ME 308 – INTRODUCTION TO VIBRATIONS

Designation as a 'Required' or 'Elective' course
TYPE OF COURSE: Required for BSME Major

Course (catalog) description
COURSE DESCRIPTION: ME 308 Introduction to Vibrations. 3 Hours. Free and forced vibrations of damped linear single and multiple degree of freedom systems. Approximate methods, instrumentation, and applications.

Prerequisite(s)
PREREQUISITE(S): ME 210 Engineering Dynamics, 3 Hours. Math 220 Differential Equations, 3 Hours.

Textbook(s) and/or other required material
SAMPLE SOURCES AND RESOURCE MATERIALS: (1) A. A. Shabana, Theory of Vibration: An Introduction (2nd Edition), 1996, Springer-Verlag, New York.

Course objectives
COURSE OBJECTIVES: This course introduces students to basic concepts in mechanical vibrations and associated mathematics, and theoretical and computational analysis tools. Most of the course is devoted to the single-degree-of-freedom vibration problem (70%). Multi-degree-of-freedom discrete systems (30%) are introduced. Formulation and analysis of mechanical design problems are presented in all of these topics.

Topics covered

MAJOR TOPICS:		Hrs
1.	Overview of applications & Course Introduction	4
2.	Solution of the vibration equations	9
3.	Free vibration of single degree of freedom systems	9
4.	Forced vibration of single degree of freedom systems	9
5.	Discrete systems with more than one degree of freedom	9
	Examinations & Review for examinations	5
	Total	45

Class/laboratory schedule, i.e., number of sessions each week and duration of each session

CREDIT HOURS: 3 Hours
TYPE OF INSTRUCTION:

Type of Instruction	Contact Hours/Week
Lecture-Discussion	3

Contribution of course to meeting the professional component
This course introduces students to basic concepts in mechanical vibrations and associated mathematics, and theoretical and computational analysis tools. The following fundamental concepts and techniques are also a part of this required course: linear algebra, matrix algebra, numerical and analytical calculations for the equation of motion, solutions to ordinary differential equations.

Relationship of course to program outcomes
As shown in the BSME Course Outcomes Matrix:
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Person(s) who prepared this description and date of preparation
Thomas J. Royston, Associate Professor of Mechanical Engineering, February 12, 2002
Updated by: Thomas J. Royston, Professor of Mechanical Engineering, September 12, 2006
Updated by: Thomas J. Royston, Professor of Mechanical Engineering, August 9, 2007
Updated by: Carmen M. Lilley, Assistant Professor of Mechanical Engineering, April 28, 2008
Reviewed by: Carmen M. Lilley, Assistant Professor of Mechanical Engineering, January 8, 2009 August 21, 2009, January 6, 2010, and August 14, 2012.
Updated by: Carmen M. Lilley, Associate Professor of Mechanical Engineering, August 16, 2013
Updated by: Jamison Szwalek, Clinical Assistant Professor of Mechanical Engineering, on December 14, 2018. Outcomes were changed to conform to ABET new Student Outcomes.

Comments on outcomes
1. Use of complex numbers, linear algebra; principles of dynamic systems, differential equations, graphical constructions, and analytical formulations.
2. Through homework, students learn to formulate and solve vibration analysis of mechanical design problems. Course includes exposure to practical applications of vibration theory as applied to mechanical design.

These outcomes are what students are expected to gain from this course.