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MECH 236 - 005: DYNAMICS - Hybrid

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JOHN A. REIF, JR. DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING

NJIT New Jersey Institute of Technology

MECH 236 - Engineering Mechanics: Dynamics (Hybrid) Fall 2024

Text:
1. Hibbeler, R.C., Engineering Mechanics-Dynamics, **15th Edition**, Prentice Hall, 2010, ISBN 978-0-13-481498-8 or 0-13-481498-3
2. NCEES, Fundamentals of Engineering Supplied-Reference Handbook, latest edition: Download from the NCEES website for FREE: **https://ncees.org/ncees-publishes-new-version-of-fe-reference-handbook/**

Instructor: Prof. G. Milano, 239 Colton Hall, 973-596-5830, milano@njit.edu

TA: Khadka Prabhakar, PhD Candidate, pk734@njit.edu

Prerequisite: Mech 235 (or Mech 234 for EE, CoE, IE, ME majors). Provides an understanding of the mathematics of the motion of particles and rigid bodies, and of the relation of forces and motion of particles.

WEEK	TOPIC	ARTICLES	HOMEWORK
1, Sept. 3, F2F	Linear Motion	12.1, 2, 4, 5	12-1, 3, 5, 13
2, Sept. 10, F2F	Projectile Motion	12.6 - 7	12-86, 87, 89, 93
3, Sept. 17, ONL	Dependent and Relative Motion	12.9 - 10	12-205, 207, 211
4, Sept. 24, F2F	Kinetics: Force & Acceleration	13.1 - 13.4	13-3, 9, 10, 14
5, Oct. 1, ONL	Equations of Motion	13.4 - 13.5	13-57, 71, 74
6. Oct. 8, F2F	**Exam 1, Ch. 12 & 13**		
7, Oct. 15, F2F	Work and Energy	14.1 - 14.6	14-1, 9, 15, 33, 47
8, Oct. 22, ONL	Impulse and Momentum	15.1 - 15.3	15.1, 2, 3, 18
9, Oct. 29, ONL	Rigid body: Relative Velocity	15.4	15.74, 86, 89, 91
10, Nov. 5, F2F	**Exam 2, Ch. 14 & 15**		
11, Nov. 12, F2F	Planar Kinematics of Rigid Body	16.1 - 4	16.3, 5, 18
12, Nov. 19, ONL	Relative Motion	16.5	16.59, 61, 63
13, Dec. 3, F2F	**Exam-3, Ch. 16**		
14, Dec. 10, F2F	Kinetics of a Rigid Body	17.1 - 4	17.25, 27
15	Final Exam - TBA		

TUTORIAL HELP:
Tutorial schedule is posted on Canvas (in person in 423-Colton Hall and Zoom link)

GRADING:		**The grade schedule:**	
Homework	16 %		
Exam-1	21 %	A = 90+	C = 65+
Exam-2	21%	B+ = 80	D = 60+
Exam-3	21%	B = 75+	F = 59 or less
Final Exam	21%	C+ = 70+	W
Total	100%		

Incomplete = given in rare instances where the student is unable to attend or otherwise do the work of the course due to illness, etc. The grade must be made up in the next semester by completing all of the missed work.

EXAMs:
Generally, calculator is needed for all exams. Other electronic device, storage medium, or accessory of any kind, are NOT allowed during any exam.

HOMEWORK:
To obtain full credit, you must submit the work on time and in the proper form. A minimum of 70% of the homework must be submitted to receive a passing grade in the course. Late homework will NOT be accepted.

The followings are required for homework:

1. On the top of the first page, PRINT your name, class day and time (e.g. Tuesday 6pm), date.
2. The problems must be presented in numerical order as assigned. If more than one problem on the same page**, a clear dividing line is required between problems.** (Do not write one problem on two pages). Writings are to be neat, clear and legible.
3. Draw neat, clear free body diagrams as required. Use a straight edge if needed.
4. Box the final answer(s) with unit(s) (and direction if needed).
5. **All hw submission will be on Canvas. Do not email HW.**

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: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

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

This course expects students to work without artificial intelligence (AI) assistance in order to better develop their skills in this content area. As such, AI usage is not permitted throughout this course under any circumstance.

Outcomes Course Matrix – MECH 236 Dynamics

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Identify transition concepts from Physics (science) to Dynamics (engineering).			
Present engineering approach and problem solving techniques.	1	1	Homework, tests and success future courses.
Student Learning Outcome 2: Analyze and solve kinematics, kineties of particles and rigid bodies in engineer dynamics problems.			
Discuss the underlying concepts, principals and procedures of dynamics of particles and rigid bodies.	1	1	Homework, tests and success future courses.
Student Learning Outcome 3: Formulate, diagram and solve FBD problems.			
Require FBD's for all problems .	1, 2	1	Homework, tests and success future courses.
Illustrate the problem solving process including FBD, equation formulation and mathematical solution.	1	1	Homework, tests and success future courses.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program educational objectives are reflected in the achievements of our recent alumni:

1 – Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Alumni will advance their skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: Fall 2021