
ME 239: Advanced Design and Automation

Special Topics in Exoskeleton and Human-Machine Design

Spring 2011

Lecture: Tuesday, Thursday

9:30 – 11:00 A.M.

Brief Description:

This subject offers a Mechatronics approach to the design of robots and automated systems covering from the design of mechanical hardware to surrounding electronics and computer interface. Basic Kinematics of the robotic systems, Basic Dynamics of Robotic Systems, Hydraulic and Pneumatic Systems, Electric Actuators, Power transmission, Sensors, control and Computer Interfacing, Applications to factory automation, manufacturing, hazardous environment and human machine systems.

A CONTROL and/or DESIGN PROJECT IS REQUIRED.

Prerequisites:

Consent of Instructor

Tentative Outline:

Jan. 17	Week 1	Electric Actuators (Two Weeks) (DC motors theory, motor selection, PWM amplifier)
Jan. 31	Week 3	Power Transmission (One week) (planetary gears, traction drives, belts, clutches)
Feb. 7	Week 4	Basic Kinematics of the Robotic Systems (Two Weeks) (forward kinematics, inverse kinematics, force-torque relations, trajectory planning)
Feb. 21	Week 6	Basic Dynamics of Robotic Systems (Two Weeks) (Lagrange's equations, inverse dynamics)
Mar. 7	Week 8	Bearings (One Week)
Mar. 14	Week 9	Control (Two Weeks)
Mar. 21	Week 10	Spring Break
Apr. 4	Week 12	Hydraulic and Pneumatic Systems (Two Weeks) (pumps and motors, electro-hydraulic and pneumatic power elements)
Apr. 18	Week 14	Sensors (One Week) (encoders, tachometers, resolvers, Hall Effect, sensor, piezoelectric sensors, strain gauge sensors)
Apr. 25	Week 15	Final Presentations and Trade Show