CHEMICAL & BIOLOGICAL ENGINEERNG (CBE-GY)

CBE-GY 902X Guided Studies in Chemical Engineering (3-6 Credits)
Typically offered Fall and Spring
These studies involve selections, analyses, solutions and presentations of engineering reports of problems in products, processes or equipment design, or other fields of chemical engineering practices under faculty supervision. Conferences are scheduled. Master's-degree candidates are required to submit three unbound copies of their reports to advisers one week before the last day of classes. | Prerequisite: Adviser's approval
Grading: Satisfactory/Unsatisfactory
Repeatable for additional credit: Yes

CBE-GY 997X MS Thesis in Chemical & Biological Engineering (3-9 Credits)
Typically offered Fall and Spring
Theses for the master's degree in chemical engineering should give results of original investigation of problems in chemical engineering or the application of physical, chemical or other scientific principles to chemical engineering. Theses may involve experimental research, theoretical analyses or process designs, or combinations thereof. Master's-degree candidates are required to submit four unbound copies to advisers before the seventh Wednesday before commencement. | Prerequisite: Adviser's approval.
Grading: Satisfactory/Unsatisfactory
Repeatable for additional credit: Yes

CBE-GY 998X Research in Chemical & Biomolecular Engineering (3-9 Credits)
Typically offered occasionally
Dissertation research for PhD students who have not completed their qualifying examination. No more than a maximum of 9 credits can be taken or counted toward the PhD dissertation. Minimum registration is 3 credits. Prerequisites: Admission into the CBE PhD degree program & consent of PhD academic and thesis advisors.
Grading: Satisfactory/Unsatisfactory
Repeatable for additional credit: Yes
Prerequisites: Admission into the CBE PhD degree program & consent of PhD academic and thesis advisors.

CBE-GY 999X PhD Dissertation in Chemical and Biological Engineering (3-12 Credits)
Typically offered Fall and Spring
Theses for the PhD degree must give results of independent investigations of problems in chemical engineering and may involve experimental or theoretical work. Theses must show ability to do creative work and must show that original contributions, worthy of publication in recognized journals, are made to chemical engineering. Candidates are required to take oral examinations on thesis subjects and related topics. Doctoral-degree candidates must submit five unbound thesis copies to advisers before or on the seventh Wednesday before commencement. | Prerequisite: Adviser's approval and students must have passed the doctoral qualifying examination.
Grading: Satisfactory/Unsatisfactory
Repeatable for additional credit: Yes
Prerequisites: RE-GY 9990 AND Restriction: Academic Plan = PHD Chemical Engineering-PHD.

CBE-GY 6153 Applied Mathematics in Engineering (3 Credits)
Typically offered Fall
This course covers mathematical formulation of chemical engineering problems in terms of ordinary, partial differential and differential equations. Topics include solutions of boundary and initial value problems using Green's functions and other techniques; characterization of second-order partial differential equations and properties of their solutions; asymptotic methods and numerical techniques. | Prerequisite: MA-UY 2122 and MA-UY 2132 or adviser's approval.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CBE-GY 6333 Transport Phenomena (3 Credits)
Typically offered Spring
The topics in this course include vector analysis review; diffusive fluxes; conservation equations for chemical species and thermal energy; boundary conditions; scaling and approximation techniques; solution methods for conduction and diffusion problems; transient unidirectional diffusion and conduction; momentum diffusion and viscous stress; conservation equation for momentum and the Navier-Stokes equations; unidirectional and lubrication flows; and low- and high-Reynolds number flows. | Prerequisite: CBE-UY 3313 or adviser's approval.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CBE-GY 6733 Chemical Engineering Thermodynamics (3 Credits)
Typically offered occasionally
This course is an organized exposition of fundamental concepts of classical thermodynamics and traditional tools that will help chemical engineers understand and analyze systems they are likely to encounter in practice and/or original research. This course is for students who seek a much deeper understanding of classical thermodynamics than a typical undergraduate course provides. Topics include phase, chemical, and reaction equilibria, ideal and non-ideal solutions, stability of thermodynamic systems and thermodynamics of surfaces.. | Prerequisite: CBE-UY 3153 or adviser's approval.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CBE-GY 6813 Chemical Reactor Analysis and Design (3 Credits)
Typically offered Spring
The topics in this course include trends and issues in modern reactor design; kinetics of complex homogenous and heterogeneous reactions: determination of nonlinear kinetic parameters, effects of transport processes, and catalyst deactivation; analysis and design of reactors; laminar flow reactors; dispersion model; split boundary condition problems; effects of non-ideal flow on conversion; and fixed-bed, fluidized-bed and multiphase reactors. | Prerequisite: CBE-UY 3223 or adviser's approval.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CBE-GY 8373 Engineering Principles of Drug Delivery (3 Credits)
Typically offered occasionally
The course covers fundamental concepts in drug delivery from an engineering perspective. Emphasis will be on materials, processing methods and characterization of drug delivery vehicles ranging from antibody drug conjugates, to nanoparticles, to hydrogels. The class will begin with an overview of drug delivery fundamentals – rationale, mechanisms, approaches – and dive into specifics – delivery vehicle material properties, processing techniques and characterization. Topics will include therapeutic modalities and mechanisms of action; engineering principles of controlled release and of drug transport; thermodynamic principles of self-assembly; physicochemical characterization of drug delivery vehicles; processing and purification methods; effects of macromolecular conformation on bio-interactions; and significance of biodistributions. Clinical and industrial examples will be presented where possible. | Prerequisite: CBE-UY 3313 and CBE-UY 3323 or adviser's approval.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CBE-GY 9413 Selct Tpcs Chem & Bio Engr II (3 Credits)
Typically offered Fall
Topics of special interest in chemical and biomolecular engineering are announced in advance in each semester offering
Grading: Grad Poly Graded
Repeatable for additional credit: Yes

CBE-GY 9910 Seminar in Chemical & Biology Engineering (0 Credits)
Typically offered Fall
Recent developments in chemical and biomolecular sciences and engineering are presented by engineers and scientists from industry and academia. Four semesters are required for PhD candidates.
Grading: Grad Poly Pass/Fail
Repeatable for additional credit: Yes

CBE-GY 9920 Seminar in Chemical & Biological Engineering (0 Credits)
Typically offered Spring
Recent developments in chemical and biomolecular engineering are presented by engineers and scientists from industry and academia
Grading: Grad Poly Pass/Fail
Repeatable for additional credit: Yes