Instructor: Edward L. Hajduk, D.Eng, PE
Lecturer
Office Location: PA105D
E-Mail: Edward_Hajduk@uml.edu
Office Hours: See office door or website. Also by appointment.

Prerequisites: MATH.1310 Calculus I and PHYS.1410 Physics I
Co-requisites: MATH.1320 Calculus II


Course Description
Discusses vector concepts of forces and moments of forces. Static equilibrium of particles, rigid bodies and simple structures. Static friction forces. Geometric properties of sections.

Course Objectives
Upon completion of ENGN.2050, a student should be able to:

1. Apply the rules for manipulating vectors: addition, subtraction, dot product, and cross product.
2. Determine the moment of a force.
3. Replace a system of forces and couples with a single force and a single couple at a point.
4. Construct a free body diagram.
5. Apply the equations of equilibrium to the solution of engineering-type problems.
6. Recognize two-force members and to use this concept in the analysis of trusses, frames and machines.
7. Apply the method of joints and the method of sections in the determination of forces in truss members.
8. Recognize a statically indeterminate frame.
9. Use the concept of dry friction in the solution of simple statics problems where motion is impending.
10. Determine the centroids of lines, areas, volumes and masses.
11. Determine the moments of inertia of composite areas and composite masses.
Basis of Course Grade:

Individual course grades are determined as follows with the subsequent grading breakdown:

\[
\text{Grade (\%)} = \frac{\sum (\text{Total Points Earned including extra credit})}{\sum (\text{Total Points Possible not including extra credit})} \times 100
\]

- 93% ≤ A
- 90% ≤ A- < 93%
- 87% ≤ B+ < 90%
- 83% ≤ B < 87%
- 80% ≤ B- < 83%
- 77% ≤ C+ < 80%
- 73% ≤ C < 77%
- 70% ≤ C- < 73%
- 67% ≤ D+ < 70%
- 65% ≤ D < 67%
- F < 65%

Grades will be dependent on your work and performance. Grading will NOT be conducted on a curve; it is theoretically possible for the whole class to earn an A or an F.

Each assignment problem is worth two (2) points, while the weekly tests are worth one hundred (100) points each. Your lowest weekly test will be dropped. The final exam will be given on the last day of class and will be worth three hundred points (300) points. Grades will be dependent on your work and performance. Grading will NOT be conducted on a curve; it is theoretically possible for the whole class to earn an A or an F. **Students have one week after the return of assignments and tests to discuss grading with the Instructor.** The exception is the last week of class. Students have until five (5) hours after the end of the final exam to discuss the last week’s assignments and/or exams and the final exam.

Assignment guidelines are provided in a separate handout. Assignments must be handed directly to the Instructor unless directed otherwise by the Instructor. Assignments will have one (1) point late penalty deduction for each day past the assignment due date unless an extension is granted by the Instructor. Note the assignment due date will be determined by the Instructor and told to students in class the day the assignment is given. Any assignment extensions will be announced in class or via email.

Everyone makes mistakes: no one is perfect. If the Instructor makes a mistake in class and you are the first to notify him during that class, you are eligible for two (2) extra credit points towards your assignment grade. To receive these extra credit points, you must email the Instructor within one (1) day of noting the mistake. The email should have the course number in the Subject Field and you need to summarize the mistake.
and state the solution within the body of the email (e.g. “The equation in Slide 4 on your lecture notes on 7/8/13 was F=me. The equation should have been F=ma).

