

Syllabus

Advanced Dynamics

Term: Fall 2020
Course No.: MEC 568
Credit : 3 credits
Class material: Class lecture notes and a textbook
Textbook: Title: TBD
Publisher: Prentice Hall, Pearson Education, Inc.
Year: 2013 by R.C. Hibbeler
Upper Saddle River, NJ 07458
ISBN-10: 0-13-291127-2
ISBN-13: 978-0-13-291127-6

References: TBD
Software: MATLAB (any version)
Instructor: Associate Professor Bruce W. Jo, Ph.D.
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Class hours: TBA
Classroom: TBA
Office hours: TBA

Last day to withdraw: TBA

Course description: This course is intended to strengthen the students' capabilities in analyzing forces and torques and their effects on rigid bodies including velocity and acceleration polygons of links and mechanisms, Coriolis acceleration, center of percussion, impact, moment of inertia and free body diagrams. This course will also introduce the student to the vibration phenomenon and its importance in mechatronics and mechanical engineering as well as in structural systems. This course will introduce to the student the mathematical modeling of dynamics systems, vibration systems, its analysis and control.

Prerequisite: Undergraduate Dynamics

Learning objectives: The primary objective in teaching Advanced Dynamics is to help the student develop his/her ability to apply the principles of forces and acceleration, work and energy, impulse and momentum and conservation of angular momentum to analyze the motion of rigid bodies under the

effect of forces and torques, in addition to study free and forced vibrations of mechanical systems.

Expected learning outcomes:

At completing this lecture students should be able to understand:
Knowledge and understanding: understanding the kinetics of particles and rigid bodies. Understanding the principles of vibration
Cognitive skills (thinking and analysis): modeling the system behavior and deriving its mathematical equations.
Communication skills (personal and academic)
Practical and subject specific skills (transferable skills)

Academic honesty and integrity:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Instructors are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

Disability accommodation statement:

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation are confidential.

Critical Incident:

Stony Brook University expects students to respect the rights, PRIVILEGES, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.

Ethics and disability act:

Students may consult with one another on solutions but copying another student's code is strictly prohibited. Students should write their own code. Using code found on books or internet is prohibited. The instructor follows general university "Academic dishonesty/cheating policy."

Attendance policy: **No make-up will be given for ANY missed quizzes, tests or assignments. Homework must be submitted before the class starts on the day it is due. Late homework will get reduced scores.**

Electronics: The use of cellular phones (*of any kind* – voice, texting, games, use of PDA), MP3 players and other electronic equipment is strictly prohibited during class. Students should keep cell phones on silent mode. Laptop can only be used for taking notes.

Grading policy: **Homework: 50%**
1 Midterm exams: 20%
Final (comprehensive): 30%

Blackboard: All homework assignments will be posted on the Blackboard course account (<http://blackboard.sunysb.edu>). For problems logging in, go to the helpdesk in the Main Library SINC Site or the Union SINC Site, you can also call: 631-632-9602 or e-mail: helpme@ic.sunysb.edu
I use email and blackboard exclusively to communicate with you off class. It is your responsibility to make sure that your email id is a current one on the blackboard system. I suggest that you use a university email id for this class; it is free and official. I am not responsible for the emails not delivered to your commercially available email accounts.

Tentative lecture outline

Week	Date	Chapter	Description
1	08/24	1	Introduction to Particle Dynamics
2	08/31	1	Introduction to Particle Dynamics
3	09/07	1	Introduction to Particle Dynamics
4	09/14	1	Lagrange's equation
5	09/21	2	Lagrange's equation
6	09/28	3	No Class (Chuseok)
7	10/05	3	Kinematics of a rigid body
8	10/12	4	Dynamics of a rigid body
9	10/19		Midterm exam
10	10/26	4	Equations of motion: differential approach
11	11/02	4	Equations of motion: differential approach
12	11/09	5	Equations of motion: differential approach
13	11/16	5	Equations of motion: integral approach
14	11/23	5	Equations of motion: integral approach
15	11/30		Last class (review session)
16	12/07		Final exam

- This is subject to change.