New Jersey Institute of Technology
Department of Civil & Environmental Engineering

MECH 234 and MECH 235 — Summer 2017
ENGINEERING MECHANICS: STATICS — May 22 – June 26

Text:

1. Beer, Johnston, Mazurek, **Vector Mechanics for Engineers: Statics, 11th edition**, McGraw-Hill [copies of the textbook are available at the Reserve Desk in the NJIT Library]

2. NCEES, Fundamentals of Engineering Supplied-Reference Handbook
Can be purchased from bookstore or you can reproduce pages from:
http://www.ncees.org/exams/study_materials/fe_handbook/

Classes and Instructors: **MECH 234 -111 and MECH 235 -111**
both sections meet together
Monday, Wednesday, and Thursday, 6:00-9:00 p.m. in CKB-217
First summer session, May 22 – June 26
Ms. Marwa Korayem, PhD candidate, 732-718-3596, mi45@njit.edu

Teaching Assistants: **Tutoring in 423-Colton Hall** – Your instructor will provide the hours available for tutoring. Seek help when needed. Tutoring will help to understand concepts.

***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.

Below are additional **LINKS** to "Course Information" and "Recitation Examples":

Additional Course Information	Recitation Examples
Instructors, Tutoring, Grading, andHomework Instructions	Useful solved problems from the Beer & Johnston text

Course Policies:

- Attendance is mandatory
- There will be NO need for electronic devices during class time.
  Turn OFF your cell phone and put it away.
  Put away your laptop, tablet, or any other electronic device.
- Bring your textbook to each class meeting or pages from the relevant chapter.
- Take notes and pay attention. Ask questions.
- Be prepared to participate with board work and/or class problem solving. Bring your calculator.

Quizzes, Exams and Grading Policies:

- There will be nightly quizzes beginning with the second class meeting. Quizzes will be 50% of your overall grade.
- There will be a Mid-Term Exam for 25% of your grade.
- There will be a Final Exam during the last class for 25% of your grade.
- Quizzes and exams must have Free-Body-Diagrams with Force Vectors shown. ALL work must be shown for full credit.

- There will be NO make-up quizzes or exams unless there is documentation provided to the Dean of Students Office to validate your absence. Such circumstances may include sickness documented by a doctor or NJIT Health Service; a receipt from your mechanic for car failure; etc.
- We do NOT drop the lowest grade.
- We do NOT curve the grades.
- For more information on the grading scale, go to the link for "additional course information".

Homework Policies:

- Follow the syllabus and do the homework problems suggested. Quiz problems may be taken from the homework problems or be very similar to the homework or those Sample Problems in the textbook.
- Homework may be collected on a random basis. Not all assigned problems will be collected. Only a select few will be collected randomly. Do your homework. Have it ready each week.
- 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. Have your homework ready each class meeting.
- For more information on the format for homework and the type of paper, please refer to the link for "additional course information".

*The NJIT Honor Code will be upheld and any violations will be brought to the immediate attention of the Dean of Students.

Problems in **Blue are links**to examples from a textbook by Beer & Johnston 6th edition, found at the Reserve Desk, Library, but similar to those found in current edition with different numbers.

Week	Topic	Study pages	Homework Problems**
1 May 22	Ch. 1: Introduction Ch. 2: Statics of Particles, Trig Method (sketch force polygon)	Study p. 2 - 14 p. 16 - 25	Sketch force polygon, use Law of Sines and Cosines to solve. Ch. 2: 2, 6, 10, 12, 20
2 May 24	Ch. 2: Rectangular Components Equilibrium of a Particle	p. 29 - 35 p. 39– 46	Ch. 2: 21 & 31, 23 & 32, 36 Ch. 2: 44, 46, 47, 66
3 May 25	Ch. 2: Forces in Space Forces and Equilibrium in Space Review and Summary	p. 52 - 62 p. 66–70 p. 75 - 78	Ch. 2: 71& 72, 91 & 92 Ch. 2: 100, 105 **Helpful**:2-66, 89 & 90, 2-114
4 May 31	Ch. 3: Rigid Bodies: Equivalent System of Forces	p. 83– 99	Ch. 3: 2, 4, 21, 24 and 29 3.11 done on "examples"
5 June 1	Ch. 3: Couples and Force-Couple Systems Equivalent Systems Review and Summary	p. 120 – 128 p. 136– 150 p. 161 – 168	Ch. 3: 70, 72, 76, 96 Ch. 3: 101, 106, 114
6 June 5	Ch. 4: Equilibrium of Rigid Bodies Equilibrium of a Two-Force Body Review and Summary	p. 170 – 184 p. 195 – 198 p. 225 – 229	Ch. 4: 4, 8, 22, 28, 36 Ch 4: 67, 68 **Helpful:** 4.3,12, 17, 26, 30, [43, 72, 101]
7 June 7	Ch. 6: Analysis of Structures: Method of Joints	p. 298 – 309	Ch. 6: 2, 7, 18, 28 **Helpful:** 14, 27 [13, 28]
8 June 8	MID-TERM EXAM excludes material from Ch. 6. Begin topic of Truss by Section Method (very useful for MECH 237)		
9 June 12	Ch. 6: Truss Analysis: Method of Sections	p. 317 – 324	Ch. 6: 45, 47, 52, 54
10 June 14	Ch. 6: Frames and Machines Review and Summary	p. 330 – 339 p. 361 – 365	Ch. 6: 76, 88, 92, 102, 105
11 June 15	Ch. 5: Distributed Forces: Centroids and Center of Gravity	p. 230 - 244	Ch. 5: 3, 6, 8, 9 **Helpful:** [25, 32, 34, 79]
12 June 19	Ch. 5: Distributed Loads	p. 262– 268 class notes	Ch. 5: 66, 69, 70, 76 **Helpful:** 5.78, 81, 83
13 June 21	Ch. 9: Distributed Forces: Moments of Inertia	p. 485 – 491 p. 498 – 506	Ch. 9: 4 and 8 composites, Ch. 9: 32 and 34, 44
14 June 22	Ch. 9: Parallel Axis Theorem	p. 513 – 519	Ch. 9: 72, 73, 74
15 June 26	Final Exam	Dates to be announced by Registrar at a later date.	

**Homework to be assigned by your professor. Homework will be collected randomly per your professor. NO LATE homework can be accepted after the due date.

*Students will be consulted with by the instructor and must agree to any modifications or deviation from the syllabus throughout the course of the semester.

Revised by milano,10/2001, 1/2002, 1/2003, 1/2004, 9/2004, 1/2005, 8/2005, 9/2007, 8/2008, 8/2009, 1/2010, 1/2011, 8/2011, 8/2012, 1/2013, 8/2013, 7/2014, 8/2015, 1/2016, 1/2017

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 numerous homework problems weekly.	Develop the technique of problem solving strategy by repetition for all topics.	a, e	1	Homework, exams and bonus challenge problems. Rev. 1/6/13, 9/11/13