COURSE OUTLINE: MCH103 - STRENGTH OF MATERIAL

Prepared: Howard Gray
Approved: Corey Meunier, Dean, Technology, Trades, and Apprenticeship

Course Code: Title	MCH103: STRENGTH OF MATERIALS
Program Number: Name	4039: MECH. ENG. TN-MANUFA
Department:	MECHANICAL TECHNIQUES PS
Academic Year:	2024-2025
Course Description:	Basic concepts, stress and strain, Hooke`s law, Young`s modulus, temperature stresses, thin walled cylinders, factor of safety, structural shapes, riveted and bolted connections, first and second moment of areas, and shear and bending diagrams are studied.
Total Credits:	3
Hours/Week:	3
Total Hours:	42
Prerequisites:	MCH110
Corequisites:	There are no co-requisites for this course.
This course is a pre-requisite for:	MCH608, MCH609
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4039 - MECH. ENG. TN-MANUFA** VLO 6 Analyze and solve mechanical problems by applying mathematics and fundamentals of mechanical engineering. VLO 8 Contribute to the design and the analysis of mechanical components, processes and systems applying fundamentals of mechanical engineering.
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 6 Locate, select, organize, and document information using appropriate technology and information systems. EES 7 Analyze, evaluate, and apply relevant information from a variety of sources. 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.
Books and Required Resources:	Static and Strength of Materials, Foundation for Structural Design by Russell C. Hibbeler Publisher: Pearson Edition: 5 ISBN: 9780134382593 Required Text

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Upon successful completion of this course, the student will gain an Introduction to Statics and Equilibrium Reactions	1.1 Define the terms mass, weight, force, pressure, energy and work. 1.2 Carry out units analysis in equations. 1.3 State Newtons 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**
2. Upon successful completion of this course, the student will understand Reactions of Materials Under Load - Stress, Strain, And Deformation	2.1 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, elongation). 2.2 Define and explain the difference between ductile and brittle materials. 2.3 Explain the concept of toughness for statically and dynamically loaded materials. 2.4 Explain the relationship between safety factor and allowable or working stress. 2.5 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 To 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**
3. Upon successful completion of this course, the student will be able to Define Cross-Sectional Properties of Structural Members	3.1 Explain the concept of moment of inertia and to calculate the moment of inertia for compound members. 3.2 Define the term radius of gyration. 3.3 Calculate a columns resistance to buckling under axial load.
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4. Upon successful completion of this course, the student will be able to Determine Shear and Bending Moments in Beams	4.1 Construct load, shear and moment diagrams for beams with various support and loading configurations. 4.2 Determine the maximum shear and moment locations for beams with various support and loading configurations.
Course Outcome 5	**Learning Objectives for Course Outcome 5**
5. Upon successful completion of this course, the student will be able to Calculate Bending and Shear Stresses In Beams	5.1 Calculate the bending stresses, shear stresses and deflection in beams with various cross-sectional shapes and various support and loading configurations. 5.2 Describe methods to resist lateral buckling in beams.
Course Outcome 6	**Learning Objectives for Course Outcome 6**
6. Upon successful completion of this course, the student will demonstrate the ability to Describe and Calculate Column Analysis and Design	6.1 Describe the various parameters that have to be evaluated to prevent failure in columns under axial and eccentric loading. 6.2 Describe methods to prevent buckling in columns. 6.3 To calculate the load carrying ability of columns with various shapes, support and loading configurations.

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments and Quizzes	40%
Final Exam	30%
Mid Term	30%

Date: November 19, 2024

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