MFG 427. Computer Integrated Manufacturing & Global Manufacturing. 3 Hours
Computer Integrated Manufacturing (CIM) systems and interrelationships; group technology, computer-aided process planning, expert systems, local area networks, automated flow lines, data collection, and material handling. Also covered are global manufacturing issues and specific country concerns. Prerequisite(s): MFG 204, SET 153L.

MFG 431. Controls for Industrial Automation. 3 Hours
Topics include: fundamentals of digital logic, pneumatic power, electromechanical sensors and actuators, pneumatic and electrical control circuit analysis and design, industry safety and design standards, concepts of mechatronics, programmable logic controllers, and networking communications. Prerequisite(s): ECT 110; SET 153L.

MFG 432. Plastics, Composites & Nano Materials & Processes. 3 Hours
Introduction to the more common plastics, composites, and nano engineering materials and their properties. Study of processes including extrusion, injection molding, blow molding, compression and transfer molding, and forming. Topics on part and tooling design. Prerequisite(s): CHM 123; MFG 204.

MFG 434. Robotics & Computer Numerical Control. 3 Hours
Programming of CNC turning and machining centers and industrial robots; application of CAM software to design and edit CNC and robot programs, edit programs, and display tool and motion paths. Parametric part programming concepts to produce complex surfaces. Programming of robotic devices. Prerequisite(s): MFG 110L; MFG 108L, SET 153L.

MFG 435. Advanced Numerical Control. 3 Hours
Instruction in the programming of complex, multi-axis CNC machines. Extended parametric programming. Programming language techniques. Prerequisite(s): MFG 434.

MFG 438. Sustainable Manufacturing & Product Design. 3 Hours
Design for the environment, sustainable manufacturing processes and business practices to support these topics are developed. Prerequisite(s): MFG 108L, MFG 204.

MFG 490. Senior Project. 3 Hours
Advanced study and research of the product realization process focusing on conceptual design, embodiment design, final design, and prototyping or other design verification. Students work on externally sponsored engineering projects in multidisciplinary teams that perform engineering analysis that includes safety, ergonomics, environmental, cost and sociological impact of their designs. Prerequisite(s): CMM 100; IET 323; MFG 240, MFG 431.

MFG 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

MFG 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): MFG 493.