevin; Shen, John Q; Sodhi, Raj S (Open Access)
REFERENCE TEXT	**Design of Machinery, 6th Ed.** by Robert Norton, McGraw Hill, 2019, ISBN 9781260113310
COMPUTER USAGE	Microsoft Office; SolidWorks; Instructor Specified

COURSE OUTCOMES (CO)

By the end of the course students should be able to:

1. Formulate a linkage mechanism to meet provided specifications.
2. Analyze the position, velocity and acceleration of linkage mechanisms.
3. Evaluate dynamic force interaction on a linkage mechanism.
4. Formulate a cam-follower to meet provided specifications.
5. Analyze the motion of a cam-follower system.
6. Use computer-based Finite Element Analysis (FEA) tools to design mechanisms and simulate/validate their motion.

CLASS TOPICS

Introduction, Mechanisms and Machines, Motion in Machinery, Velocity Analysis -Analytical and Graphical methods, Acceleration Analysis, Dynamic Forces on Mechanism, Balancing, 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 -5

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 – 6

Student outcome (4) - an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;
Related CO – 6

Student outcome (5) - an ability to function effectively as a member as well as a leader on technical teams.
Related CO – 6

GRADING POLICY

Homework/Quizzes	10 %
Tests (2 @ 15% ea.)	30 %

	Labs	15%
	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 https://www.njit.edu/dos/university-code-academic-integrity

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.

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

Prof. Mina Botros / Dr. J. Sodhi

COURSE COORDINATED BY

Dr. J. Sodhi

CLASS HOURS

Wednesday	6 – 7:55 PM	FMH 309
Wednesday	8:05 – 10 PM	PC MALL 39

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

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

COURSE OUTLINE

Week	Date	Topics	Lab Textbook Chapter
1	9/3	Introduction Kinematics Fundamentals	
2	9/10	Graphical Linkage Synthesis	Introduction (HW)
3	9/17	Graphical Linkage Synthesis	Chapter 2
4	9/24	Positional Analysis **Homework Package #1 Due**	
5	10/1	Positional Analysis	Chapter 3
6	10/8	Velocity Analysis **Midterm #1**	
7	10/15	Velocity Analysis **Homework Package #2 Due**	Chapter 4
8	10/22	Acceleration Analysis	
9	10/29	Acceleration Analysis	Chapter 6
10	11/5	Dynamic Force Analysis **Midterm #2**	
11	11/12	CAM Design	Chapter 7
12	11/19	CAM Design	Chapter 10
13	12/3 (No class on 11/26)	Balancing **Homework Package #3 Due**	Chapter 12
14	12/10	Review **(Project Due)**	
15	TBD	**FINAL EXAM**	