498. Master's Research  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.  
R. Open only to master's students in the Building Construction Management major.  
Masters degree Plan B research paper.

499. Master's Thesis Research  
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 99 credits in all enrollments for this course.  
R. Open only to graduate students in Building Construction Management.

CELL AND MOLECULAR BIOLOGY  

College of Natural Science  

800. Cell and Molecular Biology Seminar  
Fall, Spring. 1(1-0). A student may earn a maximum of 5 credits in all enrollments for this course.  
R. Open only to students in the Cell and Molecular Biology major.

801. Advanced Project Scheduling  
Fall of odd-numbered years. 3(2-2)  
Critical path analysis for effective and logical scheduling of construction projects. Identification of project activities and their relationships. Schedule development, analysis, and updating. Relationship of project costs and resources to the schedule. Effective communication of schedule information.

811. Advanced Project Scheduling  
Fall of even-numbered years. 3(2-2)  
Critical path analysis for effective and logical scheduling of construction projects. Identification of project activities and their relationships. Schedule development, analysis, and updating. Relationship of project costs and resources to the schedule. Effective communication of schedule information.

817. Computer-Integrated Construction Management  
Spring, 3(2-2).  
R. Approval of department; application required.  
Information generation and utilization for the management of construction projects. Integration of construction management software, conceptual modeling and knowledge-based models.

823. Advanced Construction Project Management  
Spring of even-numbered years. 3(3-0)  
P: BCM 422, BCM 426, or CE 376, CE 471. R: Open only to graduate students in Building Construction Management or Civil Engineering.  
Project management issues, services, documentation, risk assessment, bidding, cost accounting, scheduling, dispute resolution and liability case studies.

898. Master's Research  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.  
R. Open only to master's students in the Building Construction Management major.  
Masters degree Plan B research paper.

899. Master's Thesis Research  
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 99 credits in all enrollments for this course.  
R. Open only to graduate students in Building Construction Management.

CHEMICAL ENGINEERING CHE  

Department of Chemical Engineering  

College of Engineering  

201. Material and Energy Balances  
Fall, Spring. 3(4-0)  
P: MTH 123, CEM 142 or CEM 152, CPS 101 or concurrently. R: Open only to students in the College of Engineering.  
Chemical engineering calculations. Synthesis of chemical process systems. Analysis of chemical processes using material and energy balances. Enthalpy calculations for changes in temperature, phase transitions, and chemical reactions.

311. Fluid Flow and Heat Transfer  
Fall. 4(6-0)  
P: CHE 201 or concurrently, MTH 235 or concurrently. R: Open only to College of Engineering students.  

312. Mass Transfer and Separation  
Spring. 4(6-0)  
P: CHE 201 or concurrently, MTH 235 or concurrently. R: Open only to College of Engineering students.  

316. Unit Operations Laboratory  
Spring. 3(4-0)  
P: CHE 311 or concurrently; CHE 312; CHE 321 or concurrently. R: Open only to Chemical Engineering and Food Engineering majors. Completion of Tier I writing requirement.  

321. Thermodynamics for Chemical Engineering  
Spring. 4(5-0)  
P: CHE 201. R: Open only to College of Engineering students.  

327. Chemical Engineering Materials  
Fall, Spring. 3(3-0)  
P: CEM 392, CEM 391 or concurrently. R: Open only to Chemical Engineering majors.  
Structure, properties, and performance of classes of materials emphasizing polymeric materials.

422. Transport Phenomena  
Spring. 3(3-0)  
P: CHE 455; CHE 422; or FE 485. R: Open only to Chemical Engineering and Food Engineering majors.  
Mathematical and physical analogies among mass, energy and momentum transfer processes. Dimensional analysis and solutions to multivariable boundary value problems. Numerical solutions to nonlinear problems.

431. Chemical Reaction Engineering  
Spring. 3(3-0)  
P: CHE 311 or concurrently; CHE 312; CHE 321 or concurrently. R: Open only to Chemical Engineering majors.  
472. Composite Materials Processing  
Fall. 3(2-3)  
P: CHE 511 or MSE 332 or CE 321. R: Open only to College of Engineering majors.  
Manufacturing processes for thermoset and thermoplastic matrix composites. Mechanical and thermal evaluation of composites. Rheology and molding of fiber-filled materials.

481. Biochemical Engineering  
Fall. 3(2-3)  
P: CHE 431. R: Open only to College of Engineering majors.  
Applications of microbiology and biochemistry to biochemical engineering. Kinetics and thermodynamics of biochemical reactors. Transport phenomena in biological systems. Bioreactor design and scale-up.

490. Independent Study  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Chemical Engineering majors. Approval of department.

491. Selected Topics in Chemical Engineering  
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Chemical Engineering majors. Study of newly-developing or non-traditional chemical engineering topics in a classroom environment.

822. Advanced Transport Phenomena  
Spring. 3(0-0)  
P: CHE 422.  

831. Advanced Chemical Reaction Engineering  
Spring. 3(0-0)  
P: CHE 471.  
Characterization of solid catalysts. Heterogeneous reaction rate expressions. Simultaneous mass and heat transport and chemical reaction in porous catalysts. Design of fixed-bed and fluidized-bed reactors. Industrial catalytic reactor design.

882. Advanced Biochemical Engineering  
Spring. 3(0-0)  
P: CHE 471.  

989. Doctoral Dissertation Research  
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 72 credits in all enrollments for this course. R: Open only to Chemical Engineering majors.

CHEMISTRY  
Department of Chemistry  
College of Natural Science

124. General Chemistry I  
Fall, Spring. 3(3-0)  
P: MTH 103 or MTH 110 or MTH 116 or concurrently. R: Not open to students with credit in CEM 152 or CEM 182H.

125. General and Inorganic Chemistry  
Fall, Spring. 3(3-0)  
P: CEM 141 or CEM 151. R: Not open to students with credit in CEM 151 or CEM 181H.

143. Survey of Organic Chemistry  
Fall, Spring. 4(3-0)  
P: CEM 141 or CEM 151. R: Not open to students with credit in CEM 251 or CEM 351.

151. General and Descriptive Chemistry  
Fall. 4(4-0)  
P: MTH 110 or concurrently. R: Not open to students with credit in CEM 142 or CEM 181H.

152. Principles of Chemistry II  
Spring. 3(3-0)  
P: CEM 151. R: Not open to students with credit in CEM 141 or CEM 182H.

161. Chemistry Laboratory I  
Fall, Spring. 1 credit.  
P: CEM 141 or CEM 151 or concurrently.

162. Chemistry Laboratory II  
Spring. 1 credit.  
P: CEM 161; CEM 142 or CEM 152 or concurrently.

181H. Honors Chemistry I  
Fall. 4(4-0)  
P: MTH 124 or MTH 132 or MTH 152H or concurrently. R: Approval of department.

191. Chemistry Laboratory II  
Fall, Spring. 1 credit.  
P: CEM 161; CEM 142 or CEM 152 or concurrently. Preparation and qualitative analysis of inorganic compounds.