CHE 540 - PHYSICAL PROP OF FLUIDS
Semester Hours: 3
Theoretical, experimental, and correlation methods for determining and predicting the thermodynamic and transport properties of various fluids. Critical properties, equations of state, vapor pressure and latent heat, heat capacity. Viscosity, thermal conductivity, diffusion coefficient, phase equilibrium, heat and free energy for formation.

CHE 541 - CHEMICAL KINETICS & REACTOR DE
Semester Hours: 3
Fundamental principles of chemical kinetics and chemical reactor engineering along with the design of both thermal and catalytic reactors.

CHE 549 - INTRO ENVIRONMENTAL ENGR
Semester Hours: 3
Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and in their control.

CHE 552 - EXPER TECH IN FLUID MECH
Semester Hours: 3

CHE 559 - SELECTED TOPICS/CHE
Semester Hours: 1-6
Discussion of biocompatible polymers and their application in drug delivery systems. Polymers of natural and synthetic origin will be studied, special emphasis will be placed upon the synthesis of biocompatible polymers. The formation of polymeric micelles, hydrogels, and liposomes will be studied. The process of extravasation as an uptake mechanism for polymeric delivery systems will be discussed. Reading material will be based on the latest publications in the field.

CHE 560 - INTRO TO BIOPROCESS ENGR
Semester Hours: 3
Application of engineering principles to the analysis of and the development and design of processes using biological catalysts including enzymes, plant and animal cells, and genetically engineered cells. Other topics include fermentation and biological mass transport processes.

CHE 561 - BIOSEPARATIONS RECOMBI TECH/PR
Semester Hours: 3
General characteristics of separation processes used in the biotechnology industry, including removal of insolubles, isolation and purification of thermally sensitive products for final use by the customer. Application of unit operation principles for biological separations, recombinant DNA techniques, protein engineering. Prerequisite: CHE 560.

CHE 594 - APPLIED MATERIALS PROCESSING
Semester Hours: 3
Synthesis and processing methods of materials for engineering applications. Selection and use of materials performance factors for design of structural and functional components. Use of computational methods in solving open-ended design problems that depend on an understanding of the nature and properties of materials will be emphasized. All classes of materials are covered.

CHE 595 - POLYMER ENGINEERING
Semester Hours: 3

CHE 641 - ADV THERMODYNAMICS
Semester Hours: 3
Application of classical thermodynamics. Treatment of problems involving nonideal gases and liquids, phase equilibrium, and chemical equilibrium.

CHE 642 - PHYSICOCHEMICAL HYDRODYNAMICS
Semester Hours: 3
Treatment of electrokinetic phenomena, axial dispersion, convective diffusion in liquids, Brownian motion, flows driven by surface tensions, capillary motion.
CHE 644 - INTRO ELECTROCHEM SYSTEM
Semester Hours: 3
Thermodynamics, transport, and kinetics of electrodes and cells. Systems analysis of batteries, fuel cells, porous electrodes, electroplating, electrowinning, and corrosion processes. Convective diffusion at high Schmidt numbers.

CHE 646 - THERMODYNAMICS OF MATRALS
Semester Hours: 3
Fundamental thermodynamic review, phase equilibrium, chemical reaction equilibrium, free energy, binary and ternary phase transformations, solution models and selected topics.

CHE 648 - TRANSPORT PHENOMENA I
Semester Hours: 3

CHE 649 - TRANSPORT PHENOMENA II
Semester Hours: 3

CHE 650 - PRINC LIQUID/SOLID INTER
Semester Hours: 3
Applies basic principles in thermodynamics and kinetics to characterize surfaces and surface phenomena. Reviews fundamental properties of gas-liquid, liquid-liquid, solid-liquid, and solid-gas interfaces and phenomena occurring at these interfaces.

CHE 652 - INTRO TO AIR POLLU CONTROL
Semester Hours: 3
Technology of air pollution dealing with air pollutants, effects, sources, combustion processes, and abatement and control technology. Engineering contributions to both the problems and their solutions. Nature of air pollution problem and fundamental technological approaches to its solution.

CHE 657 - ADVANCED PROCESS CONTROL
Semester Hours: 3
Application of modern control theory to chemical processes; multivariable control; estimation and adaptive control, optimal control.

CHE 658 - CATALYSIS/REACTOR DESIGN
Semester Hours: 3
Treatment of homogeneous and heterogeneous reaction kinetics, transport in fluid-solid reactions, catalyst deactivation and their effects on the analysis and design of chemical reactors. Prerequisite: CHE 541.

CHE 659 - SELECTED TOPICS/CHE
Semester Hours: 1-6

CHE 696 - GRAD INTERNSHIP CHE ENGR
Semester Hours: 1-9
Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance to the graduate student. Permission of CHE faculty member required.

CHE 699 - MASTER'S THESIS
Semester Hours: 1-9
Required each semester in which a student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of nine hours of credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

CHE 724 - INSTR METH/BIO-MTLS CHARACTERI
Semester Hours: 3

CHE 725 - INSTR METH/BIO-MTLS CHARACTERI
Semester Hours: 4
CHE 747 - ADV TOP/BIOENGINEERING  
Semester Hours: 3  
Engineering aspects of microbial processes and the processing of biological materials. Integrating knowledge of governing biological properties and principles with chemical engineering methodology. Emphasis on current literature in the areas of purification and separation technology, bioprocess development, and biomaterials.

CHE 749 - MASS TRANSPORT  
Semester Hours: 3  
Mass transfer in solid and fluid systems under steady and transient conditions. Integration of momentum, heat and mass transfer equations with application to reactive, rheological and multicomponent systems.

CHE 757 - OPT TECH/FLUID MECHANICS  
Semester Hours: 3  
Laser courses, molecular interactions with light and diatomic spectroscopy needed fluorescence, Brillouin scattering, four wave mixing, CARS and other applications in optical fluid diagnostics.

CHE 759 - ADV SELECTED TOPICS IN CHE  
Semester Hours: 1-3

CHE 799 - DOCTORAL DISSERTATION  
Semester Hours: 1-9  
Required each semester student is enrolled and receiving direction on doctoral dissertation.