

# Virginia Western Community College

## EGR 246

### Mechanics of Materials

#### Prerequisites

EGR 140

#### Course Description

Teaches concepts of stress, strain, deformation, internal equilibrium, and basic properties of engineering materials. Analyzes axial loads, torsion, bending, shear and combined loading. Studies stress transformation and principle stresses, column analysis and energy principles.

The objective of this course is to learn how the application of various forces and moments on an object will affect the object's performance. Under a given set of conditions, the object may respond elastically, plastically, or fail. Loadings are investigated individually first, then combined loadings are analyzed. In addition, principal normal and shear stresses and strains are calculated to determine the object's most critical condition. Furthermore, methods to calculate beam deflection due to transverse loading and potential buckling due to centric and eccentric axial loadings are analyzed. The course concludes with an energy analysis, and MDSolids is presented in the course as a tool to assist in calculations.

**Semester Credits: 3**

**Lecture Hours: 3**

**Lab/Recitation Hours: 0**



**Required Materials****Textbook:**

Mechanics of Materials, 10<sup>th</sup> ed., Author: Russell C. Hibbeler, Publisher: Prentice Hall, ISBN# 9780134583235

**Other Required Materials:**

Calculator (TI-89 or higher preferred)

All Homework will be administered via: [www.masteringengineering.com](http://www.masteringengineering.com)

The following supplementary materials are available:

MDSolids software

**Course Outcomes**

**At the completion of this course, the student should be able to:**

1. Establish the principal stresses and/or strains of an object loaded in tension, compression, torsion, bending, and/or shear.
2. Establish the deflection of a beam using direct integration, singularity functions, the moment-area method, and/or superposition.
3. Establish whether a column will fail due to buckling.

Topical Description:

Week	Topic	Chapter
1	Statics Review, Stress , Strain	1, 2
2	Mechanical Properties	3
3	Axial Loading	4
4	Torsional Loading	5



5	Bending	6
6	Transverse Shear	7
7	Combined Loadings	8
8	<i>Review and Catch-Up</i>	---
9	Stress Transformation	9
10	Strain Transformation	10
11	Design of Beams and Shafts	11
12	Deflection of Beams and Shafts	12
13	Buckling of Columns	13
14	Energy Methods	14
15	<i>Review and Catch-Up</i>	---

### Notes to Instructors

1. All instructors teaching this course will use the same textbook.
2. Course content within this course may be covered at the instructor's discretion with all topics being covered.
3. This course and its grades will be structured around a minimum of a mid-term, final exam, and homework.
4. At the end of the semester, all instructors will give the outcome assessment as it relates to the final exam to the program head at the same time they prepare their student final grades.
5. Homework can be assigned using Mastering Engineering.
6. A comprehensive final exam will be given, which must be at least 10% of the final grade.

