COURSE OUTLINE

CIV225

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Course Code: Title	CIV225: STRUCTURES
Program Number: Name	4080: CIVIL ENG TECHNICIAN
Department:	CIVIL/CONSTRUCTION
Semester/Term:	18W
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
Total Credits:	5
Hours/Week:	60
Total Hours:	0
Prerequisites:	MCH212
Substitutes:	ARC219, ARC235
Vocational Learning Outcomes (VLO's): **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4080 - CIVIL ENG TECHNICIAN** #5. collaborate with the project team and communicate effectively with project stakeholders to support civil engineering projects. #7. use industry-specific electronic and digital technologies to support civil engineering projects. #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. #11. apply teamwork, leadership and interpersonal skills when working individually or within multidisciplinary teams to complete civil engineering projects.
Essential Employability Skills (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.

	#3. Execute mathematical operations accurately. #4. Apply a systematic approach to solve problems. #5. Use a variety of thinking skills to anticipate and solve problems. #6. Locate, select, organize, and document information using appropriate technology and information systems. #9. Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. #10. Manage the use of time and other resources to complete projects. #11. Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 50%, D
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 by Barry Onouye Publisher: Pearson Prentice Hall ISBN: 0-13-111837
Ends in View:	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
Process:	1.1 Carry out unitsÃƒÂ¢Ã¢`Â¬Ã¢ Â¢ analysis in equations. 1.2 State NewtonÃƒÂ¢Ã¢`Â¬Ã¢ Â¢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:	Upon successful completion, the student will be able to: 2. Define and illustrate the relationship between load, shear forces and bending moments in beams.
Process:	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.
Ends in View:	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.
Process:	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:	Upon successful completion, the student will be able to: 4. Identify and solve technical problems involving column analysis and design.
Process:	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:	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.
Process:	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:	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.
Process:	6.1 Calculate the centroid and moment of inertia of structural members using AutoCAD. 6.2 Calculate centroid and moment of inertia using an Excel spreadsheet. 6.3 Identify and work with menus and commands using WoodWorks Sizer software. 6.4 Perform a detailed load analysis and design for beams or joist using WoodWorks Sizer software. 6.5 Perform a detailed load analysis and design for columns using WoodWorks Sizer software. 6.5 Replicate a structure problem using layout grids, floor elevations and then locating columns and walls on the grid plan that will in turn support the beams and grid area using WoodWorks Sizer software. 6.6 Create an area load for the replicated structures and design the structure using WoodWorks Sizer software.
Ends in View:	Upon successful completion, the student will be able to: 7. Complete duties and assist in determining certain loads on structures in compliance with the Ontario Building Code.
Process:	7.1 Identify and define words, terms, phrases and organization of the Building Code. 7.2 Find information in the Building Code and determine how the Code applies to different types of building structures. 7.3 Identify and review the general requirements for structural design using Division B, Part 4 of the OBC. 7.4 Determine dead load and live load due to use and occupancy in a building using Divison B, Part 4 of the OBC. 7.5 Determine minimum snow live loads for the design of building structures using Part 4 and Part 9 of the OBC. 7.6 Determine minimum wind loads for the design of building structures using Part 4 of the OBC. 7.7 Determine earthquake loads for the design of building structures using Part 4 of the OBC.
Ends in View:	Upon successful completion, the student will be able to: 8. Apply teamwork, leadership and interpersonal skills when working individually or within a team to complete the survey field camp projects.
Process:	8.1 Take initiative while working with your team to complete in class assignments and laboratories 8.2 Assume accountability for self in managing the use of time and resources to meet established deadline 8.3 Work as an effective team player to complete in class assignments and laboratories while promoting a positive work environment 8.4 Use effective time-management and organizational techniques to prioritize project tasks and to accomplish goals set by the team
Ends in View:	Upon successful completion, the student will be able to: 9. Identify the key players in a project team and the effective communication paths for the support of the structure design and construction of a structural project.

Process:	9.1 Identify the preliminary design group that is reflective of the building codes, architectural considerations, mechanical and electrical requirements. 9.2 Identify the process of tender structural drawing and awarding the contract. 9.3 Identify the design process that takes into consideration the structural design group, layouts and materials sizes, fabricated components, construction site and change orders.
Date:	Friday, January 19, 2018
	Please refer to the course outline addendum on the Learning Management System for further information.