BIOLOGICAL CHEMISTRY (BIOC)

BIOC 95 Biochemistry Internship
Prerequisites: Biochemistry Major, Permission
Notes: Permission to enroll will be granted upon review of the proposed internship request by the instructor.
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, computational/systems biology, or biochemistry career related focus.
Credit Hours: 0
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Pass No Pass
Offered: FALL/SPR
Experiential Learning: Internship/Co-op

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.
Credit Hours: 0
Max credits per semester: 1
Max credits per degree: 3
Grading Option: Pass No Pass
Offered: FALL/SPR

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.
Credit 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. LIFE 120 and CHEM 109A and 109L or CHEM 113A and 113L
Notes: BIOC 101 and CHEM 110A/CHEM 110L or CHEM 114 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.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded with Option
Prerequisite for: BIOC 435

BIOC 305 Reflective Approach to Graduate/Professional School Application
Prerequisites: Biochemistry major or minor; BIOC 431 or concurrent.
Notes: Letter grade only.
Description: Focused preparation for graduate/professional school application through reflective writing and application specific activities.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
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
Credit 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 251 or CHEM 261; 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: Graded
Offered: SPRING
Course Fee: $35

BIOC 401L Laboratory for Elements of Biochemistry
Prerequisites: BIOC 401 or parallel.
Description: Laboratory exercises and experiments that complement material covered in BIOC 401.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Offered: FALL/SPR

BIOC 401L Elements of Biochemistry
Prerequisites: BIOC 401 or parallel.
Description: Laboratory exercises and experiments that complement material covered in BIOC 401.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Offered: FALL/SPR
Course Fee: $35
BIOC 431 Biochemistry I: Structure and Metabolism
Crosslisted with: BIOC 831, 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: Graded with Option
Offered: FALL/SPR
Prerequisite for: BIOC 831, BIOS 831, CHEM 831
Crosslisted with: CHEM 431/831 or parallel; or CHEM 435/835.
Prerequisite for: BIOS 206 or parallel; BIOC 431 or parallel.
Notes: 433H is a course-based research experience (CURE) where students immerse in an authentic research project.
Description: A discovery-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/SPR

BIOC 432 Biochemistry II: Metabolism and Biological Information
Crosslisted with: BIOC 832, BIOS 832, 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 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
Crosslisted with: CHEM 431/831.
Prerequisite for: BIOS 206 or parallel; BIOC 431 or parallel.
Notes: Continuation of BIOC 431/831.
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
Offered: FALL/SPR

BIOC 433 Advanced Topics in Biochemistry
Crosslisted with: BIOS 434, BIOS 834, 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
Offered: FALL/SPR

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
Offered: FALL/SPR

BIOC 437 Research Techniques in Biochemistry
Crosslisted with: BIOC 837, BIOS 837, CHEM 837
Prerequisites: BIOC/BIOS/CHEM 431/833.
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
Offered: FALL/SPR
Prerequisite for: VBMS 919
Course and Laboratory Fee: $50

BIOC 433H Honors: Inquiry-based Biochemistry Laboratory
Prerequisites: BIOS 206 or parallel; BIOC 431 or parallel.
Notes: 433H is a course-based research experience (CURE) where students immerse in an authentic research project.
Description: A discovery-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/SPR

BIOC 305; BIOC 390; BIOC 432, BIOC 832, BIOS 432, CHEM 432, CHEM 832, BIOS 832, BIOC 433, BIOC 833, BIOS 833, CHEM 433, CHEM 833; BIOC 433H; BIOC 440; FDST 470, FDST 870; NUTR 450; NUTR 455; NUTR 820, NUTR 420; NUTR 821; PLAS 434, BIOC 434, BIOS 434, CHEM 434, AGRO 834, BIOC 834, BIOS 834, CHEM 834; VBMS 410; VBMS 805; VBMS 950

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 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
Crosslisted with: CHEM 431/831.
Prerequisite for: BIOS 206 or parallel; BIOC 431 or parallel.
Notes: Continuation of BIOC 431/831.
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
Offered: FALL/SPR

ACE: ACE 10 Integrated Product

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
Offered: FALL/SPR

BIOC 437 Research Techniques in Biochemistry
Crosslisted with: BIOC 837, BIOS 837, CHEM 837
Prerequisites: BIOC/BIOS/CHEM 431/833.
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
Offered: FALL/SPR
Prerequisite for: VBMS 919
Course and Laboratory Fee: $50

Course and Laboratory Fee: $50
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; BIOC 932, BIOS 932, CHEM 932; BIOC 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 in Biochemistry
Prerequisites: Permission.
Notes: Permission to enroll will be granted upon review of the Request for Research Experience application by supervising UNL faculty.
Description: Research on a specific biochemical project under the supervision of a 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
Experiential Learning: Research

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