**Honor and Ethics:**
Engineers have a trust placed on them by society to ensure that the public safety is held paramount. People constantly depend on engineers to provide safe bridges, buildings, drinking water, etc. **This trust must not be violated.** For this reason, no form of academic dishonesty will be tolerated in this class. Students are encouraged to work together on homework assignments and class projects (if assigned). However, any evidence of direct copying of a homework assignment will result in a zero grade for that assignment for all students involved. Any evidence of academic dishonesty during a weekly test or the final exam will also result in a zero grade for that assignment for all students involved. Refer to the University of Massachusetts Lowell’s Academic Integrity Policy for additional details, which can be found at this URL: [http://www.uml.edu/Catalog/Undergraduate/Policies/Academic-Policies/Academic-Integrity.aspx](http://www.uml.edu/Catalog/Undergraduate/Policies/Academic-Policies/Academic-Integrity.aspx)

During weekly tests and the final exam, only calculators that cannot communicate with other electronic devices are allowed. Students are encouraged to use calculators approved for the Fundamentals of Engineering (FE) exam to prepare themselves for the FE Exam. Refer to the National Council of Examiners for Engineering and Surveying (NCEES) Calculator Policy [http://ncees.org/exams/calculator-policy/](http://ncees.org/exams/calculator-policy/) for additional details. While the use of the approved NCEES FE calculators is not required, you cannot use calculators that can communicate with other devices. All other electronic devices, such as mobile phones, music players, computers, tablets, etc. are not allowed during the weekly tests and the final exam.

You must cite and acknowledge all people and sources used in your work. Students submitting academic work for an individual grade are individually held to not plagiarize. Plagiarism is defined as **representing the words or ideas of another as one's own work in any academic exercise.** Materials from outside sources must be documented using the American Society of Civil Engineers (ASCE) Author-Date format. This reference system can be found within the ASCE E-Books Publishing in ASCE Journals: A Guide for Authors [http://ascelibrary.org/doi/book/10.1061/9780784479018] or Publishing Books with ASCE: A Guide for Authors, Editors, and Committees [http://ascelibrary.org/doi/book/10.1061/9780784478998].

**Attendance:**
The University of Massachusetts – Lowell’s Policy on Class Attendance is in effect for this course. This policy can be found at this URL: [http://www.uml.edu/Catalog/Undergraduate/Policies/Academic-Policies/Attendance-Policies.aspx](http://www.uml.edu/Catalog/Undergraduate/Policies/Academic-Policies/Attendance-Policies.aspx)

All tests/exams, including the final examination, must be taken on the assigned day. Any exceptions to this policy must be approved by the Instructor in advance. Exceptions will be granted only for reasons beyond the control of the student.
**Classroom Demeanor:**
The expectation for students to participate as engineering professionals is implicit. In addition, no active cell phones, pagers, or sound or image recording devices shall be allowed in the classroom.

**Email Policy:**
When required, I will send class information to students via email using the Student Information System (SiS) system. SiS sends emails to your UMass Lowell student email address. Every student who registers for courses at the University of Massachusetts – Lowell receives a UML student email address. If you have not already accessed your student email, visit the Division of Continuing Studies & Online Education website ([https://continuinged.uml.edu/general/registration.cfm](https://continuinged.uml.edu/general/registration.cfm)) to get information on how to access your UMass Lowell email. Students are responsible for checking this email account for messages from the Instructor for this course.

**Academic Support:**
Please contact me privately if you need accommodations because of a disability. The University’s Policy for Students with Disabilities will be followed for this course. This policy can be found at [http://www.uml.edu/student-services/Disability/Policies.aspx](http://www.uml.edu/student-services/Disability/Policies.aspx).

**Tentative Schedule of Class Activity:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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| 1    | Statics of Particles: Vectors, Components & Equilibrium  
   Statics of Particles: Components & Equilibrium in Space |
| 2    | Rigid Bodies: Moment of a Force, Vector & Scalar Products  
   Rigid Bodies: Moment of a Couple, Equivalent Systems  
   Equilibrium of Rigid Bodies: 2D and Two Force Bodies |
| 3    | Equilibrium of Rigid Bodies: 3D  
   Distributed Forces: Centroids & Centers of Gravity  
   Analysis of Structures: Method of Joints |
| 4    | Analysis of Structures: Method of Sections  
   Analysis of Structures: Frames and Machines |
| 5    | Friction: Dry Friction & Belt Friction  
   Distributed Forces: Moment of Inertia, Parallel Axis Theorem |
| 6    | Distributed Forces: Moment of Inertia of Composite Areas and of a Mass  
   Course Review & Final Exam |