Stony Brook University

MECHANICAL ENGINEERING

Syllabus

Important Note: Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. It is your responsibility to check Brightspace for corrections or updates to the syllabus. Any changes will be clearly noted in course announcement or through email.

Part 1: Course Information

Course Title: Engineering Dynamics

Course Catalog # & Section: MEC 262

Credit Hours: 3

Lectures: MonWedFri 9:15AM – 10:10AM, Frey Hall 102 (Prof. Wang)

Recitations:

MEC 262-R01: Mon 4:25PM - 5:20PM, Melville LBR W4525 (Prof. Stewart)

MEC 262-R02: Mon 1:00PM - 1:55PM, Heavy Engineering 201 (Prof. Stewart)

MEC 262-R03: Wed 4:25PM - 5:20PM, Light Engineering 102 (Prof. Stewart)

Instructor Name: Lifeng Wang, William Stewart

Instructor Contact Information:

Prof. Wang, Email: Lifeng.Wang@stonybrook.edu

Prof. Stewart, Email: William.Stewart@stonybrook.edu

Office Hours:

Prof. Wang, Wednesday & Thursday 10:30AM – 12:00PM (Light ENG 141)

Prof. Stewart, Tuesday 10:30AM – 12:00PM & 2PM – 3:30PM (Heavy ENG 214)

Teaching Assistants:

Mrs. Huan Liu (Huan.Liu.1@stonybrook.edu, office hours: Thursday 1PM – 4PM, Heavy ENG 131

Mr. Sriram Chembai Ganesh (sriram.chembaiganesh@stonybrook.edu) office hours: Friday 10:30AM – 12:00PM & 2PM – 3:30PM, Light ENG 158

Course Description:

This Engineering Dynamics (MEC 262) class focuses on the vectorial kinematics and dynamics of particles and rigid bodies. The students learn to represent and compute displacement, velocity, and acceleration of particles and rigid bodies in different coordinate systems. Further upon, they learn to relate forces and motions of particles and rigid bodies using Newton's laws and Newton-Euler equations. Free, forced, and damped vibrations of particles and rigid bodies are presented in the end.

Required Course Textbook and Materials:

For this course you will be required to purchase McGraw-Hill Education Connect® access for Connect-Semester Online Access or Access Card for **Engineering Dynamics, 2nd edition by Gray, Costanzo, and Plesha**. The Connect Access includes eBook. You are not required to have a print text and please be aware if you purchase a used textbook you will still need to purchase Connect access.

Connect codes are available for purchase at the SBU Online bookstore or through Connect directly. Additionally, if you would like a print version of the text to accompany the eBook in Connect, a print-upgrade option is available via Connect once you log on to the Connect web site.

Title: Engineering Dynamics: Dynamics (USCS edition) + Connect Access Card for Dynamics
Authors: Gary Gray; Francesco Costanzo; Michael Plesha
Edition: 2nd
ISBN: 9781259877162 (this ISBN is for our book store only and is not searchable on the internet.)
Publisher: McGraw-Hill Higher Education

Math and Statics Pre-Requisites:

From your pre-requisite class (A grade of "C" or better in MEC 260), you should have acquired a working knowledge of

- Basic Trigonometry (sines, cosines, basic trigonometry formula, etc.) and Geometry
- Vector Calculus (differentiating and integrating vector functions) and Vector Algebra (adding two vectors, Dot and Cross products, etc.)
- Free Body Diagram (FBD)
- Differential and Integral Calculus.

How We Will Communicate:

Course-related questions and other personal/private issues, the preferred method of contact is via email listed at the top of this syllabus. Your Stony Brook University email must be used for all University related communications. You must have an active Stony Brook University e-mail account and access to the Internet. *All instructor correspondence will be sent to your SBU e-mail account.* Please plan on checking your SBU email account regularly for course related messages. To log in to Stony Brook Google Mail, go to http://www.stonybrook.edu/mycloud and sign in with your NetID and password.

We are using Brightspace, a digital learning environment, for this course. To learn more and for SUNY Online helpdesk information, visit: https://brightspace.stonybrook.edu. If you would like, you can add a link to Brightspace in your Blackboard "My Courses" list to easily move between

the LMS's during this transition. Information can be found:
https://it.stonybrook.edu/help/kb/adding-brightspace-course-to-bb-course-list.

