



JOHN CABOT UNIVERSITY

COURSE CODE: ENGR 212
COURSE NAME: **Mechanics and Machines''**
Summer Engineering Sample Syllabus

TOTAL NO. OF CONTACT HOURS: 45

CREDITS: 3

PREREQUISITES: MA299 Calculus II, Principles of Physics I (with Laboratory)

COURSE AIMS:

This course provides a foundation in vector mechanics, statics, and axial, torsional, and bending stresses. Deflections of axial and torsional members are also emphasized. Some machine elements are introduced.

SUMMARY OF COURSE CONTENT:

Vector algebra; free body diagrams; static analysis of particles, rigid bodies, trusses, frames, and machines; static friction; internal forces; centroids; moments of inertia; shear force and bending moment diagrams; stresses, strains, and deflections in axially loaded, torsional, and bending members; buckling.

LEARNING OUTCOMES:

Upon successful completion of this course, students will

1. Learn to accurately draw free body diagrams and use them as tools to solve statics and solid mechanics problems;
2. Learn to determine stresses, strains, and elongations for axial, torsional, and bending loading conditions;
3. Enhance previously learned skills in vector algebra and will learn new applications for each of those skills and gain new skills in solving systems of linear equations using matrices;
4. Begin to learn to solve open-ended problems;
5. Become familiar with some basic machine elements.

TEXTBOOK: Statics and Mechanics of Materials with 2 Semester Connect Access Card, 2nd Edition, [Ferdinand Beer](#), 2017.



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SCHEDULE			
Session	Session Focus	Reading / Other Assignment	Meeting Place/Exam Dates
Week 1	Vectors in two and three dimensions, including addition, scalar product, and dot product. Systems of forces and moments	Chapters 1 - 3	Quiz Thursday, July 11
Week 2	Equilibrium of particles and rigid bodies in two and three dimensions, Centroids, first moments of area, and second moments of area	Chapters 4, 5 and 7	Quiz Monday, July 15
Week 3	Analysis of trusses, frames, and machines, Concept of stress and strain, material properties, Stresses and deformation of axially loaded members, linear elasticity	Chapters 6, 8.1 and 8.4, 9.1, 9.4, 9.6, 9.8 and 9.9	Quiz Monday, July 22
Week 4	Stresses and deformation of members subjected to torsion, Shear and moment diagrams	Chapter 10.1 and 10.2, 12.1 and 12.2	Quiz Monday, July 29
Week 5	Normal and transverse shear stresses in beams, Buckling of slender columns, Friction acting on rigid bodies: tip or slip conditions. Friction on simple machine elements	Chapter 11.1, 11.2, 13.1	Quiz Monday, Aug. 5 Comprehensive Final Exam Aug. 9