ELECTROMECHANICAL (ELMC)

ELMC2080 INTRODUCTION TO ROBOTIC SYSTEMS
This course introduces the fundamental principles of robotic systems. Students study both the hardware and software needed to design, build, program, and test a mobile robot. Topics include power sources, motors, sensors, actuators, and process controls. Laboratory work complements classroom discussion. ***Prerequisite:*** *MATH1500 or MATH1750 or MATH1775 (3 credits)*

ELMC3000 ELECTROMECHANICAL DESIGN
Students work in teams to design and construct an interdisciplinary project. Teams, with clearly defined individual responsibilities, are required. During the course of the semester, each team undertakes the necessary activities to bring about a successful design project that is well understood, documented, and presented in both oral and written form. Emphasis is placed on research, innovation, project management, decision-making, prototyping, design for manufacturing, design for testability, environmental and ethical issues in design, depth and breadth of analysis, quality of hardware, documentation, and communications. ***Prerequisites:*** *Junior status; ENGR1500 and MECH2500 and ELEC3250 (3 credits)*

ELMC3250 ELECTROMAGNETIC FIELD THEORY
This course introduces static electric and magnetic fields. Time-varying fields are studied using Maxell's equations. Application of energy transfer in space and in communication transmission lines are analyzed. ***Prerequisite:*** *MATH2025 (3 credits)*

ELMC3800 SPECIAL TOPICS ELECTROMECHANICAL ENGINEERING
Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 - 4 credits)

ELMC4000 ADVANCED MATHEMATICAL MODELING
Problems in heat transfer, fluid mechanics, vibration systems, and wave propagation will be modeled using partial differential equations. Solution techniques will involve the study of orthogonal expansions in Fourier series, Sturm-Liouville theory, and the method of separation of variables. Additional problems in heat conduction will be presented and solved using Bessel functions and cylindrical coordinates. Computer software for both modeling and problem solving will be employed. ***Prerequisite:*** *MATH2500 (3 credits)*

ELMC4125 ELECTROMECHANICAL SYSTEMS
This course analyzes the dynamic behavior of mechanical, electrical, fluid and thermal systems using modeling and simulation techniques. Steady state and transient conditions will be examined in both free and forced modes. Various simulation software packages are used in the laboratory to analyze electromechanical systems. ***Prerequisites:*** *ELEC4475 and MECH3850 (4 credits) summer*

ELMC5000 SENIOR DESIGN I
In this first capstone course, engineering students will apply knowledge and skills learned in their undergraduate curriculum toward a proposed project approved by the instructor to investigate, analyze, design, build and test a prototype module for a concept that addresses an issue in society or the environment. Electromechanical engineering projects with real world relevancy are encouraged. Elements of the design process are considered as well as real-world constraints, such as economic and societal factors, marketability, ergonomics, safety, aesthetics and ethics. Course requirements include oral and written reports. ***Prerequisites:*** *MECH3100, ELEC2850 & ELEC3600* ***Corequisite:*** *MECH3850 (4 credits) spring*

ELMC5500 SENIOR DESIGN II
In this second capstone course, engineering students will continue to develop their project. Their prototype module for a concept that addresses an issue in society or the environment will be fabricated and tested. Functional tests at both subsystem and system level will be designed and implemented, with the results analyzed toward determining the feasibility of this design concept to address the identified issue. Students are required to present their full project in oral and written form within the course, and are encouraged to also present within the wider community.***Prerequisite:*** *ELMC5000 (4 credits) summer*

ELMC5505 ELECTROMECHANICAL SYSTEMS II
This course is a continuation of Electromechanical Systems I. Analysis of multi-degree of freedom systems will be studied. Dynamic responses of first and second order systems to harmonic excitation are analyzed. State space analysis will be used to solve sets of nth order coupled differential equations. Sensors to detect displacement, velocity, and acceleration as well as digital signal processing techniques to acquire data, provide filtering, and perform system analysis will be employed. The laboratory projects will reinforce the theory and demonstrate the rigor of the analytical techniques. Laboratory exercises will stress the comparison of theoretical and simulated results. ***Prerequisite:*** *ELMC4125 (4 credits)*