Technical Assistance:

DoIT provides technical assistance to all students. If you require assistance with hardware or using any supported applications, available support options include:

- Visit one of DoIT's Tech Stations
- Access self-help materials
- Submit a ticket online at service.stonybrook.edu
- Chat live with a student consultant
- Call 631-632-9800 for assistance (2-9800 from on campus)

If you need assistance with Brightspace, you can access resources from the Brightspace Resources link on Stony Brook Brightspace homepage (https://brightspace.stonybrook.edu) or contact the SUNY helpdesk via phone/ticket/live chat at: https://online.suny.edu/help/

Need a laptop? You can borrow a laptop from the Melville LIbrary SINC Site. Details can be found at: https://it.stonybrook.edu/services/student-laptop-loaner-program

Part 2: Course Learning Objectives and Assessments

Learning Objectives and Activities:

Upon completion of the course, students will be able to:

1. Determine the position, velocity and acceleration of a particle and system of particles in Cartesian, Polar as well as Normal and Tangential coordinate systems.
2. Draw Free Body Diagrams and apply Newton's laws of motion to calculate (1) the displacement, velocity, and acceleration of a particle system caused by given forces, and (2) the forces needed for a particle system to move in a prescribed way.
3. Compute work, potential energy and kinetic energy for particle(s), and apply work-energy approach to problems where forces and acceleration are not primary quantities of interest and to use these principles to obtain velocity, displacement, and the work done by external forces
4. Compute Momentum and Impulse of particle(s) and apply Momentum-Impulse approach to problems where velocity, time, and forces are related in a more natural way.
5. Determine the velocity and acceleration components of a system of connected rigid bodies with pinned, sliding and rolling connections.
6. Draw Free Body Diagram and apply Newton-Euler equations to relate forces and moments acting on rigid bodies in planar motion with their linear and angular acceleration.
7. Compute potential- and kinetic-energy for a system of interconnected rigid bodies moving in a plane, and apply work-energy principle to the problems where forces and acceleration are not primary quantities of interest and to use these principles to obtain velocity, displacement, and the work done by external forces.
8. Derive and solve differential equation of motions for particles and rigid bodies under free, forced, and damped vibrations.

Assignments and Expectations:

- Homework is to be completed in McGraw-Hill Connect, which is accessible through Brightspace under Homework Assignment.
- For each problem, you will have unlimited attempts. Your highest score will be recorded on Brightspace.
- Homework will be automatically submitted in Connect at the time and date due. Solutions can be accessed through Connect 1 hour after the homework is due.
- Please contact McGraw-Hill or a TA if you have problems with Connect.

Exams:

- All exams will be closed book and closed notes. An exam absence will be scored as a zero. Make-up exam policy is consistent with university policy.
- You must bring your Stony Brook ID, two or more pencils, and an approved scientific calculator to each exam.
- The dates and times will be announced in advance.

Assessment and ABET Student Outcomes:

The relevant ABET Student Outcomes are:

1. **An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.**

(1a) Select appropriate model for the problem.
(1b) Prepare a solution that exhibits logical sequence of steps that are consistent with the model.
(1c) Demonstrate a correct solution to the problem.
(1d) Present solution in appropriate format.

Performance Indicator	5=Exemplary	4=Good	3=Adequate	2=Marginal	1=Unacceptable
Appropriate Model	Best model is selected for the problem.	A correct model is selected.	A correct model is chosen, but there are some conceptual errors.	Incorrect model is selected for the problem.	No model is selected for the problem.
Logically Consistent Solution	There is a complete and detailed sequence of steps to the solution.	There is a complete sequence of steps to the solution.	There is a correct sequence of steps to the solution.	There is a partially correct sequence of steps to the solution.	There is no logical sequence of steps to the solution.
Correct Solution	The solution is conceptually correct, with no procedural errors.	The solution is conceptually correct, with only minor procedural errors.	The solution is conceptually correct, but contains procedural errors.	The solution contains several conceptual or procedural errors.	The solution contains major conceptual or procedural errors.
Present Result	Presentation of results is detailed, well organized, and clear. All intermediate steps are shown.	Presentation of results is detailed and clear. All intermediate steps are shown.	Presentation is clear. All intermediate steps are shown.	Presentation is neat, but not all intermediate steps are shown.	Presentation is sloppy. Intermediate steps are not shown. Illegible.

Part 3: Course Schedule

****subject to changes****

Please note that this schedule is tentative. Our exact schedule during the semester might differ depending on our progress, weather related class cancellations etc. Updates to this schedule will be posted on Brightspace.

Week	Date	Contents	Assignments
1	Mon	Section 1.1	
	Wed	Section 1.2	
	Fri	Section 2.1	Homework-1
2	Mon	Section 2.2	
	Wed	Section 2.3	
	Fri	Section 2.4	Homework-2
3	Mon	Section 2.5	
	Wed	Section 2.6	
	Fri	Section 2.7	Homework-3
4	Mon	Section 2.8	
	Wed	Section 3.1-1	
	Fri	Section 3.1-2	Homework-4
5	Mon	Section 3.2	
	Wed	Section 3.3	
	Fri	Exam 1 review	Homework-5
6	Mon	Section 4.1	
	Wed	Section 4.2	
	Fri	Midterm I, Chapters 1-3	Homework-6
7	Mon	Section 4.3	
	Wed	Section 4.4	
	Fri	Section 5.1	Homework-7
8	Mon	Spring Break	
	Wed	Spring Break	
	Fri	Spring Break	
9	Mon	Section 5.2	
	Wed	Section 5.3	
	Fri	Section 6.1	Homework-8
10	Mon	Section 6.2	
	Wed	Section 6.3	
	Fri	Section 6.4	Homework-9
11	Mon	Exam 2 review	
	Wed	Section 7.1	
	Fri	Section 7.2	Homework-10
12	Mon	Midterm II, Chapters 4-6	
	Wed	Section 7.3	
	Fri	Section 7.4	Homework-11
13	Mon	Section 8.1	
	Wed	Section 8.2	
	Fri	Section 9.1	Homework-12
14	Mon	Section 9.2	
	Wed	Section 9.3	
	Fri	None	Homework-13
15		Final Exam review	
16		Final Exam, TBA, Comprehensive	

