Fall 2020

MECH 235-001: Engineering Mechanics: Statics

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NEW JERSEY INSTITUTE OF TECHNOLOGY

Department of Civil & Environmental Engineering

MECH 235: ENGINEERING MECHANICS: STATICS Fall 2020

Text: Beer, Johnston, et al, Vector Mechanics for Engineers, STATICS
McGraw-Hill, 12th Edition

- rental text ISBN: 9781259977268
- loose leaf text ISBN: 9781259977275
- soft cover text ISBN: 9781307445015

Class: **MECH 235-001**

Location: CTR ATRIUM. Converged Learning

Time: Lecture: Wednesday (9:00am – 10:20am). Saturday (10:30am-11:50am)
Recitation: Wednesday (12:30pm – 1:30pm)

Instructor: Prof. S. Saigal, Ph.D., P.E.
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Teaching Assistant: Bruno Bezerra de Souza. Email: bb322@njit.edu

***Prerequisites**: Phys 111, Math 112. Provides an understanding of equilibrium of particles and rigid bodies subject to concentrated and distributed forces.*

Students must earn a C or better in this course to register for Strength of Materials, MECH237.

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"

SYLLABUS

WEEK	TOPIC
1	Ch 1: Introduction Ch 2: Statics of Particles, Trig Method (sketch force polygon)
2	Ch 2: Rectangular Components Equilibrium of a Particle
3	Ch 2: Force in Space Forces and Equilibrium in Space
4	Ch 3: Rigid Bodies: Equivalent System of Forces Scalar (Dot) Products
5	Ch 3: Couples and Force-Couple Systems Equivalent Systems
6	Ch 4: Equilibrium of Rigid Bodies Equilibrium of a 2-Force Body
7	MIDTERM EXAM Ch 5: Centroids and Center of Gravity
8	Ch 5: Distributed Loads
9	Ch 6: Truss Analysis: Method of Joints
10	Ch 6: Truss Analysis: Method of Sections
11	Ch 6: Frame Analysis
12	Ch 9: Moments of Inertia
13	Ch 9: Parallel Axis Theorem
14	Review
15	FINAL EXAM

- Students will be informed in advance by the instructor of any modifications or deviation from the syllabus throughout the course of the semester.

SEMESTER WEEKS

MONTH	WEEK	DAY	DATE	COMMENTS
SEPT.	0	Tuesday	1-Sep	NJIT Classes Begin
	1	Wednesday	2-Sep	
		Saturday	5-Sep	
	2	Wednesday	9-Sep	
		Saturday	12-Sep	
	3	Wednesday	16-Sep	
		Saturday	19-Sep	
	4	Wednesday	23-Sep	
		Saturday	26-Sep	
	5	Wednesday	30-Sep	
OCT.		Saturday	3-Oct	
	6	Wednesday	7-Oct	
		Saturday	10-Oct	
	7	Wednesday	14-Oct	
		Saturday	17-Oct	
	8	Wednesday	21-Oct	
		Saturday	24-Oct	
	9	Wednesday	28-Oct	
		Saturday	31-Oct	
NOV.	10	Wednesday	4-Nov	
		Saturday	7-Nov	
	11	Wednesday	11-Nov	
		Saturday	14-Nov	
	12	Wednesday	18-Nov	
		Saturday	21-Nov	
		Wednesday	25-Nov	FRIDAY CLASSES MEET
		Saturday	28-Nov	THANKSGIVING
DEC.	13	Wednesday	2-Dec	
		Saturday	6-Dec	
	14	Wednesday	9-Dec	

IMPORTANT DATES

EVENT	DATE
First Day of Classes	1-Sep
Last Day to Add/Drop a Class	8-Sep
Withdrawl - 100% refund	8-Sep
Withdrawl - 90% refund	14-Sep
Withdrawl - 50% refund	28-Sep
Withdrawl - 25% refund	19-Oct
Last Day to Withdraw	9-Nov
Thanksgiving Break	11/26 to 11/29
Last Day of Classes	10-Dec
Final Exams Begin	15-Dec
Final Exams End	21-Dec
Final Grades Due	23-Dec

Grading Scale:

A:	100-90
B+:	89-85
B:	84-80
C+:	79-75
C:	74-70
D:	69-60
F:	Below 60

Course Policies:

- Attendance is mandatory
- Please turn off all electronic devices (including cell phone, laptop, tablet) during class time.
- Bring your textbook to each class meeting or pages from the relevant chapter.
- Bring your calculator.

