### Biological Chemistry (BIOC)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Format</th>
<th>Prerequisites</th>
<th>Crosslisted with</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 810</td>
<td>Plant Molecular Biology</td>
<td>3</td>
<td>LEC</td>
<td></td>
<td>AGRO 810, BIOS 810, HORT 810</td>
</tr>
<tr>
<td>BIOC 818</td>
<td>Agricultural Biochemistry</td>
<td>3</td>
<td>LEC</td>
<td>AGRO 818</td>
<td></td>
</tr>
<tr>
<td>BIOC 831</td>
<td>Structure and Metabolism</td>
<td>3</td>
<td>IND</td>
<td>BIOC/BIOS/CHEM 431/831</td>
<td></td>
</tr>
<tr>
<td>BIOC 832</td>
<td>Metabolism and Biological Information</td>
<td>3</td>
<td>LEC</td>
<td>BIOC 431/831 with a grade of C or better</td>
<td>BIOC 432, BIOS 432, CHEM 432, CHEM 832</td>
</tr>
<tr>
<td>BIOC 833</td>
<td>Biochemistry Laboratory</td>
<td>2</td>
<td>LEC</td>
<td>BIOC 431/831 (or concurrent enrollment) or CHEM 435/835</td>
<td>AGRO 434, BIOS 434, CHEM 434, AGRO 834, BIOS 834, CHEM 834</td>
</tr>
<tr>
<td>BIOC 834</td>
<td>Plant Biochemistry</td>
<td>3</td>
<td>LEC</td>
<td>BIOC/BIOS/CHEM 431/831</td>
<td></td>
</tr>
<tr>
<td>BIOC 835</td>
<td>Physical Basis of Macromolecular Function</td>
<td>3</td>
<td>LEC</td>
<td>CHEM 836</td>
<td></td>
</tr>
<tr>
<td>BIOC 836</td>
<td>Research Techniques in Biochemistry</td>
<td>4</td>
<td>LEC</td>
<td>BIOC 437, BIOS 437, CHEM 837</td>
<td></td>
</tr>
<tr>
<td>BIOC 837</td>
<td>Dynamics of Biochemical and Biological Networks</td>
<td>3</td>
<td>LEC</td>
<td>BIOC 439, BIOS 439, BIOS 839</td>
<td>BIOS 206, BIOS 321 or BIOC 431 (or equivalent)</td>
</tr>
</tbody>
</table>

**Description:**
- **BIOC 810:** 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.
- **BIOC 818:** Undergraduate major in life sciences or related area, and a course in biochemistry.
- **BIOC 831:** 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.
- **BIOC 832:** Structure and function of proteins, nucleic acids, carbohydrates and lipids; nature of enzymes; major metabolic pathways of catabolism; and biochemical energy production.
- **BIOC 833:** 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.
- **BIOC 834:** 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.
- **BIOC 835:** 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.
- **BIOC 836:** 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.
- **BIOC 837:** 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.
- **BIOC 838:** 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.

**Notes:**
- **BIOC 810:** AGRO 215 or BIOS 206; BIOC 831 or permission.
- **BIOC 818:** AGRO 810, BIOS 810, HORT 810.
- **BIOC 831:** AGRO 215 or BIOS 206; BIOC 831 or permission.
- **BIOC 832:** BIOS 206 or AGRO 215.
- **BIOC 833:** BIOC 431/831 (or concurrent enrollment) or CHEM 435/835.
- **BIOC 834:** AGRO 434, BIOS 434, CHEM 434, AGRO 834, BIOS 834, CHEM 834.
- **BIOC 835:** AGRO 434, BIOS 434, CHEM 434, AGRO 834, BIOS 834, CHEM 834.
- **BIOC 836:** CHEM 836.
- **BIOC 837:** BIOC/BIOS/CHEM 433/833, or permission.
- **BIOC 838:** BIOC/BIOS/CHEM 431/831.

**Format:**
- **LEC:** Lecture
- **IND:** Independent study
- **VBMS:** Virtual Classroom
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 reductive 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 BIOS 832 or CHEM 839 or BIOS 839 or BIOS 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.
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