**BIOLOGICAL CHEMISTRY (BIOC)**

**BIOC 801 Elements of Biochemistry**
*Crosslisted with:* BIOC 401
**Prerequisites:** CHEM 255 (preferred) or CHEM 251; BIOS 101 and BIOS 101L or LIFE 120 and LIFE 120L
**Notes:** Will not count towards a biochemistry major.
**Description:** Structure and function of proteins, carbohydrates, lipids and nucleic acids; enzymes; principal metabolic pathways; and biochemical expression of genetic information.
**Credit Hours:** 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Grade Pass/No Pass Option
**Offered:** FALL/SPR

**BIOC 810 Plant Molecular Biology**
*Crosslisted with:* AGRO 810, HORT 810
**Prerequisites:** AGRO 215 or BIOS 206; BIOC 831
**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
**Grading Option:** Grade Pass/No Pass Option
**Offered:** SPRING

**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
**Grading Option:** Grade Pass/No Pass Option
**Prerequisite for:** VBMS 919

**BIOC 831 Biochemistry I: Structure and Metabolism**
*Crosslisted with:* BIOC 431, BIOS 431, BIOS 831, CHEM 431, CHEM 831
**Prerequisites:** LIFE 120 with a grade of C or better; CHEM 252 or CHEM 262 with a grade of C or better.
**Notes:** BIOS 206 or PLAS 215 is recommended. 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
**Grading Option:** Grade Pass/No Pass Option
**Offered:** FALL/SPR
**Prerequisite for:** AGRO 810, BIOC 810, HORT 810; ASCI 820; ASCI 917; ASCI 925, NUTR 925; ASCI 926, NUTR 926; ASCI 927, NUTR 927; BIOC 305; BIOC 390; BIOC 432, BIOC 832, BIOS 432, CHEM 832, BIOC 834, BIOS 834, CHEM 834; CHEM 833, CHEM 833; BIOC 440, FDST 470, FDST 870; NUTR 450; NUTR 455; NUTR 820, NUTR 821; PLAS 343, BIOC 343, BIOS 343, CHEM 343, AGRO 834, BIOC 834, BIOS 834, CHEM 834; VBMS 410; VBMS 805; VBMS 950

**BIOC 832 Biochemistry II: 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 PLAS 215 with a grade of C or better.
**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
**Grading Option:** Grade Pass/No Pass Option
**Offered:** FALL/SPR
**Prerequisite for:** BIOC 435; BIOC 932, BIOS 932, CHEM 932; BIOC 933, BIOS 933, CHEM 933; BIOC 934, BIOS 934, CHEM 934; BIOC 935, BIOS 935, CHEM 935; BIOC 998; VBMS 919; VBMS 950; VBMS 951

**BIOC 833 Biochemistry Laboratory**
*Crosslisted with:* BIOC 433, BIOS 433, BIOS 833, CHEM 433, CHEM 833
**Prerequisites:** BIOC 431/831 or parallel; 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
**Grading Option:** Grade Pass/No Pass Option
**Offered:** FALL/SPR
**Prerequisite for:** BIOC 437, BIOC 837, BIOS 437, BIOS 837, BIOC 898
**Course and Laboratory Fee:** $50
BIOC 834 Plant Biochemistry
Crosslisted with: PLAS 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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Grade Pass/No Pass Option

BIOC 837 Research Techniques in Biochemistry
Crosslisted with: BIOC 437, BIOS 437, CHEM 837
Prerequisites: BIOC/BIOS/CHEM 433/833.
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
Grading Option: Grade Pass/No Pass Option
Prerequisite for: VBMS 919
Course and Laboratory Fee: $70

BIOC 839 Dynamics of Biochemical and Biological Networks
Crosslisted with: BIOC 439, BIOS 439, CHEM 839
Prerequisites: BIOS 206 or PLAS 215; BIOC 401 or BIOC 431
Notes: Letter grade only.
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
Grading Option: Graded
Offered: SPRING
Prerequisite for: ASCI 949, BIOC 949, NUTR 949; BIOC 932, BIOS 932, CHEM 932, BIOC 933, BIOS 933, CHEM 933; BIOC 998

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
Grading Option: Grade Pass/No Pass Option

BIOC 848 Redox Biochemistry
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
Grading Option: Grade Pass/No Pass Option

BIOC 886 Advanced Topics in Biophysical Chemistry
Crosslisted with: BIOC 486, CHEM 486, CHEM 886
Prerequisites: CHEM 471/871 or CHEM 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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Grade Pass/No Pass Option

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: 9
Grading Option: Grade Pass/No Pass Option

BIOC 932 Proteins
Crosslisted with: BIOC 932, CHEM 932
Prerequisites: BIOC/BIOS/CHEM 832 or BIOC/BIOS/CHEM 839
Description: Protein structure and function.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Grade Pass/No Pass Option
BIOC 933 Enzymes
Crosslisted with: BIOS 933, CHEM 933
Prerequisites: BIOC/BIOS/CHM 432/832, or BIOC/BIOS/CHM 839
Description: Kinetics regulation and reaction mechanisms of enzymes.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Grade Pass/No Pass Option

BIOC 934 Genome Dynamics and Gene Expression
Crosslisted with: BIOS 934, CHEM 934
Prerequisites: BIOC/BIOS/CHM 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
Grading Option: Grade Pass/No Pass Option

BIOC 935 Metabolic Function and Dysfunction
Crosslisted with: BIOS 935, CHEM 935
Prerequisites: BIOC/CHM/BIOS 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
Grading Option: Grade Pass/No Pass Option

BIOC 949 Biochemistry of Nutrition
Crosslisted with: ASCI 949, NUTR 949
Prerequisites: BIOC 832 or 839
Notes: Offered odd-numbered calendar years.
Description: Offered odd-numbered calendar years. 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
Grading Option: Grade Pass/No Pass Option
Offered: FALL

BIOC 992K Seminar in Biological Chemistry
Crosslisted with: CHEM 992K
Description: Presentations of current and original Biochemistry research.
Credit Hours: 1-2
Min credits per semester: 1
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Grade Pass/No Pass Option

BIOC 999 Doctoral Dissertation
Prerequisites: Admission to doctoral degree program and permission of supervisory committee chair
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 99
Grading Option: Grade Pass/No Pass Option