

## AA 312 COURSE DETAILS

<b>TITLE:</b>	Structural Vibrations
<b>CREDITS:</b>	4
<b>FORMAT &amp; SCHEDULE:</b>	Lecture, 4 hours / week
<b>FACULTY CONTACT:</b>	Behcet Acikmese

### **COURSE DESCRIPTION (Catalog Short Form, 50 words Max):**

Vibration theory. Characteristics of single and multi degree-of-freedom linear systems with forced inputs. Approximate methods for determining principal frequencies and mode shapes. Application to simple aeroelastic problems.

### **COURSE OVERVIEW & LEARNING OBJECTIVES:**

Introduce students to the fundamental elements of linear analysis of mechanical systems. Fundamental tools of modeling will be introduced first. Then basic mathematical analysis tools will be introduced both in time domain, via state-space models, and in frequency domain, via Fourier analysis.

Course Objectives:

1. Students will learn the fundamentals of modeling and analysis of linear mechanical systems.
2. Students will be prepared to perform practical control system design using computer aided control systems design tools.

## COURSE REQUIREMENTS

**PREREQUISITES:** M E 230

**REQUIRED TEXTBOOK:** *None required.*

## COURSE SCHEDULE

### Topics

Overview of complex numbers, Laplace transforms, linear algebra, modeling rigid body dynamics

Modeling continuous systems : vibrating string, torsional shafts, beams, and approximations via discretizations

Time-domain representations of mechanical systems : 2<sup>nd</sup> order ODEs and state-space forms

Frequency domain function models : Impulse response, transfer functions

Basics of time-domain analysis, eigenvalues and eigenvectors

Basics of frequency domain analysis, Bode plots, Fourier analysis