COURSE OUTLINE: CIV225 - STRUCTURES

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Course Code: Title	CIV225: STRUCTURES
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 Structures 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. Students will learn the design process for structural loadings, beams, columns, and trusses.
Total Credits:	5
Hours/Week:	4
Total Hours:	56
Prerequisites:	MCH212
Corequisites:	There are no co-requisites for this course.
Substitutes:	ARC219, ARC235
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 1 develop and use strategies to enhance professional growth and ongoing learning in the civil engineering field. VLO 3 complete duties and assist in monitoring that work is performed in compliance with contractual obligations, applicable laws, standards, bylaws, codes and ethical practices in the civil engineering field. VLO 4 carry out sustainable practices in accordance with contract documents, industry standards and environmental legislative requirements. 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 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 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 a 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 problems The documented explanation has to be sent to me by e-mail no later than three days from a missed class. A Doctor note, etc., is to be attached as a PDF file to your e-mail.
Books and Required Resources:	Statics and Strength of Materials - 5th Edition by Hibbler Publisher: Pearson ISBN: 9780134382593

Ends in View and Processes:

Ends in View	**Process**
Upon successful completion, the student will be able to: 1. Recall and apply basic statics and strength of materials principles to the study of structures	1.1 Carry out units analysis in equations. 1.2 State Newton`s three laws and explain their significance to the design of structures. 1.3 Determine how loads applied to structures are distributed to supporting members. 1.4 Construct free-body diagrams for particles and rigid bodies. 1.5 Construct shear and bending moment diagrams for beams 1.6 Identify and illustrate the significance of the stress strain diagram for steel and its relation the study of structures
Ends in View	**Process**
Upon successful completion, the student will be able to: 2. Define and illustrate the relationship between load, shear forces and bending moments in beams.	2.1 Construct load, shear and moment diagrams for beams with point loads. 2.2 Determine the maximum shear and moment locations for beams with various support and loading configurations. 2.3 Construct load, shear and moment diagrams for beams with distributed loads. 2.4 Construct load, shear and moment diagrams for beams with combination loads. 2.5 Construct load, shear and moment diagrams for overhanging beams. 2.6 Construct load, shear and moment diagrams for cantilevered beams. 2.7 Calculate structural loadings based on material properties and design codes.
Ends in View	**Process**
Upon successful completion, the student will be able to: 3. Solve technical problems based on the physical properties of materials of regular geometric cross-sections and composite standard structural sections.	1 Identify, calculate and draw flexural stress variations for a beam cross section 3.2 Calculate flexural and resisting moments for beams using elastic behaviour theories. 3.3 Identify, calculate and draw shear stress variations for a beam cross section 3.4 Calculate shear stresses for beams using elastic behaviour theories. 3.5 Determine allowable stresses in structural members such as safe design stress. 3.6 Identify and apply standard beam deflection tables to determine defections of structural beams under given loads. 3.7 Describe and illustrate methods to resist lateral buckling in

	beams.
Ends in View	**Process**
Upon successful completion, the student will be able to: 4. Identify and solve technical problems involving column analysis and design.	4.1 Identify column elements with respect to their length end support conditions and lateral bracing. 4.2 Identify common terms used to identify column elements such as studs, struts, posts, piers, piles and shafts. 4.3 Identify different modes of failures for short and long columns. 4.4 Identify and calculate column capacities using Euler buckling formula. 4.5 Identify and calculate the slenderness ratio of columns 4.6 Describe the various parameters that have to be evaluated to prevent failure in columns under axial and eccentric loading. 4.7 Describe methods to prevent buckling in columns. 4.8 To calculate the load carrying ability of columns with various shapes, support and loading configurations. 4.9 Analyze the capacity of steel columns using the American Institute of Steel Construction (AISC)formulas and tables. 4.10 Design steel columns using the American Institute of Steel Construction (AISC) formulas and tables.
Ends in View	**Process**
Upon successful completion, the student will be able to: 5. Identify and solve technical problems involving load tracing of structures from the very uppermost level, tracing down layer by layer until the foundation is reached.	5.1 Identify the meaning of lad paths, tributary areas and framing systems. 5.2 Identify the load path for a single-level, double-level and three- level framing system 5.3 Identify the lad path for wall systems. 5.4 Identify the load path for foundation systems. 5.5 Solve load tracing problems for determinate floor and roof systems, which also include sloping roofs.
Ends in View	**Process**
Upon successful completion, the student will be able to: 6. Complete duties and assist in determining certain loads on structures in compliance with the Ontario Building Code(OBC), the National Building Code (NBC) and CSA Documents.	6.1 Identify and define words, terms, phrases and organization of the Building Code. 6.2 Find information in the Building Code and determine how the Code applies to different types of building structures. 6.3 Identify and review the general requirements for structural design using Division B, Part 4 of the OBC. 6.4 Determine dead load and live load due to use and occupancy in a building using Divison B, Part 4 of the OBC. 6.5 Determine minimum snow live loads for the design of building structures using Part 4 and Part 9 of the OBC. 6.6 Determine minimum wind loads for the design of building structures using Part 4 of the OBC.
Ends in View	**Process**

	Upon successful completion, the student will be able to: 7. Apply teamwork, leadership and interpersonal skills when working individually or within team to complete a design project.	7.1 Take initiative while working with your team to complete in class assignments and laboratories 7.2 Assume accountability for self in managing the use of time and resources to meet established deadline 7.3 Work as an effective team player to complete in class assignments and laboratories while promoting a positive work environment 7.4 Use effective time-management and organizational techniques to prioritize project tasks and to accomplish goals set by the team

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments/Quizzes/Activities	60%
Final Exam	20%
Mid-Term Exam	20%

Date: July 31, 2025

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