NJIT

ME-305
INTRODUCTION TO SYSTEM DYNAMICS

Objectives/Syllabus

Description: Principles of dynamic system modeling and response with emphasis on mechanical, electrical, and fluid systems. Application of computer simulation techniques.

Prerequisite(s):   Math 222 – Differential Equations
ME 231 – Kinematics of Machinery
Mech 236 – Dynamics

Textbook(s)/Materials Required:

1.   K. Ogata, <u>System Dynamics</u>, Prentice-Hall, 4th Ed. 2004

Objectives:

1.   Students will learn the fundamental techniques for deriving the governing equations of dynamic systems such as mechanical and electrical.

2.   Students will learn the basic process of solving the governing equations of mechanical and electrical systems as well as automatic controllers using simple proportional, derivative and integral actions and learn to derive system response due to the initial conditions as well as input forces such as impulse, step, ramp and sinusoidal.

3.   Students will learn applied topics such as (a) experimental determination of elements of mechanical systems such as inertia, springs and dampers, and (b) design of vibration isolation systems.

Topics:

Use of Laplace transforms in solving differential equations
Modeling of Mechanical Systems
Modeling of Electrical Systems
Transient Response of First and Second Order Systems
Frequency Response of First and Second Order Systems
Vibration Isolation
Industrial Automatic Controllers
Exams and Quizzes

Schedule: Lecture/Recitation: 3 hours, per week

Laboratory: none