

# EM121 Statics and Mechanics of Materials I

<http://www.rose-hulman.edu/EM121>

## Course Objectives:

After this course the students will be able to:

Analyze a static structure or system of particles to determine the forces and moments which are acting external and internal to the bodies

- Understand, use and mathematically manipulate vectors
- Understand definitions of stress and strain
- Understand elastic behavior of materials
- Distinguish between applied stress and material strength to apply factors of safety
- Determine centroids of volumes and areas
- Apply problem solving techniques such as the use of Free Body Diagrams.
- Apply the principles of the course in a design project.

## Text:

***Statics and Mechanics of Materials***, 2<sup>nd</sup> edition, Riley, Sturges, and Morris. This book will be used again for EM204 (Statics and Mechanics of Materials II).

## Student Evaluation:

A grade will be given to evaluate how well the student has assimilated the course material. The total grade for the quarter will be dependent upon homework, exams, and a project.

Homework	10%
Exam I	15%
Exam II	15%
Exam III	15%
Project	15%
Final Exam	30%

## Hour Exams:

Each exam will be a 50 minute exam. To pass the class, students must have a passing exam weighted average, including the final exam. (Passing is defined as a 60% or higher.) Make-up exams are not given, should you miss an exam and have made prior agreement with your instructor, your final exam grade will count for your missed exam.

## Final Exam:

Four hours will be allotted for the cumulative final exam. All students are expected to take the final exam at its scheduled time.

## How to Succeed:

Desire and motivation are the keys to success. You are all bright enough to do well in this class. The students who do the best are mentally active in class, keep up-to-date with homework assignments, and take advantage of available help from upperclassmen, peers, and faculty.

Students who fail typically fall behind on or don't do assignments, rely on files for homework, or skip class.

## Homework

### Format:

Standardized solution formats serve two purposes

1. First, they help you organize your thoughts to better solve the problem
2. Second, they provide a structure that makes it easier for the reader to understand your solution

Please recognize that the solution method is not as linear as it appears, and iteration is often needed. Consequently, what you submit should be a final version of the scratch work it took you to get there.

### Cover Sheet:

The cover sheet should contain

1. Your Name and CM Number
2. The Course Name, Number, and Section
3. Date Due
4. Vertical List of Assigned Problems

### Header:

Each problem should start on a new page of green engineering paper. The header of each page should contain the following information

1. Course Number and Section Number
2. Problem Number
3. Student Name and CM Number
4. Problem Number
5. Assignment Page Number and Total Number of Pages

### Problem Statement:

The goal here is to define the problem. In an engineering analysis course, the problem statement in the book may be that definition. In design courses or after graduation, a significant portion of the problem solution is the problem statement. The problem statement should contain two subheadings: Given and Find. You may photocopy or scan the problem and figure from the text and paste the information under the appropriate heading.

### Identify System or Systems:

In words and/or pictures, clearly identify the system or systems you will be analyzing. For many problems in Statics, this means that you must draw a **Free Body Diagram**. Your coordinate system should be clearly labeled.

### Problem Solution:

Logically and neatly apply the appropriate principles and laws to determine the desired answer. Often you will find it useful to solve the problem in symbolic form first and then substitute in the numbers at the end. Final answers must be boxed. If a computer algebra system is used, include the printout.

### Words of Warning:

It is very important to your grade to not miss turning in homework assignments. Although each homework assignment is only a fraction of your total quarter grade, the homework reinforces the concepts from lecture. If you get behind on your homework you will rapidly become lost.