COURSE NUMBER	ME 231
COURSE TITLE	**Kinematics of Machinery**
COURSE STRUCTURE	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR	Dr. Ian S. Fischer
COURSE DESCRIPTION	Design, selection, and evaluation of mechanisms for various applications. Topics include displacement, velocity, and acceleration analysis of planar linkages, synthesis of function generators and motion generators, design of cams, gear-tooth geometry, and analysis of gear trains
PREREQUISITE(S)	MATH 213, grade C or higher in MECH 234
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTIVE ELECTIVE	Required
REQUIRED MATERIALS	Robert L. Norton *Design of Machinery* McGraw-Hill, 5th ed., ISBN 978-0-07-742171-7.
OTHER SUPPLEMENTAL MATERIALS	none
COMPUTER USAGE	Matlab demonstrations

COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:	Course Learning Outcomes	SOs*	Expected Performance Criteria
	1 Calculate the degree of freedom of a mechanism	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	2. Identify the mobility of a four-bar mechanism	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	3. Calculate the extremes of the transmission angle in a crank-and-rocker mechanism	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	4. Calculate the displacements of a planar mechanism	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	5. Apply Freudenstein's Equation in the analysis of a four-bar mechanism	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)

	6. Synthesize a four-bar mechanism motion generator for two or three positions of a moving plane	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	7. Synthesize a four-bar mechanism function generator for three precision points using Freudenstein's equation	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	8. Calculate the velocities of planar mechanism	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	9. Calculate the accelerations of planar mechanism	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	10. Design a cam for a specified follower motion	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	11. Design a gear train for a desired speed ratio	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)
	12. Calculate the speed ratio of a planetary gear train	1, 2	**Exam Question** (80% of the students will earn a grade of 70% or better on this question)

CLASS TOPICS	1. Mechanisms and Machines – degrees of freedom, Grashof's rule, transmission angle, limiting positions 2. Displacement analysis 3. Linkage synthesis 4. Velocity analysis 5. Acceleration analysis 6. Cams – displacement, velocity, acceleration and jerk analysis of cam follower motion, polynomial cams 7. Spur gears, gear terminology, speed ratios 8. Involutometry 9. Planetary gear trains 10. Exams

STUDENT OUTCOMES (SCALE: 1-3)	1	2	3	4	5	6	7
	3	3					
	3 – Strongly supported 2 – Supported 1 – Minimally supported						

* Student Outcomes