BIOLOGICAL CHEMISTRY (BIOC)

BIOC 810 Plant Molecular Biology
Crosslisted with: AGRO 810, BIOS 810, HORT 810
Prerequisites: AGRO 215 or BIOS 206; BIOC 831 or permission
Description: Molecular genetic basis of biological function in higher plants. Genome organization, gene structure and function, regulation of gene expression, recombinant DNA, and genetic engineering principles. Material taken primarily from current literature.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

BIOC 818 Agricultural Biochemistry
Crosslisted with: AGRO 818
Prerequisites: Undergraduate major in life sciences or related area, and a course in biochemistry
Description: A Web-based course. Biochemical underpinnings of agricultural production and processing systems. Agricultural biotechnology; bioenergetics; kinetics and enzyme regulation; interaction of biomolecules with light, photosynthesis and the balance between anabolism and catabolism in microbes, plants and animals.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: IND

BIOC 831 Structure and Metabolism
Crosslisted with: BIOC 431, BIOS 431, BIOS 831, CHEM 431, CHEM 831
Prerequisites: CHEM 252 or CHEM 262 with a grade of C or better. LIFE 120 and BIOS 206 are recommended.
Notes: First course of a two-semester, comprehensive biochemistry course sequence.
Description: Structure and function of proteins, nucleic acids, carbohydrates and lipids; nature of enzymes; major metabolic pathways of catabolism; and biochemical energy production.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: VBMS 410

BIOC 832 Metabolism and Biological Information
Crosslisted with: BIOC 432, BIOS 432, CHEM 432, CHEM 832, BIOS 832
Prerequisites: BIOC 431/831 with a grade of C or better, BIOS 206 or AGRO 215.
Notes: Continuation of BIOC 431/831.
Description: Major metabolic pathways of anabolism, structural and biochemical aspects of biological information flow and use in biotechnology.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: BIOC 435, BIOS 934, CHEM 934

BIOC 833 Biochemistry Laboratory
Crosslisted with: BIOC 433, BIOS 433, BIOS 833, CHEM 433, CHEM 833
Prerequisites: BIOC 431/831 (or concurrent enrollment) or CHEM 435/835.
Description: Introduction to techniques used in biochemical and biotechnology research, including measurement of pH, spectroscopy, analysis of enzymes, chromatography, fractionation of macromolecules, electrophoresis, and centrifugation.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

BIOC 834 Plant Biochemistry
Crosslisted with: AGRO 434, BIOC 434, BIOS 434, CHEM 434, AGRO 834, BIOS 834, CHEM 834
Prerequisites: BIOC/BIOS/CHEM 431/831.
Description: Biochemical metabolism unique to plants. Relationships of topics previously acquired in general biochemistry to biochemical processes unique to plants. Biochemical mechanisms behind physiological processes discussed in plant or crop physiology.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

BIOC 836 Physical Basis of Macromolecular Function
Crosslisted with: CHEM 836
Description: Introduction to the theory and practice of biophysical characterization of macromolecules. The course will be based on primary research literature, although a supporting text will be used for in depth discussion of the methods.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

BIOC 837 Research Techniques in Biochemistry
Crosslisted with: BIOC 437, BIOS 437, BIOS 837
Prerequisites: BIOC/BIOS/CHEM 433/833, or permission.
Description: Methods approach to systems biology analysis. Molecular identification and quantification employing techniques such as mass spectrometry, chromatography, electrophoretic fractionation, transcriptomics, proteomics and metabolomics. Data and pathway analysis with computational methods.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC

