MECH 235 – Engineering Mechanics: Statics Section 002 – Spring 2018


Classes and Instructors: MECH 235 sections:
- 002, MW 8:30 – 9:55 and F 10 – 10:55 KUPF 211

Prof. M. Saadeghvaziri, Ph.D., P.E., [ala@njit.edu](mailto:ala@njit.edu), 260 Colton Hall, 973-596-5813

Office hours: MW 10 – 11:30 or by appointment.

Teaching Assistant: Noah Thibodeaux [nt82@njit.edu](mailto:nt82@njit.edu)

Office hours: TR 1 – 2:30 PM

Teaching Assistants: Tutoring in 423-Colton Hall - Schedule for Tutoring will be posted on the door of 423-Colton Hall. The tutoring schedule will also be emailed to you by your instructor.

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”: 

<table>
<thead>
<tr>
<th>Additional Course Information</th>
<th>Recitation Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructors, Tutoring, Grading, and Homework Instructions</td>
<td>Useful solved problems from the Beer &amp; Johnston text</td>
</tr>
</tbody>
</table>

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 weekly quizzes for weeks 2 through 7. This will be 25% of your grade.
- There will be a Mid-Term Exam during week 8. This will be 25% of your grade.
- There will be weekly quizzes for weeks 9 through 14. This will be 25% of your grade.
- There will be a Final Exam in week 15 during Finals Week. This will be 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”.

Common Exams Dates and Time: Monday 2/26/18, 3/26/18, and 4/24/18

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”.
- All work must be shown for full credit.
- Text IS REQUIRED.
  - You need to obtain a copy of the exact textbook cited (including edition).
  - Homework and examples from the textbook change from edition-to-edition.
  - If you get a different edition of the textbook and you submit the wrong homework problems, you will receive a ZERO. (sorry)
  - P.S. I am aware that a solutions manual is on the web for free.
    - DO NOT USE IT FOR HOMEWORK.
    - Use it for studying for exams.
- You are all entering a Professional Career,
  - Please Respect YOUR work, YOUR Quizzes, YOUR Exams.
  - Please keep work neat and organized.
  - Use grid paper.
    - Print your name on the top of each page.
    - Print the Course and Section Number on the top of each page.
    - Staple Your Homework Together. Loose or folded pages may be lost, along with your grade.
  - Yes, I answer emails. However, Emails are not text messages and do not get an instantaneous response.

*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.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Study pages</th>
<th>Homework Problems**</th>
</tr>
</thead>
</table>
| 1    | 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: 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: Forces in Space  
Forces and Equilibrium in Space  
Review and Summary | p. 52 - 62  
p. 66–70  
p. 75 - 78 | Ch. 2: 71& 72, 77 & 78  
Ch. 2: 100, 103  
Helpful: 2-66, 89 & 90, 2-114 |
| 4    | Ch. 3: Rigid Bodies:  
Equivalent Systems of Forces  
Vector & Dot Products | p. 82–99  
p. 105-113 | Ch. 3: 1, 5, 9, 24 and 29  
3.11 done on “examples”  
Ch. 3: 37, 3.43 find the angle |
| 5    | Ch. 3: Couples and  
Force-Couple Systems  
Simplifying Systems of Forces | 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 Bodied Two Dimensions (2-D) | p. 170 – 184  
p. 195 – 198  
p. 225 – 229 | Ch. 4: 3, 7, 19, 25, 35  
Ch 4: 68, 74  
Helpful: 4.3, 12, 17, 26, 30, [43, 72, 101] |
| 7    | Ch. 5: Distributed Forces:  
Centroids and Center of Gravity | p. 230 - 244 | Ch. 5: 3, 5, 8, 9, 13  
Helpful: [25, 32, 34, 79] |
| 8    | Review  
MID-TERM EXAM |  |  |
| 9    | Ch. 6: Analysis of Structures:  
Method of Joints & Sections | p. 298 – 309 | Ch. 6: 3, 6, 14, 18, 28  
Helpful: 14, 27 [13, 28] |
| 10   | Ch. 6: Analysis of Structures:  
Method of Sections, Frames and Machines | p. 317 – 324  
p. 330 – 339  
p. 361 – 365 | Ch. 6: 32, 45, 55, 61, 21 (FD & GH use Method of Sections)  
Ch. 6: 77, 91, 102, 105 |
| 11   | Ch. 5: Distributed Loads | p. 262–268  
class notes | Ch. 5: 66, 68, 70, 76  
Helpful: 5.78, 81, 83 |
| 12   | 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 |
| 13   | Ch. 9: Parallel Axis Theorem | p. 513 – 519 | Ch. 9: 72, 73, 74 |
| 14   | Review |  |  |
| 15   | 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 informed in advance by the instructor of any modifications or deviation from the syllabus throughout the course of the semester.*

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

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