**BIOLOGICAL CHEMISTRY (BIOC)**

**BIOC 95 Biochemistry Internship**
*Prerequisites:* Biochemistry Major; Junior or Senior standing; Permission
*Notes:* Permission to enroll will be granted upon review of the proposed internship by the supervising UNL faculty.
*Description:* Provides an opportunity for a practical experience and career exploration/development in a selected business, industry, agency or educational institution. Activities must include a significant biochemistry and/or computational/systems biology component.
*Credible Hours:* 0
*Max credits per semester:* 1
*Max credits per degree:* 4
*Grading Option:* Pass No Pass

**BIOC 98 Biochemistry Research Experience**
*Prerequisites:* Permission
*Notes:* This course may be repeated four times; research students should enroll in BIOC 498 in subsequent semesters. Permission to enroll will be granted upon review of the Request for Research Experience application by supervising UNL faculty.
*Description:* An introduction to laboratory or field methods in preparation for independent research.
*Credible Hours:* 0
*Max credits per semester:* 1
*Max credits per degree:* 4
*Grading Option:* Pass No Pass

**BIOC 101 Foundational Concepts & Career Opportunities in Biochemistry**
*Notes:* Interest in becoming a biochemistry major.
*Description:* Introduction to the field of biochemistry and exploration of biochemistry related careers.
*Credible Hours:* 1
*Max credits per semester:* 1
*Max credits per degree:* 1
*Grading Option:* Graded with Option
*Offered:* FALL/SPR

**BIOC 205 Scientific Analysis and Technical Writing**
*Prerequisites:* Biochemistry major or minor; LIFE 120 and CHEM 109A and 109L or CHEM 113A and 113L
*Notes:* BIOC 101 and CHEM 110A/CHEM 110L suggested to be taken prior to this course or concurrent enrollment.
*Description:* Data analysis and presentation, hypothesis-driven research execution and various types of scientific writing with detailed examination of high impact biochemistry research literature.
*Credible Hours:* 2
*Max credits per semester:* 2
*Max credits per degree:* 2
*Grading Option:* Graded with Option

**BIOC 305 Reflective Approach to Graduate/Professional School Application**
*Prerequisites:* Biochemistry major; junior standing or senior standing; BIOC 431. Biochemistry minor, with permission.
*Notes:* Letter grade only.
*Description:* Focuses on preparing students for graduate/professional school application through reflective writing and application specific activities.
*Credible Hours:* 1
*Max credits per semester:* 1
*Max credits per degree:* 3
*Grading Option:* Graded
*Offered:* SPRING

**BIOC 390 Seminars in the Life Sciences**
*Prerequisites:* BIOC 431 or concurrent
*Description:* Seminars by UNL faculty, graduate students, and external guests provide a picture of research in biochemistry and the related life sciences.
*Credible Hours:* 1
*Max credits per semester:* 1
*Max credits per degree:* 3
*Grading Option:* Pass No Pass
*Offered:* FALL/SPR

**BIOC 401 Elements of Biochemistry**
*Crosslisted with:* BIOC 801
*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.
*Credible Hours:* 3
*Max credits per semester:* 3
*Max credits per degree:* 3
*Grading Option:* Graded with Option
*Prerequisite for:* FDST 867; NUTR 450; NUTR 455; VBMS 410
*Offered:* FALL/SPR

**BIOC 401L Laboratory for Elements of Biochemistry**
*Prerequisites:* Parallel BIOC 401
*Description:* Laboratory exercises and experiments that complement material covered in BIOC 401.
*Credible Hours:* 1
*Max credits per semester:* 1
*Max credits per degree:* 1
*Grading Option:* Graded with Option
*Offered:* FALL/SPR
*Course and Laboratory Fee:* $35
BIOC 431 Biochemistry I: Structure and Metabolism
Crosslisted with: BIOC 831, BIOS 431, 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: Graded with Option
Offered: FALL/SPR
Prerequisite for: BIOC 431/831 or parallel; or CHEM 435/835.

BIOC 432 Biochemistry II: Metabolism and Biological Information
Crosslisted with: BIOC 832, 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: Graded with Option
Offered: FALL/SPR
Prerequisite for: ASCI 949, BIOC 949, NUTR 949; BIOC 932, BIOS 932, CHEM 932, CHEM 933; BIOS 934, CHEM 934, BIOS 935, CHEM 935; BIOS 998; VBMS 919; VBMS 950; VBMS 951

BIOC 433 Biochemistry Laboratory
Crosslisted with: BIOC 833, BIOS 433, 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: Graded with Option
Offered: FALL/SPR
Prerequisite for: BIOC 437, BIOC 837, BIOS 437, BIOS 837, BIOC 898
Course and Laboratory Fee: $50

BIOC 433H Honors: Inquiry-based Biochemistry Laboratory
Prerequisites: BIOS 206, Parallel BIOC 431
Description: A course-based research experience. Hypothesis-driven design of experiments. Data collection and analysis employing techniques used in spectroscopy, bioinformatics, mutagenesis, recombinant DNA, chromatography, enzyme analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL

BIOC 434 Plant Biochemistry
Crosslisted with: PLAS 434, BIOS 434, CHEM 434, AGRO 834, BIOC 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: Graded with Option

BIOC 435 Advanced Topics in Biochemistry
Prerequisites: BIOC/BIOS/CHEM 432/832 with a grade of C or better
Description: Application of general biochemistry knowledge to current topics in the life sciences; literature research and seminar.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

BIOC 437 Research Techniques in Biochemistry
Crosslisted with: BIOC 837, BIOS 437, BIOS 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: Graded with Option
Prerequisite for: VBMS 919

BIOC 439 Dynamics of Biochemical and Biological Networks
Crosslisted with: BIOC 839, BIOS 439, BIOS 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; BIOS 932, BIOS 933, CHEM 932, BIOS 933, BIOS 933, CHEM 933, BIOC 998
**BIOC 440 Structural Biology and Biophysical Chemistry**  
**Prerequisites:** BIOC/BIOS/CHEM 431; MATH 107; PHYS 142 or PHYS 212.  
**Description:** Introduction and development of structural and physical ideas for students interested in addressing biological and biochemical questions through quantitative, analytical, and structure-based approaches.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option  
**Offered:** FALL/SPR

**BIOC 442 Computational Biology**  
**Crosslisted with:** BIOC 842, STAT 842, STAT 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:** Graded with Option

**BIOC 486 Advanced Topics in Biophysical Chemistry**  
**Crosslisted with:** BIOC 886, 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:** Graded with Option

**BIOC 498 Undergraduate Research**  
**Prerequisites:** Permission.  
**Description:** Research on a specific biochemical project 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:** Graded with Option

**BIOC 499 Undergraduate Thesis**  
**Prerequisites:** Permission.  
**Description:** Conduct a scholarly research project and write an undergraduate thesis.  
**Credit Hours:** 1-3  
**Min credits per semester:** 1  
**Max credits per semester:** 3  
**Max credits per degree:** 6  
**Grading Option:** Graded

**BIOC 499H Honors Undergraduate Thesis**  
**Prerequisites:** Permission.  
**Description:** Conduct a scholarly research project and write a University Honors Program undergraduate thesis.  
**Credit Hours:** 1-3  
**Min credits per semester:** 1  
**Max credits per semester:** 3  
**Max credits per degree:** 6  
**Grading Option:** Graded