COURSE OUTLINE: MCH212 - MECH OF MATERIALS

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Course Code: Title	MCH212: MECHANICS OF MATERIALS
Program Number: Name	4080: CIVIL ENG TECHNICIAN
Department:	CIVIL/CONSTRUCTION
Academic Year:	2025-2026
Course Description:	You are surrounded by a wide variety of structures such as buildings, bridges, and dams. These structures play such an important role in our lives that we cannot ignore them. As a technician, you will need to know this subject well enough to intelligently facilitate communication between designers and construction personnel. This Mechanics of Materials course explores mathematical expressions which have been developed to describe how various elements of structures work. But at the same time every effort is made to link the mathematical expression to structural function. To that end you are encouraged to visually appreciate various structures in your community while understanding the mathematical relationships found in structures. This course is a continuation of MCH100 and leads to CIV225.
Total Credits:	4
Hours/Week:	4
Total Hours:	56
Prerequisites:	MCH100
Corequisites:	There are no co-requisites for this course.
Substitutes:	ARC200, ARC235, MCH103, MCH220
This course is a pre-requisite for:	CIV225
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4080 - CIVIL ENG TECHNICIAN** VLO 5 collaborate with the project team and communicate effectively with project stakeholders to support civil engineering projects. VLO 6 collect, process and interpret technical data to produce written and graphical project-related documents. VLO 7 use industry-specific electronic and digital technologies to support civil engineering projects. VLO 8 participate in the design and modeling phase of civil engineering projects by applying engineering concepts, basic technical mathematics and principles of science to the review and production of project plans. VLO 11 apply teamwork, leadership and interpersonal skills when working individually or within multidisciplinary teams to complete civil engineering projects.

Essential Employability Skills (EES) addressed in this course:	EES 1	Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
	EES 2	Respond to written, spoken, or visual messages in a manner that ensures effective communication.
	EES 3	Execute mathematical operations accurately.
	EES 4	Apply a systematic approach to solve problems.
	EES 5	Use a variety of thinking skills to anticipate and solve problems.
	EES 7	Analyze, evaluate, and apply relevant information from a variety of sources.
	EES 8	Show respect for the diverse opinions, values, belief systems, and contributions of others.
	EES 9	Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.
	EES 10	Manage the use of time and other resources to complete projects.
	EES 11	Take responsibility for ones own actions, decisions, and consequences.

Course Evaluation:

Passing Grade: 50%, D

A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.

Other Course Evaluation & Assessment Requirements:

Grade
Definition Grade Point Equivalent
A+ 90 - 100% 4.00
A 80 - 89%
B 70 - 79% 3.00
C 60 - 69% 2.00
D 50 - 59% 1.00
F (Fail)49% and below 0.00

CR (Credit) Credit for diploma requirements has been awarded.
S Satisfactory achievement in field /clinical placement or non-graded subject area.
U Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR Grade not reported to Registrar`s office.
W Student has withdrawn from the course without academic penalty.

Attendance
Students are only allowed to miss three classes without documented explanation. One mark will be deducted from your overall grade for each undocumented explanation. The maximum deduction in overall grade is not to exceed 15%. Valid documented explanation include:
-Medical reason
-Family emergency
-Child care issue
-Transportation problem
The documented explanation has to be sent to me by e-mail no later than three days from the missed class. A doctor note, etc., is to be attached as a PDF file to your e-mail.

Books and Required

Statics and Mechanics of Materials, 6th Edition by Russell C. Hibbeler

Resources:	Publisher: Pearson ISBN: 9780137964895 (Note: 5th Edition of the Book is also suitable for the course)	
Course Outcomes and Learning Objectives:	**Course Outcome 1**	**Learning Objectives for Course Outcome 1**
	Upon successful completion, the student will be able to: 1. Recall and apply basic statics principles including the equilibrium equation and the free body diagram to the study of strength of materials.	1.1 Define the terms mass, weight, force, pressure 1.2 Carry out units analysis in equations. 1.3 State Newton three laws and explain their significance to the design of structures. 1.4 Determine how loads applied to structures are distributed to supporting members. 1.5 Construct free-body diagrams for particles and rigid bodies.
	Course Outcome 2	**Learning Objectives for Course Outcome 2**
	Upon successful completion, the student will be able to: 2. Solve technical problems based on internal changes occurring in structural members as a result of the application of a force that produces stress, strain and deformation.	2.1 Discover real life example of structural members that are under various load conditions 2.2 Identify and define the various elements of a stress/strain diagram (elastic range, plastic range, proportional limit, elastic limit, yield point, ultimate strength, rupture strength,and elongation). 2.3 Define and explain the difference between ductile and brittle materials. 2.4 Explain the concept of toughness for statically and dynamically loaded materials. 2.5 Explain the relationship between safety factor and allowable or working stress. 2.6 Differentiate tensile, compressive and shear stresses and to know which one to use in particular cases. 2.6 Explain Hooke`s law and Young`s modulus, how they relate and their importance to structures. 2.7 Explain the concept of stress concentration and when it should be taken into consideration. 2.8 Calculate allowance for thermal effects in structures.
	Course Outcome 3	**Learning Objectives for Course Outcome 3**
	Upon successful completion, the student will be able to: 3. Determine the cross-sectional properties of structural members beams so that the critical bending, shear stresses and deflection are kept within allowable safe limits.	3.1 Explain the difference between centroid and center of gravity. 3.2 Calculate the center of gravity for masses with compound shapes. 3.3 Explain the concept of moment of inertia and to calculate the moment of inertia for compound members. 3.4 Define the term radius of gyration
	Course Outcome 4	**Learning Objectives for Course Outcome 4**
	Upon successful completion, the student will	4.1 Construct load, shear and moment diagrams for beams with point loads

	be able to: 4. Define and illustrate the relationship between load, shear forces and bending moments in beams.	4.2 Determine the maximum shear and moment locations for beams with various support and loading configurations. 4.3 Construct load, shear and moment diagrams for beams with distributed loads 4.4 Construct load, shear and moment diagrams for beams with combination loads 4.5 Construct load, shear and moment diagrams for overhanging beams 4.6 Construct load, shear and moment diagrams for cantilevered beams 4.7 Use AutoCAD or other CAD software to estimate centroid and moment of inertia for irregular shapes. 4.8 Evaluate the impact of cross-sectional geometry on flexural and torsional stiffness.
	Course Outcome 5	**Learning Objectives for Course Outcome 5**
	Upon successful completion, the student will be able to: 5. Apply teamwork, leadership and interpersonal skills when working individually or within a team to complete the survey field camp projects.	5.1 Take initiative while working with your team to complete in class assignments and laboratories 5.2 Assume accountability for self in managing the use of time and resources to meet established deadline 5.3 Work as an effective team player to complete in class assignments and laboratories while promoting a positive work environment 5.4 Use effective time-management and organizational techniques to prioritize project tasks and to accomplish goals set by the team 5.5 Use conflict resolution skills in the field including cooperation and compromise
	Course Outcome 6	**Learning Objectives for Course Outcome 6**
	Upon successful completion, the student will be able to: 6. Use industry-specific electronic technologies to support the calculations for typical strength of materials problems	6.1 calculate and graph the results of stress strain activities using an Excel spreadsheet

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Final Exam	20%
Homework	5%
Labs	15%
Mid-Term Exam	20%
Quizzes/Assignments	40%

Date: July 31, 2025

Addendum: Please refer to the course outline addendum on the Learning Management System for further

information.