BIOC 839 Dynamics of Biochemical and Biological Networks
Crosslisted with: BIOC 439, BIOS 439, BIOS 839
Prerequisites: BIOS 206, BIOC 321 or BIOC 431 (or equivalent).
Description: To introduce and integrate, students in biochemistry and other life sciences, to the field of computational modeling of biochemical and biological network systems into a seamless curriculum.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
**BIOC 842 Computational Biology**  
*Crosslisted with:* STAT 842, STAT 442, BIOC 442  
**Prerequisites:** Any introductory course in biology, or genetics, or statistics.  
**Description:** Databases, high-throughput biology, literature mining, gene expression, next-generation sequencing, proteomics, metabolomics, system biology and biological networks.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**BIOC 848 Redox Biochemistry**  
*Crosslisted with:* CHEM 848  
**Prerequisites:** 3 hrs BIOC and 3 hrs inorganic chemistry  
**Description:** Redox (oxidation and reduction)-based biochemical processes (energy generation, oxygen transfer, enzyme catalysis, signaling, gene regulation, and diseases). Recent progress in these areas. Roles 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.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**BIOC 886 Advanced Topics in Biophysical Chemistry**  
*Crosslisted with:* BIOC 486, BIOS 486, BIOS 886, CHEM 486, CHEM 886  
**Prerequisites:** CHEM 471/871 or 481/881.  
**Description:** Applications of thermodynamics to biochemical phenomena, optical properties of proteins and polynucleotides, and kinetics of rapid reactions.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**BIOC 898 Research in Biochemistry**  
**Prerequisites:** BIOC 833 and permission  
**Description:** Laboratory research on a specific problem under the supervision of a biochemistry faculty member.  
**Credit Hours:** 1-6  
**Min credits per semester:** 1  
**Max credits per semester:** 6  
**Max credits per degree:** 6  
**Format:** IND

**BIOC 899 Masters Thesis**  
**Prerequisites:** Admission to masters degree program and permission of major adviser  
**Credit Hours:** 1-10  
**Min credits per semester:** 1  
**Max credits per semester:** 10  
**Max credits per degree:** 99  
**Format:** IND

**BIOC 932 Proteins**  
*Crosslisted with:* BIOS 932, CHEM 932  
**Prerequisites:** CHEM 832 or BIOS 832 or BIOC 832 or CHEM 839 or BIOS 839 or BIOC 839  
**Description:** Protein structure and function.  
**Credit Hours:** 2  
**Max credits per semester:** 2  
**Max credits per degree:** 2  
**Format:** LEC

**BIOC 933 Enzymes**  
*Crosslisted with:* BIOS 933, CHEM 933  
**Prerequisites:** BIOC/BIOS/CHEM 432/832, or BIOC/BIOS/CHEM *839  
**Description:** Kinetics regulation and reaction mechanisms of enzymes.  
**Credit Hours:** 2  
**Max credits per semester:** 2  
**Max credits per degree:** 2  
**Format:** LEC

**BIOC 934 Genome Dynamics and Gene Expression**  
*Crosslisted with:* BIOS 934, CHEM 934  
**Prerequisites:** BIOC/BIOS/CHEM 832 or permission  
**Description:** 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.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**BIOC 935 Metabolic Function and Dysfunction**  
*Crosslisted with:* BIOS 935, CHEM 935  
**Prerequisites:** BIOC/BIOS/CHEM 432/832 and permission  
**Description:** Current metabolic research at the bioenergetic, metabolomic, and molecular level. The normal metabolic processes that go awry in cancer, obesity, and oxidative stress.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**BIOC 949 Biochemistry of Nutrition**  
*Crosslisted with:* ASCI 949, BIOS 949, NUTR 949  
**Prerequisites:** BIOC 832 or 839, or permission  
**Notes:** Offered odd-numbered calendar years.  
**Description:** Interrelationships of nutrients, nutritional state and metabolic processes. Energy metabolism, integration of nutrition and metabolism and nutritional regulation of gene function.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**BIOC 992K Seminar in Biological Chemistry**  
*Crosslisted with:* CHEM 992K  
**Prerequisites:** BIOC 832 or *839; and permission  
**Credit Hours:** 1-2  
**Min credits per semester:** 1  
**Max credits per semester:** 2  
**Max credits per degree:** 2  
**Format:** LEC
BIOC 998 Advanced Topics in Biochemistry
Prerequisites: BIOC 832 and *839
Description: BIOC 998 is a special biochemistry topics when faculty and
student needs cannot be met by other courses.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

BIOC 999 Doctoral Dissertation
Prerequisites: BIOC 832 and *839
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 99
Format: IND