

## Course Descriptions for CBC Graduate Courses

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**831. Biomolecules and Metabolism** (CHEM, BIOS 431/831) (4 cr I, II) Lec 4. Prereq: CHEM 252 or 262. BIOS 102 recommended. First course of a two semester, comprehensive biochemistry course sequence. Structure and function of proteins, nucleic acids and carbohydrates; nature of enzymes; major metabolic pathways; and biochemical aspects of molecular biology. Completion of BIOC 432/832 following this course is recommended. Suitable for biochemistry study in pre-professional and graduate programs.

**832. Gene expression and replication** (CHEM, BIOS 432/832) (2 cr I, II) Lec 2. Prereq: BIOC 431/831. A continuation of BIOC 431/831. Structural and biochemical aspects of DNA replication and gene expression, and biotechnology.

**833. Biochemistry Laboratory** (CHEM, BIOS 433/833) (2 cr I, II) Lec 1, lab 4. Prereq: BIOC 431/831 or concurrent enrollment. An introduction to techniques used in biochemical and biotechnology research, including measurement of pH, spectroscopy, analysis of enzymes, chromatography, fractionation of macromolecules, electrophoresis and centrifugation.

**834. Plant Biochemistry** (AGRO, BIOS, CHEM 434/834)(3 cr, II) Lec 3. Prereq: BIOC 431/831 or the equivalent. Biochemical metabolism unique to plants. Relationships of topics previously described in general biochemistry to biochemical processes unique to plants. Biochemical mechanisms behind physiological processes discussed in plant or crop physiology.

**836. Biophysical Chemistry** (CHEM, BIOS 436/836) (3 cr II) Lec 3. Prereq: one semester of physical chemistry or permission. An introductory course covering: X-ray diffraction and protein structure. Absorption spectroscopy of biomolecules, linear and circular dichroic spectroscopy of proteins and nucleic acids. Fluorescence probes, membrane dynamics, NMR, EPR, and Resonance Raman spectroscopy applied to biological systems. Energetics, enzyme kinetics, relaxation kinetics, allosteric systems, and hydrodynamics.

**837. Research Techniques in Biochemistry** (BIOS 437/837)(4 cr II) Lec 1 lab 9. Prereq: CHEM 116 or 221 and BIOC 433/833, or permission. Practical applications of biochemical methodology to studies in the life sciences. Hands-on experience with quantification by spectrophotometry and spectrofluorimetry, chromatographic and electrophoretic fractionation of proteins and nucleic acids, detection of biomolecules by immunological and DNA hybridization techniques, and analysis of data with a microcomputer. For advanced undergraduate and beginning graduate students who plan a career in laboratory work within the life sciences.

**839. Graduate Survey of Biochemistry** (CHEM, BIOS 839) (4 cr I) Lec 4. Prereq: Graduate standing in Biological Chemistry, Chemistry or Biological Sciences or permission. A comprehensive survey of biochemistry for incoming graduate students. Topics to be covered include those in BIOC 831 and 832, but not all topics will be discussed in lecture periods. Depth enhanced by assigned readings.

**848. Redox Biochemistry** (CHEM 848) (3 cr) Lec 3. Prereq: 3 hrs BIOC and 3 hrs inorganic chemistry. Redox (oxidation and reduction)-based biochemical processes (energy generation, oxygen transfer, enzyme catalysis, signaling, gene regulation, and diseases). Recent progress in these areas. Role of metals in biochemical reactions, metal homeostasis, and biosynthesis of metal cofactors and metal sites. Biochemistry and pathophysiology of redoxactive species and radicals. Antioxidant molecules and enzymes.

**886. Advanced Topics in Biophysical Chemistry** (BIOC, BIOS 486/886)(3 cr II) Lec 3. Prereq: CHEM 471/871 or 481/881. Applications of thermodynamics to biochemical phenomena, optical properties of proteins and poly-nucleotides, and kinetics of rapid reactions.

**898. Research in Biochemistry** (1-6 cr I, II, III) Prereq: BIOC 433/833 and permission. Laboratory research of a specific problem under the supervision of a Biological Chemistry faculty member. 899. Masters Thesis (Biological Sciences 899) (6-10 cr I, II, III) 915Q. Graduate Seminar in Molecular Plant Biology (Biological Sciences 915Q) (1 cr per sem. I, II) Prereq: Graduate Standing and permission.

**992k. Seminar in Biological Chemistry** (CHEM, BIOS 992k) (1 cr, I, II). Prereq: BIOC 432/832 or 839 and permission.

**932. Proteins** (CHEM, BIOS 932) (2 cr) Lec 3. Prereq: BIOC 432/832 or 839, or permission. Classification, composition, purification and function of proteins.

**933. Enzymes** (CHEM, BIOS 933) (2 cr) Lec 3. Prereq: BIOC 432/832 or 839, or permission. Kinetics, regulation and reaction mechanisms of enzymes.

**934. Genome Dynamics and Gene Expression** (CHEM, BIOS 934) (3 cr II) Lec 3. Prereq: BIOC 432/832 or 839 or permission. Detailed examination of dynamic control mechanisms of genome maintenance and gene regulation. Mechanisms of transcription, translation, and replication based on analysis of current and seminal literature.

**935. Metabolic Function and Dysfunction** (CHEM, BIOS 935)(3 cr I) Lec 3. Prereq: BIOC 432/832 or 839 or permission. Integration of major metabolic pathways. Bioenergetics and control mechanisms for catabolic and anabolic processes. Disease mechanisms.

**937A. Advanced Topics in Plant Biochemistry: Photosynthesis and Related Processes** (CHEM, BIOS 937A) (3 cr, offered every fourth semester) Lec 3. Prereq: permission. A journal-based advanced coverage of biochemical and biophysical aspects of photosynthesis, stomatal function, translocation and mitochondrial respiration in higher plants.

**939. Photobiochemistry** (CHEM, BIOS 939) (2 cr II, even years). Lec 2. Prereq: 1 yr biochemistry and physics. Biochemical effects caused by the interaction of light and living matter. Systems to be covered will include microbes, animals and plants.

**949. Biochemistry of Nutrition** (BIOS 949) (3 cr I odd years) Lec 3. Prereq: BIOC 432/832 or 839 or permission. Interrelationships of nutrients, nutritional state and metabolic processes will be explored. Special emphasis will be given to energy metabolism, integration of nutrition and metabolism and nutritional regulation of gene function.

**999. Doctoral Dissertation** (BIOS 999) (Cr arr. I, II, III)