Grading Policy:

ITEM	TIME	GRADE (%)
Weekly Quizzes	Each Week	30
Mid-Term Exam	Week 7	35
Final Exam	Week 15	35
TOTAL		100

- There will be NO make-up quizzes or exams unless there is documentation provided to the Dean of Students Office to validate your absence.
- Quizzes and Exams must have Free-Body-Diagrams with Force Vectors shown. ALL work must be shown for full credit.

Homework Policies:

- Follow the syllabus and do the homework problems listed in the Syllabus
- Have your homework ready each class meeting.
- Homework may be collected on a random basis. Not all assigned problems will be collected. Only a select few will be collected randomly.
- NO late homework will be accepted.
- All homework MUST include a Free-Body-Diagram to show Force Vectors. All work must be shown for full credit.
- Homework NOT submitted will earn MINUS points deducted from your overall quiz grades.

Helpful Suggestions:

- Take notes and pay attention.
- Ask questions.
- Participate with board work and/or class problem solving.

Tutoring:

Tutoring facilities will be provided for the class. Additional information concerning tutoring will be provided in the class and posted on CANVAS.

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

3 - Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, and humanitarian endeavors.

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

(a) an ability to apply knowledge of math, science, and engineering
(b) an ability to design and conduct experiments, as well as interpret data
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use techniques, skills and modern engineering tools necessary for engineering practice

Rev. 4/4/12, 9/11/13

Course Objectives Matrix; MECH 235 Statics

Strategies and Actions	Student Learning Objectives	Student Outcomes (a-k)	Program Educational Objectives	Assessment Methods /Metrics
Course Objective 1: Provide transition from Physics (science) to Statics (engineering).				
Present engineering approach and problem solving techniques used for vector analysis.	Able to apply problem-solving techniques while building on math and physics fundamentals relevant to force systems in equilibrium.	a, e, i	1	Homework, exams and success in future courses.
Illustrate applications to practical problems of torque, moments, and couples.	Recognize the application of geometry and trigonometry to realistic-type problems. Understand the practical application of cross products and dot products.	a, e, i	1	Homework, bonus problems, and exams.
Course Objective 2: Master the concept of two-dimensional and three-dimensional vectors.				
Illustrate 2D vector components by orientation using trigonometry and proportions.	Learn the best approach to determine vector components. Understand when and how to apply trigonometry or proportions in determining vector components.	a, e, i	1	Homework and exams.
Use vivid Power Point examples to demonstrate analysis technique for force systems on beams and trusses and frames.	Learn the best approach to determine vector components. Understand when and how to apply trigonometry or proportions in determining vector components.	a, e, i	1	Homework and exams.
Demonstrate logical approach to spatial vectors by visualization of forces, moments.	Able to visualize orientation of spatial components and to develop technique to determine these components using geometry and projections. Understand application of cross products.	a, e, i	1	Homework, exams, and bonus challenge problems.
Course Objective 3: Master the concept of developing free body, diagrams and how to formulate and structure problems solving techniques which is fundamental to the solution of all engineering problems.				
Require FBD's, for all problems and emphasize importance of vector directions.	Ability to translate a problem statement into a FBD and distinguish tensile and compressive members in trusses and frames. Able to understand the effect of friction in a force system.	a, e, i	1	Homework, bonus challenge problems, and exams.
Illustrate the approach of going from the FBD to the problem solution by formulating the appropriate equation set.	Understand the techniques of problem solving based upon the use of FBD¦#146;s applied to beams, trusses, and frames. Understand the concepts of centroids and moments of inertia.	a, e, i	1	Homework, bonus challenge problems, and exams.
Provide numerous solved problems available on web. Require	Develop the technique of problem solving strategy by repetition for all topics.	a, e	1	Homework, exams and bonus challenge problems.

numerous homework problems weekly.				Rev. 1/6/13, 9/11/13