Spring 2019

MECH 235-002: Engineering Mechanics: Statics

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NEW JERSEY INSTITUTE OF TECHNOLOGY

Department of Civil & Environmental Engineering

MECH 235: ENGINEERING MECHANICS: STATICS Spring 2019
SECTION: 002

Text: Beer, Johnston, Mazurek, **Vector Mechanics for Engineers: Statics, 11th edition**, McGraw-Hill, to be purchased directly from McGraw-Hill publishers

Class: **MECH 235-002**

Lecture Location: COLT 416
Time: 10:00 AM – 12:50 PM Mondays

Recitation Location: COLT 416
Time: 01:00 PM – 02:00 PM Mondays

Instructor: Prof. S. Saigal, Ph.D., P.E.
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Teaching Assistant: TBA

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

SYLLABUS

WEEK	TOPIC	STUDY PAGES	HOMEWORK PROBLEMS	QUIZ
1	Ch 1: Introduction Ch 2: Statics of Particles, Trig Method (sketch force polygon)	p. 2-14 p. 16-25	Sketch Force Polygons Use Laws of Sines and Cosines Ch 2: 3, 6, 9, 12, 19	
2	Ch 2: Rectangular Components Equilibrium of a Particle	p. 29-35 p. 39-46	Ch 2: 22, 34, 36, 38 Ch 2: 43, 45, 48, 66	
3	Ch 2: Force in Space Forces and Equilibrium in Space	p. 52-62 p. 66-70 p. 75-78	Ch 2: 71, 72, 77, 78 Ch 2: 100, 103	
4	Ch 3: Rigid Bodies: Equivalent System of Forces Scalar (Dot) Products	p. 82-99 p. 105-113	Ch 3: 1, 5, 9, 24, 29 Ch 3: 37, 43 (find the angle) Ch 3: 55, 59	
5	Ch 3: Couples and Force-Couple Systems Equivalent Systems	p. 120-128 p. 136-150 p. 161-168	Ch 3: 71, 72, 78, 87, 91 Ch 3: 101, 105, 115	
6	Ch 4: Equilibrium of Rigid Bodies Equilibrium of a 2-Force Body	p. 170-184 p. 195-198 p. 225-229	Ch 4: 3, 7, 19, 25, 35 Ch 4: 68, 74	
7	Ch 5: Centroids and Center of Gravity	p. 230-244	Ch 5: 3, 5, 8, 9	
7.1	MID TERM EXAM			
8	Ch 5: Distributed Loads	p. 262-268	Ch 5: 66, 68, 70, 76	
	SPRING BREAK			
9	Ch 6: Truss Analysis: Method of Joints	p. 298-309	Ch 6: 3, 6, 14, 18	
10	Ch 6: Truss Analysis: Method of Sections	p. 317-324	Ch 6: 43, 45, 52, 55	
11	Ch 6: Frame Analysis	p. 330-339 p. 361-365	Ch 6: 77, 91, 102, 105	
12	Ch 9: Moments of Inertia	p. 485-491 p. 498-506	Ch 9: 4, 8 Ch 9: 32, 34, 44	
13	Ch 9: Parallel Axis Theorem	p. 513-519	Ch 9: 72, 73, 74	
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.

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	Weeks 2 through 7	25
Mid-Term Exam	Week 8	25
Weekly Quizzes	Weeks 9 through 14	25
Mid-Term Exam	Week 15 (Finals Week)	25
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.
- For more information on the format for homework and the type of paper, please refer to the link for "additional course information".

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 Moodle

Outcomes Course Matrix - MECH 235 – Engineering Mechanics: Statics Section 002

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Identify transition from Physics (science) to Statics (engineering).			
Present engineering approach and problem solving techniques used for vector analysis.	1	1	Homework, exams and success in future courses.
Illustrate applications to practical problems of torque, moments, and couples.	1	1	Homework, bonus problems, and exams.
Student Learning Outcome 2: Analyze and calculate two-dimensional and three-dimensional vectors.			
Illustrate 2D vector components by orientation using trigonometry and proportions.	1	1	Homework and exams.
Use vivid Power Point examples to demonstrate analysis technique for force systems on beams and trusses and frames.	1	1	Homework and exams.
Demonstrate logical approach to spatial vectors by visualization of forces, moments.	1	1	Homework, exams, and bonus challenge problems.
Student Learning Outcome 3: Diagram and employ free body diagrams to formulate and analyze solution of engineering problems.			
Require FBD's, for all problems and emphasize importance of vector directions.	1, 2	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.	1, 2	1	Homework, bonus challenge problems, and exams.
Provide numerous solved problems available on web. Require numerous homework problems weekly.	1, 2	1	Homework, exams and bonus challenge problems.

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: 2/13/18