

**EM 303, Mechanics of Deformable Solids**  
Course Syllabus  
**School of Engineering and Applied Sciences**  
**Western Kentucky University**  
Summer 2021

**Instructor Information**

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Office Hours: MTWRF (11:15am-12pm)

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**Class Information**

Location: Section 1: EBS2136

Time: Section 1: MTWRF, 8:00-11:15am

Prerequisites: Calculus II (Math 137) with grade C or higher; Statics (EM 222) with grade C or higher; and Physics I (Phys 255) with grade C or higher

**Required Materials**

**Mechanics of Materials, 8th Edition**, 2019, by Beer, Johnston, DeWolf and Mazurek. ISBN-13: 978-1260113273; previous editions of the textbook can be used. However, homework will be from 8<sup>th</sup> edition.

**Course Description**

Study of fundamental principles and physical laws governing the response of mechanical components to external forces. Concepts of stress, equivalent systems, rigid body equilibrium, stress-strain and deformation, torsion, internal forces and bending moments, shear and bending moment diagrams, flexural loading, Mohr's circle and pressure vessels are presented.

**Course Outcomes**

By the end of the course students will be able to:

- Determine normal and shear stresses in mechanical components under known loads
- Determine deflections under axial and transverse load conditions
- Model the variation of stresses in structural members
- Determine the locations and magnitudes of maximum stresses and deflections
- Model column stability and determine buckling conditions

## Evaluation Methods

The course grade will be evaluated as follows:

Method of Evaluation	% of Final Grade
Homework	10
Quizzes	15
Two Tests (20% each)	40
Final Exam (Comprehensive)	35

## Attendance and Punctuality

Attendance in classes is critical to student success; students should seize the opportunity to share and discuss information in classes. The course is designed to move swiftly and efficiently. If a student is going to miss a class, s/he should inform the instructor before missing the class. To be considered in attendance for a class, students must arrive by the official class starting time and students must remain in class for the entire period.

## Grading

Grades for the course will be consistent with the following table, per the

Letter	A	B	C	D	F
% Range	90-100	80-89	70-79	60-69	Below 60

## Late or Missed Assignments

If a student is experiencing difficulty meeting a deadline, he/she is encouraged to contact the course instructor as soon as possible to discuss the situation in advance of the deadline.

## Calculators

You will only be allowed to use an NCEES approved calculator on exams, the same calculators used on the FE and PE exams. I suggest you get one now and start practicing. You can find the published list at <http://ncees.org/exams/calculator-policy/>

## Academic Integrity

“The maintenance of academic integrity is of fundamental importance to the Western Kentucky University. Thus it should be clearly understood that acts of plagiarism or any other form of cheating will not be tolerated and that anyone committing such acts risks punishment of a serious nature.”

## **Plagiarism**

“To represent written work taken from another source as one's own is plagiarism. Plagiarism is a serious offense. The academic work of a student must be his/her own. One must give any author credit for source material borrowed from him/her. To lift content directly from a source without giving credit is a flagrant act. To present a borrowed passage without reference to the source after having changed a few words is also plagiarism.”

## **Special Accommodations**

In compliance with university policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Office of “The Student Accessibility Resource Center” (Formerly Student Disability Services) in the first floor of the Downing Student Union, 1074. The phone number is 270 745 5004. Please DO NOT request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services.

## **Approach for Evaluating Student Understanding**

In grading of student work, a focus is maintained on whether there is an understanding the fundamental concepts. This needs to be clearly expressed by the work, with neat and logical flow of problem solution. Memorization of specific equations is good, but not mandatory as equation sheets will be available for exams. Demonstrating your understanding of how to apply the equations, and the meaning of the results is considered most important. Keep in mind that a numerically correct answer may not receive full credit if the path to obtaining that answer is not readily apparent.

## **Discrimination, Harassment, Sexual Misconduct/Assault Policies**

Western Kentucky University (WKU) is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) at <https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf> and Discrimination and Harassment Policy (#0.2040) at [https://wku.edu/policies/hr\\_policies/2040\\_discrimination\\_harassment\\_policy.pdf](https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf).

Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, [270-745-5398](tel:270-745-5398) or Title IX Investigators, Michael Crowe, [270-745-5429](tel:270-745-5429) or Joshua Hayes, [270-745-5121](tel:270-745-5121).

Please note that while you may report an incident of sex/gender based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are “Responsible Employees” of the University and **MUST** report what you share to WKU's Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU's Counseling and Testing Center at [270-745-3159](tel:270-745-3159).

## **WKU Covid-19 Mask Statement**

Out of respect for the health and safety of the WKU community and in adherence with the CDC guidelines, the University requires that a cloth face covering (reusable or disposable) that covers

both the nose and mouth must be worn at all times when in public areas within all buildings. Students must properly wear masks face coverings while in class regardless of the room size or the nature of the classroom activities. Students who fail to wear a face covering mask as required will be in violation of the WKU Student Code of Conduct and will be asked to comply or will face disciplinary action, including possible dismissal from the University. Accommodations to masks face coverings must be determined by the Student Accessibility Resource Center and documented before a student may attend class.

### Covered Topics

The course will tentatively follow the outline in the following table.

<b>Topics</b>
Statics Review, Units and Calculus- Chap1 Types of Stress; Normal and Shear- Chap1 Hooke's Law; tensile properties- Chap2 Evaluation of deformation- Chap2 Stress Concentration, Saint Venant's Principal-Chap2 Shear Stress Distribution from Torsion- Chap3 Angle of Twist, Gears and Transmission Shafts- Chap3 Indeterminate Systems-2- Chap 3 <b>Exam 1</b>
Pure Bending; Stress Distribution- Chap 4 Eccentric Loading- Chap 4 Shear & Bending Diagrams-Chap 5 Shear Flow in Beams- chap 6 Mohr's Circle for Plane Stress- Chap 7 <b>Exam 2</b>
Equation of Elastic Curve- Chap 9 Indeterminate Beams, Superposition- Chap 9 Euler's Formula, Buckling-- Chap 10 End Constraints, Slenderness Ratio- Chap 10 <b>Final Exam (Comprehensive)</b>

\* Content is time-permitting