**Systems Engineering**

**SYS 6321** Systems Integration (3 semester hours) Introduction to systems integration in complex systems using the automotive sector as an example; plan, organize and manage the integration of complex automotive systems; understand the decomposition/integration paradigm to manage complexity; define metrics to define achievement of objectives; and, demonstrate ability to work in cross-functional/multi-disciplinary teams. Features of the course include: Team approach; simulated production environment including (virtual) client and vendor interaction in the face of unpredictable (virtual) external events; cross-disciplinary. Intended for a broad audience of engineering graduate students regardless of their specific knowledge or interest in automotive systems or that industry. (3-0) T

**SYS 6322 (MECH 6316)** Digital Control of Automotive Powertrain Systems (3 semester hours) Digital control systems, discretization and design by equivalents. Input-output design and discrete-time state variable estimation and control. Introduction to various control problems in automotive powertrains. Application of digital control principles to automotive powertrains for internal combustion engine idle speed control and air-to-fuel ratio control. Prerequisites: EE 4310 or MECH 4310 or equivalents (3-0) T

**SYS 6323 (MECH 6323)** Robust Control Systems (3 semester hours) Theory, methodology, and software tools for the analysis and design of model-based control systems with multiple actuators and multiple sensors. Control oriented model parameterizations and modeling errors. Definitions and criteria for robust stability and performance. Optimal synthesis of linear controllers. The loop shaping design method. Methods to simplify the control law. Control law discretization. Mechatronic design examples. Prerequisite: (MECH 6300 or ENGR 6331 or SYSM 6307) or equivalent. (3-0) T

**SYS 6324 (BMEN 6388, ENGR 6336, MECH 6313)** Nonlinear Control Systems (3 semester hours) Differential geometric tools, feedback linearization, input-output linearization, output injection, output tracking, stability. Prerequisite: ENGR 6331 or MECH 6300 or SYSM 6307 or equivalent. (3-0) T