COURSE OUTLINE: MCH502 - ADVANCED DYNAMICS

Prepared: Kevin Sloss
Approved: Corey Meunier, Dean, Technology, Trades, and Apprenticeship

Course Code: Title	MCH502: ADVANCED DYNAMICS
Program Number: Name	4043: MECH ENG. TECHNOLOGY
Department:	MECHANICAL TECHNIQUES PS
Academic Year:	2024-2025
Course Description:	In this course students study mechanism displacement diagrams of machine members by relative velocity method, instantaneous centers, velocity polygon, relative acceleration polygon, coriolis acceleration, and straight and curved links. Revised NCCP Description: In this course students learn about kinematics of particles: rectilinear motion, planar curvilinear motion using various coordinate frames (such as rectangular, normal-tangential and radial-transverse), and analysis using Newton`s Second Law. Students also study the kinematics of rigid bodies: translation, rotation, general planar motion, forces and accelerations, mass moment of inertia, and static forces in machines.
Total Credits:	3
Hours/Week:	3
Total Hours:	42
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
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 9 Design, manufacture and maintain mechanical components according to required specifications.
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 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:	Vector Mechanics for Engineers by F.P. Beer, E.R. Johnston, Jr., D.F. Mazurek, P.J. Cornwell Publisher: McGraw Hill Edition: 12th ISBN: 978-1-260-09274-5

Course Outcomes and Learning Objectives:

Course Outcome 1	**Learning Objectives for Course Outcome 1**
1. Solve kinematics problems involving rectilinear motion of particles.	1.1 Solve for displacement, velocity and accelerations using the three equations of constant acceleration rectilinear kinematics for object in motion, including projectile motion.
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Solve kinematics problems involving angular motion of particles.	2.1 Solve for values of angular displacement, velocity, and acceleration using the three equations of angular motion with uniform acceleration
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3. Solve kinematics problems involving planar motion of particles.	3.1 Solve for linear values of displacement, velocity, or acceleration in either absolute or relative terms 3.2 Determine both linear and angular velocities of various mechanisms by means of instantaneous centres
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4. Solve kinematics problems using Newton`s 2nd Law.	4.1 Solve for forces or torque and respective accelerations of linear and angular motion 4.2 Solve for force, torque, linear acceleration and angular acceleration of plane motion
Course Outcome 5	**Learning Objectives for Course Outcome 5**
5. Solve work, energy and power problems involving linear, angular and planar	5.1 Calculate the work of a constant or a variable force 5.2 Apply the conservation of energy principles to linear,

	motion of machine components.	angular and plane motion 5.3 Calculate power & efficiency

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments	40%
Final Exam	30%
Midterm Test	30%

Date: November 12, 2024

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