MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 326 Intermediate Dynamics (4 Units)
Required for General and Mechatronics Concentrations

Course Description: (2019-20 Catalog)	Continuation of ME212. Additional analysis of planar motion of rigid bodies with particular attention to rotating reference frames. Kinematics of linkages, three dimensional dynamics, introduction to numerical methods and dynamic simulation of mechanisms. 3 lectures, 1 activity.
Prerequisite Courses:	MATH 242 (or concurrent), ME 212, CSC 231 or CSC 234.
Prerequisites by Topic:	1. Knowledge of two dimensional engineering kinematics and kinetics. 2. Course in computer programming (e.g., Matlab, FORTRAN, C++). 3. MATH 242?
Textbook: (and/or other required material)	**Vector Mechanics for Engineers: Dynamics**, 12th edition, by F.B. Beer, E.R. Johnston, P.J. Cornwell, McGraw-Hill, 2019. **MATLAB: An Introduction with Applications,** 4th edition, by Amos Gilat, Wiley, 2011
References:	None
Course Coordinator/Instructor:	Brian P. Self, Professor of ME
Course Learning Outcomes:	1. Ability to solve two and three-dimensional kinematics problems using rotating reference frames. 2. Ability to analyze two and three-dimensional kinetics problems, including gyroscopic motion, using Newton's second law and Euler's equations of motion. 3. Ability to analyze two and three-dimensional kinetics problems using the principle of work and energy. 4. Ability to analyze two and three-dimensional kinetics problems using the principle of impulse and momentum. 5. Ability to simulate mechanical systems using modern computer programming tools. 6. Ability to apply basic numerical methods to solve differential equations used in dynamics.

Relationship of Course to Mechanical Engineering Student Outcomes:	SO 1: Develop (D) SO 2: SO 3: SO 4: SO 5: SO 6: SO 7:
Topics Covered:	1. Review of plane kinematics and kinetics of rigid bodies 2. Computer aided solution for kinematics of plane mechanisms and dynamic systems. Numerical techniques for solution of non-linear and linear ordinary differential equations. 3. Kinematics of three dimensional rigid bodies. 4. Kinetics of three dimensional rigid bodies including Newton's equations, energy methods and impulse-momentum techniques. 5. Gyroscopic Motion.
Laboratory Projects:	During the activity period, students meet in a computer laboratory to solve both plane kinematics problems in mechanisms and non-linear, initial value differential equations. These are long term projects that typically span over more than one week in the term.
Class/Lab Schedule:	Three 50-minute lectures, one 110-minute activity period per week.
Contribution of Course to Meeting the Professional Component:	(a) College-level mathematics and basic sciences: 0 credits (b) Engineering Topics: 4 credits Design? no (c) General Education: 0 credits (d) Other: 0 credits
Prepared by: Brian P. Self	**Date:** 2/27/2020