COURSE OUTLINE: MCH100 - APPLIED MECHANICS

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Course Code: Title	MCH100: APPLIED MECHANICS
Program Number: Name	4080: CIVIL ENG TECHNICIAN
Department:	CIVIL/CONSTRUCTION
Semesters/Terms:	21W
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 Applied Mechanics 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 the first in the series of courses that leads to MCH212 and ends with CIV225.
Total Credits:	4
Hours/Week:	4
Total Hours:	60
Prerequisites:	PHY100
Corequisites:	There are no co-requisites for this course.
Substitutes:	ARC100, MCH110, PHY118
This course is a pre-requisite for:	MCH212
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 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.

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.

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.
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 Mechanics of Materials, 5th Edition by Russell C. Hibbeler Publisher: Pearson ISBN: 9780134382593

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	1.1 Illustrate with a sketch of a right-angled triangle the accepted method of labeling both the sides and the angles of this triangle. 1.2 Recall the six trigonometric functions and apply these to

trigonometry and measurement units to the study of statics.	simple right-angled triangle problems to solve for the lengths of unknown sides or the magnitude of unknown angles. 1.3 Apply the basic principle known as the Pythagorean Theorem. 1.4 Recall both the sine law and the cosine law and apply these to the solution of triangles which are non-right-angled. Show how the cosine law is related to the Pythagorean Theorem. 1.5 Recall the relationships that exist by way of conversion factors between the S.I. metric and the Imperial system of units for quantities such as length, mass, weight and force. Convert between systems of units using the method of multiplying by ratios equal to one.
Course Outcome 2	**Learning Objectives for Course Outcome 2**
Upon successful completion, the student will be able to: 2. Solve technical problems by applying principles of statics involving the manipulation of vectors.	2.1 Define what is meant by a scalar quantity and list at least a dozen examples of scalar quantities. 2.2 Define what is meant by a vector quantity and list seven examples of vector quantities. 2.3 List the various types of forces along with their characteristics and the commonly used units for forces both in the S.I. metric and the Imperial system of units. 2.4 Describe what is meant by the resultant of a system of forces. 2.5 Describe what is meant by the equilibrant of a system of forces. 2.6 Using the method known as the parallelogram method, determine the resultant of two vector quantities using both a graphical and a mathematical approach. 2.7 Using the method known as the string polygon method, determine the resultant of two or more vector quantities using a graphical approach. 2.8 Given a vector quantity superimposed onto an x, y coordinate plane, resolve the vector into its two orthogonal components, namely its x component and its y component. 2.9 Determine the resultant of two or more vector quantities by the analytical method known as the method of components.
Course Outcome 3	**Learning Objectives for Course Outcome 3**
Upon successful completion, the student will be able to: 3. Solve technical problems by applying principles of statics involving moments about axes caused by single force or a combination of forces	3.1 Define what is meant by the moment or torque of a force about a given point of rotation. 3.2 Write the equation for determining the moment or torque of a force about a given point of rotation. 3.3 Calculate the moment of a force by: i. Multiplying the total force by its perpendicular distance to the point of rotation, ii. Multiplying each of the forces components by their respective perpendicular distances to the point of rotation. 3.4 Determine the resultant moment for a system of moments.

	3.5 Name the three factors that together constitute what is known as a 3.6 Calculate the moment of a given couple. 3.7 Replace a given couple with an equivalent couple at a different location. 3.8 Analyze the effects of couples on a body.
Course Outcome 4	**Learning Objectives for Course Outcome 4**
Upon successful completion, the student will be able to: 4. Solve technical problems by applying principles of statics involving equations of equilibrium and the free body diagram.	4.1 Write the 3 equations that represent the three requirements that must be met for a body to be in a state of static equilibrium 4.2 Explain what is meant by a free body diagram 4.3 List the assumptions or conventions that one must employ when drawing free body diagrams and replacing supports with equivalent supporting forces. 4.4 Construct a free body diagram for parts or the whole of given mechanisms or structures. 4.5 Differentiate between externally applied loads and internal reactions 4.6 Apply the three conditions of equilibrium to free body diagrams and determine the reactions. 4.7 Describe what is meant by a two force member and explain the implications for a free body diagram involving such members. 4.8 Apply the principles of equilibrium to the solution of problems involving static systems of pulleys. 4.9 Describe what is meant by and solve problems involving coplanar concurrent force systems 4.10 Explain the difference between what is known as a concentrated load and what is known as a distributed load 4.11 Describe what is meant by and solve problems involving coplanar parallel force systems including both uniform and non-uniform beam loading. 4.12 Describe what is meant by and solve problems involving coplanar, non-concurrent force systems 4.13 Calculate internal member forces
Course Outcome 5	**Learning Objectives for Course Outcome 5**
Upon successful completion, the student will be able to: 5. Solve technical problems by applying principles of statics involving friction.	5.1 Write the characteristics that pertain to the force known as the friction force 5.2 Sketch the graph of the friction force versus the applied force when a force is applied to a block, initially at rest, on a horizontal, flat surface. The applied force starts at zero and increases gradually up to and beyond the point where the block begins to slide. 5.3 Indicate clearly the two distinct regions of the graph drawn above, namely, the static region and the kinetic region 5.4 Explain what is meant by the coefficient of friction 5.5 Write the equation for the coefficient of static friction 5.6 Write the equation for the coefficient of kinetic friction 5.7 Explain what is meant by the angle of friction

	5.8 Write the equation for the angle of friction in terms of the maximum force of static friction and the normal reaction force between the object and the surface upon which it rests. 5.8 Solve a variety of problems involving friction. These problems will include those that require the student to determine whether motion is impending or not. Also, solve those problems that require the student to determine whether tipping or sliding will occur.

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Final Exam	25%
Mid-Term Exam	25%
Quizzes/Assignments	50%

Date: June 11, 2020

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