## MTRE 4610: Advanced Controls

*3 Credit Hours*

*Prerequisite: ((MTRE 3610 and MTRE 3610L) or EE 4201 or (ME 3501 and ME 4501)) and MATH 3260 and Engineering Standing*

This course is an advanced study of modern control systems focused on control theories and system applications. It covers the basic theoretical methods and mathematical tools for the analysis and design of control systems. Topics that will be included are a state-space variable method, system transfer function, discrete-time systems, z-transforms, digital control, fundamentals of modern control systems, analysis and design techniques such as controllability, observability, Ackerman's formula, and pole placement.

## MTRE 4610L: Advanced Controls Laboratory

*1 Credit Hours*

*Concurrent: MTRE 4610*

This is a laboratory course designed to complement the advanced control system topics covered in MTRE 4610. Several topics such as the state-space representation of dynamic systems, controllability, observability, Ackerman's formula, pole placement, Integral control design, and design of digital control systems are studied and analyzed using simulations and experimental setups.

## MTRE 4710: Instruments and Controls

*3 Credit Hours*

*Prerequisite: EE 2501 and ((MTRE 3610 and MTRE 3610L) or EE 4201 or (ME 3501 and ME 4501)) and MATH 2306 and Engineering Standing*
*Concurrent: (MTRE 3110 or ENGR 3343 or EE 3701 or CPE 4010)*

Characteristics of instruments used in mechanical systems for determining parameters such as temperature, pressure, and flow are studied. The use of these devices in automated systems is covered. Furthermore, the elements of control theory, selection of control modes, and application to mechanical systems are studied. Exercises illustrating the use of pertinent instrumentation for determining the performance of mechanical equipment are conducted.