

Course Outline

DEN 398 Mechatronics I

Mechatronics, as an engineering discipline, is the synergistic combination of mechanical engineering, electronics, control engineering, and computers, all integrated through the design process. It involves the application of complex decision-making to the operation of physical systems. Mechatronic systems depend for their unique functionality on computer software. This introductory course studies mechatronics at a theoretical and practical level; balance between theory/analysis and hardware implementation is emphasized; emphasis is placed on physical understanding rather than on mathematical formalities. A case-study, problem-solving approach, with video hardware demonstrations, is used throughout the course.

Mechatronics I Topics

Introduction to Mechatronics

Dynamic System Investigation Process

General Approach to Physical and Mathematical Modeling

General Concepts in Modeling

Physical & Mathematical Modeling of Mechanical, Electrical, Electromechanical, Thermal, Fluid, and Multidisciplinary Physical Systems

Modeling System Parasitic Effects; Nonlinear Behavior and Time Variation: Loading Effects

Dynamic System Analytical and Numerical, Time Response and Frequency Response

Analog Electronics for Mechatronics.

About the Course

The course consists of six modules; each module covers several topics. Before studying the modules, students will read the objectives and quiz questions. For each module there is a quiz that must be completed and submitted for a grade before moving on to the next module. All six quizzes must be completed to receive credit for the course.

Computer Usage/Software Needed

MatLab with Simulink and the Control System Toolbox will be used extensively throughout the course. A tutorial “MatLab for Mechatronics Applications” will be made available. It is highly recommended, but not required, that students have access to one of these programs. Students will learn from just reading through the exercises, but in order to be an effective mechatronics engineer, they need to be proficient in using software such as these. Most companies have these available for their engineers. If not available, the student version of this software will meet the course requirements and can be purchased through the The MathWorks (www.mathworks.com).