Part 4: Grading

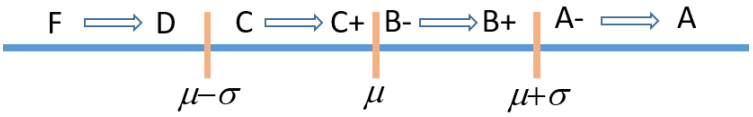
Assessment & Grading:

Points you've earned for graded activities will be posted to the Grades Center on Brightspace (automatically synced with McGraw-Hill connect)

Semester letter grade will be decided based on your aggregate score calculated as below:

- On-line Homework 30% (assigned through McGraw-Hill Connect)
- Midterm-1 20% (Chapters 1-3)
- Midterm-2 20% (Chapters 4-6)
- Final Exam 30% (Comprehensive)

Your final letter grade maybe be curved (only to improve) and will be decided based on the above weights and your relative placement in the class. The following scale shows roughly what your final letter grade range might look like, where μ is the average, and σ is the standard deviation.



For Example, if for a specific class, the mean is 63.7 and the standard deviation is 16, the grades are assigned as is shown in the following table:

At least 1 standard deviations above the mean	79.7 → 100	A- → A
Between 0 (inclusive) and 1 (exclusive) standard deviations above the mean	63.7 → 79.6	B- → B+
Between 1 (inclusive) and 0 (exclusive) standard deviations below the mean	47.7 → 63.6	C → C+
At least 1 standard deviations below the mean	0 → 47.6	F → D

Part 5: Course and University Policies

Students are expected to attend every class, report for examinations and submit major graded coursework as scheduled. If a student is unable to attend lecture(s), report for any exams or complete major graded coursework as scheduled due to extenuating circumstances, the student must contact the instructor as soon as possible. Students may be requested to provide documentation to support their absence and/or may be referred to the Student Support Team for assistance. Students will be provided reasonable accommodations for missed exams, assignments or projects due to significant illness, tragedy or other personal emergencies. In the instance of missed lectures or labs, the student is responsible for reviewing posted slides and recorded lectures.

Student Accessibility Support Center Statement:

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.
Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacuation/evacuation-guide-disabilities and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement:

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. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Professions, 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/commcms/academic_integrity/index.html

Critical Incident Management:

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards 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. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Course Materials and Copyright Statement:

Course material accessed from Bb, SB Connect, SB Capture or a Stony Brook Course website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the

copyright holder is a violation of the Federal copyright law, as well as a violation of Stony Brook's Academic Integrity and Student Conduct Codes.

Calculator Policy:

Effective Spring, 2009 only the following calculators are being permitted to be used on all midterm and final exams in the Department of Mechanical Engineering. There will be no exceptions. This list of calculators is identical to that allowed for the National Council for Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (FE) exam that many of you will take in your senior year as well as the Professional Engineering (PE) exam that you may take several years from now. The sooner you become comfortable on one of these calculators, the better.

NCEES Allowed calculators as of Nov 2011:
- Casio: All fx-115 models. Any Casio calculator must contain fx-115 in its model name.
- Hewlett Packard: The HP 33s and HP 35s models, but no others.
- Texas Instruments: All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name.
The NCEES policy on calculators can be found here: http://www.ncees.org/Exams/Exam-day_policies/Calculator_policy.php

Make-up exam Policy:

The class policy on make-up exams is consistent with university policy on Student Participation in University Sponsored Events, the policy on Final Exams and the New York State Education Law regarding Equivalent Opportunity and Religious Absences.

1. Student Participation in University Sponsored Events
https://www.stonybrook.edu/sb/bulletin/current/policiesandregulations/policies_expectations/participation_univsponsered_activities.php
2. University policy on Final Exams:
https://www.stonybrook.edu/sb/bulletin/current/policiesandregulations/records_registration/final_examinations.php
3. New York State Education Law regarding Equivalent Opportunity and Religious Absences
https://www.stonybrook.edu/sb/bulletin/current/policiesandregulations/policies_expectations/equivopportunity_religiousabsences.php.