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MET 314-102: Dynamics of Machinery

Mina Botros

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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, MET 237, MATH 238, MET 105, CS 106
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
REQUIRED MATERIALS	Kinematics and Dynamics of Machinery, 3rd Ed. by Wilson and Saddler, Prentice-Hall, 2003, ISBN 9780201350999
COMPUTER USAGE	Microsoft Office
COURSE LEARNING OUTCOMES	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 Learning Outcomes support the achievement of the following MET Student Outcomes and TAC of ABET Criterion 9 requirements: Student outcome b - an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;

Related CLO – 1

Student outcome c - an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;

Related CLO – 4, 5

Student outcome e - an ability to function effectively as a member or leader on a technical team

Related CLO – 4,5

Student outcome f - an ability to identify, analyze, and solve broadly-defined engineering technology problems

Related CLO – 2, 3

Student Outcome g - an ability to communicate effectively regarding broadly-defined engineering technology activities

Related CLO – 4, 5

Student Outcome l - technical expertise in dynamics, fluid mechanics, and thermodynamics

Related CLO – 1-3

Student Outcome l - technical expertise having added technical depth in mechanical design, solid mechanics, and electro-mechanical devices and controls

Related CLO – 4, 5

GRADING POLICY

Homework, Attendance and Class Participation	10 %
Tests (2 @ 20% ea.)	40 %
Laboratory and Project	15%
Final Exam	35%

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 5:45 PM – 7:40 PM CKB 320

Tuesday 7:50 PM-9:45 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

COURSE OUTLINE

Week# / Date	Topics	Reading Assignment	Homework Assignment
1 Jan 21	Introduction Mechanisms and Machines	pp. 1-50	Special Problems
2 Jan 28	Motion in Machinery	pp. 99-116 pp. 126-135	Special Problems
3 Feb 4	Velocity Analysis (Analytical/Graphical method)	pp. 161-167 pp. 172-183	Special Problems
4 Feb 11	Velocity Analysis (Analytical/Graphical method) Homework Package #1 Due	pp. 188-191 pp. 204-221 pp. 228-231	
5 Feb 18	Lab. # 1 Oscilloscope Midterm #1	pp. 260-263 pp. 265-270	Special Problems
6 Feb 25	Acceleration Analysis (Analytical/Graphical Method)	pp. 277-292	Special Problems
7 Mar 3	Acceleration Analysis – Continued Homework Package #2 Due Lab #1 Due	pp. 299-304 pp. 307-308 pp. 311-313	Special Problems
8 Mar 10	Static Forces on Mechanism Midterm #2	pp. 609-625	Special Problems
SPRING BREAK 3/15-3/22			
9 Mar 24	Dynamic Forces on Mechanism Last Day to Withdraw class	pp. 685-703	Special Problems
10 Mar 31	Spur Gears-Contact Ratio - Interference	pp. 401-441	Special Problems
11 Apr 7	Cont'd Lab. # 2 Speed Measurements		Special Problems
12 Apr 14	Drive Trains	pp. 511-531	Special Problems
13 Apr 21	Cont'd Lab #2 Due Homework Package #3 Due		Special Problems
14 Apr 28	Review (Project Due)		-
15TBD	FINAL EXAM		