COURSE OUTLINE: MCH608 - ADVANCED STR OF MATE

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Course Code: Title	MCH608: ADVANCED STRENGTH OF MATERIALS
Program Number: Name	4043: MECH ENG. TECHNOLOGY
Department:	MECHANICAL TECHNIQUES PS
Academic Year:	2024-2025
Course Description:	This course builds on concepts students have learned in earlier courses. In this course, beams will be analyzed using first principles in terms of shear, bending and deflection with applications to statically determinant and indeterminate problems. Columns will also be analyzed for crushing (short columns) buckling (long slender columns). Euler`s equation will be used to analyze columns with various end conditions.
Total Credits:	3
Hours/Week:	3
Total Hours:	42
Prerequisites:	MCH103
Corequisites:	There are no co-requisites for this course.
Substitutes:	MCH202
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4043 - MECH ENG. TECHNOLOGY** VLO 5 Use current and emerging technologies to implement mechanical engineering projects. VLO 6 Analyze and solve complex mechanical problems by applying mathematics and fundamentals of mechanical engineering. VLO 8 Design and analyze mechanical components, processes and systems by applying fundamentals of mechanical engineering. VLO 10 Establish and verify the specifications of materials, processes and operations for the design and production of mechanical components.
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 8 Show respect for the diverse opinions, values, belief systems, and contributions of others. 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%, 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:	Applied Statics and Strength of Materials by Limbrunner Edition: 6th ISBN: 0133840549

Course Outcomes and Learning Objectives:

Course Outcome 1	**Learning Objectives for Course Outcome 1**
1. Examine shear and bending moment in beams.	1.1 Review types of beams and supports. 1.2 Review types of loads on beams. 1.3 Review beam reactions. 1.4 Calculate shear force and bending moment along the length of a beam. 1.5 Develop and draw shear diagrams. 1.6 Develop and draw moment diagrams. 1.7 Determine sections of maximum moment.
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Examine shear stresses in beams.	2.1 Examine tensile and compressive stresses due to bending. 2.2 Learn and apply the Flexural Formula. 2.3 Calculate internal and maximum bending stress through a beam section. 2.4 Learn and apply the General Shear Formula. 2.5 Examine shear stresses in structural members. 2.6 Calculate the load-carrying capacity of beams and

	maximum span for a given beam loading.
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3. Examine Deflection of beams	3.1 Understand the need for considering beam deflection. 3.2 Calculate the radius of curvature. 3.3 Calculate beam deflection using the formula method and moment-area method.
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4. Examine combined stresses	4.1 Understand combined axial and bending stresses. 4.2 Learn combined normal and shear stresses. 4.3 Construct and use Mohr`s Circle
Course Outcome 5	**Learning Objectives for Course Outcome 5**
5. Examine short and long columns	5.1 Learn to identify the type of columns. 5.2 Learn to apply Euler`s formula with various end conditions. 5.3 Define effective length.
Course Outcome 6	**Learning Objectives for Course Outcome 6**
6. Examine statically indeterminate beams	6.1 Identify statically indeterminate beams in structural systems. 6.2 Identify restrained beams such as cantilever or fixed beams. 6.3 Use the method of superposition to analyze restrained beams. 6.4 Identify continuous beams in a structural support.

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments	25%
Test #1	25%
Test #2	25%
Test #3	25%

Date: November 12, 2024

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