ENMF - ENGINEERING-MANUFACTURING (ENMF)

ENMF 506. Quality Management and Six Sigma. (3 Credits)
Quality Management and Six Sigma: Concepts of six sigma and quality improvement methods. Understanding and application of advanced lean and statistical methods to improve the quality of products, services, processes and the management of resources. An understanding of statistical principles including distributions will be required and used throughout the class. Software such as R or SAS may also be used. (Spring)

ENMF 600. Applied Engineering Programming. (3 Credits)
Use of high level programming language (Matlab) and associated application programming interfaces (API) to design and create models for manufacturing processes. Programming methods for designing, implementing and using machines used in manufacture. The approach will be practical where students will learn to develop, debug and execute scripts to achieve specific objectives. (Fall)

ENMF 602. Advanced Applied Engineering Mathematics. (3 Credits)
Advanced Applied Engineering Mathematics: Mathematics remains the language which engineers design, modify and use machines. Topics covered will include: linear algebra, differential equations, numerical methods and approximations, use of computer algebra systems like MATLab. (Fall)

ENMF 603. Advanced Engineering Principles. (3 Credits)
Concepts from all engineering disciplines that are important in understanding, designing and using manufacturing methods. The concepts could include: materials properties (including stress strain relationships), materials testing and analysis (including technologies to test bulk and surface properties), the movement of solids, liquids and gases (and basic thermodynamics), fundamentals of computer aided design (and additive/3D manufacturing), core concepts and ideas from circuits, power creation and transmission, machines and motors. Instructors may use special case studies that cover some of the concepts to understand failure modes or how a process could be optimized. The course is designed for students from all branches of traditional engineering disciplines. Prerequisites: ENMF 600 and ENMF 602 . (Spring)

ENMF 604. Precision Control and Automated Manufacturing. (3 Credits)
The primary objective of this course is to provide an understanding and help the students master the concepts of dynamics and control algorithms of precision systems. The course will also present the techniques and methods to design, develop and control typical precision control systems, and will also discuss the techniques and challenges of automated manufacturing systems and robotics. Matlab and Simulink may be used to design/analyze the control systems. Prerequisite: ENMF 603. (Summer)

ENMF 605. 3D Modeling for Manufacturing Industries. (3 Credits)
This course is designed to teach students intermediate and advanced 3D CAD design and modeling knowledge and skills demanded by modern manufacturing industries using the SolidWorks package. Students will be introduced to basic CAD and SolidWorks techniques, followed by intermediate and advanced skills including topics such as creating multibody parts, revolved & thread features, flex bending, sweep with guide curves, lofts and boundaries, surfaces and patches, assembly motions and mates, assembly, assembly drawings and BOMs, drawings and detailing, sheet metal parts, using subtract & intersect, using magnetic mates, hybrid modeling, etc. A design project will be required of students to apply skills learned to real projects. In the design project, students will experience the entire design process from concept design, detailed design, assembly and drawing documentation. Prerequisite: ENMF 603. (Summer)

ENMF 606. Bio-Engineered Products. (3 Credits)
Identification and application of engineering principles to the analysis and development of processes using biological molecules including enzymes, whole plant or animal cells. Understand and identify characteristics of separation processes for thermally sensitive products such as proteins, DNA, RNA and plasmids. The objective will be to examine practical and relevant engineering applications from current practice – including the use of process simulators for optimization. Prerequisite: ENMF 603 . (Summer)

ENMF 607. Advanced Applied Chemical Process Engineering. (3 Credits)
This course will provide an integrated study of chemical-related manufacturing process systems. A variety of chemical-related manufacturing process systems will be analyzed from the perspective of equipment, operations, and safety. Commercial-grade chemical process simulation software (e.g., Aspen, ProSim, ChemCAD, ChemSep, etc.) will be used to design/simulate/analyze chemical-related manufacturing process systems. Prerequisite: ENMF 603 . (Summer)

ENMF 608. Manufacturing Systems Design and Economics. (3 Credits)
The design of manufacturing systems using principles of macroeconomics – including issues of cost, revenues, profit and supply chains. Calculations of profit/loss and rates of return to compare systems and optimize processes/systems used for manufacture. Prerequisite: ENMF 603. (Fall)

ENMF 609. Preventative Maintenance and Reliability Engineering. (3 Credits)
This course is designed to provide insights into how the reliability of an organization's manufacturing and other assets can provide a strategic competitive advantage. Topics will include effective management practices and a study of the most recent technologies available for predicting and preventing failures that will enable the improvement of asset reliability. Prerequisite: EMNF 602 . (Fall)

ENMF 610. Engineering Analysis and Simulation. (3 Credits)
The design and analysis of manufacturing systems using the latest methods and practices and the modeling of manufacturing systems using simulation software. Using simulation software to examine alternatives to existing manufacturing methods and systems. Software systems to be used could include ANSYS, CFD, 3d Modeling and Finite Element Analysis. Students will design individual parts of a manufacturing system, assemble them into a manufacturing process and analyze the results in software. Students will be required to prepare a detailed technical report summarizing their conclusions on a final project. Prerequisite: ENMF 603. (Spring)