

# Biochemistry (BIOC)

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**BIOC 194. Individual Study. 1-5 Credits.**

**BIOC 196. Field Experience. 1-15 Credits.**

**BIOC 199. Special Topics. 1-5 Credits.**

**BIOC 260. Elements of Biochemistry. 4 Credits.**

Protein structure, function conformation, and dynamics; enzymes, DNA-RNA: structure and flow of genetic information; biological membranes; metabolism. 4 lectures. Prereq: CHEM 117 or CHEM 122 and CHEM 140 or CHEM 240.

**BIOC 291. Seminar. 1-3 Credits.**

**BIOC 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

**BIOC 294. Individual Study. 1-5 Credits.**

**BIOC 299. Special Topics. 1-5 Credits.**

**BIOC 303. The Science of Learning. 1 Credit.**

This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

**BIOC 350. Fundamentals of Forensic DNA Analysis. 2 Credits.**

Principles, technologies, and analysis of genetic information (DNA) and its applications to forensic science, in particular, identity profiling.

**BIOC 379. Global Seminar. 1-6 Credits.**

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

**BIOC 391. Seminar. 1-3 Credits.**

**BIOC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

**BIOC 394. Individual Study. 1-5 Credits.**

**BIOC 399. Special Topics. 1-5 Credits.**

**BIOC 460. Foundations of Biochemistry and Molecular Biology I. 3 Credits.**

Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. Prereq: CHEM 240 or CHEM 341. Recommended Prereq: CHEM 342. {Also offered for graduate credit - see BIOC 660.}

**BIOC 460L. Foundations of Biochemistry I Laboratory. 1 Credit.**

Laboratory to accompany BIOC 460. Introduction to techniques and instrumentation in biochemistry. Co-Req: BIOC 460.

**BIOC 461. Foundations of Biochemistry and Molecular Biology II. 3 Credits.**

Interrelations between metabolic pathways and controls, with emphasis on mammalian systems; biochemistry of specialized tissues, fluids, and hormones, regulation of gene expression in eukaryotes; genetic defects in metabolism. 3 lectures. Recommended prereq: BIOC 460. {Also offered for graduate credit - see BIOC 661.}

**BIOC 473. Methods of Biochemical Research. 4 Credits.**

Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 460. {Also offered for graduate credit - see BIOC 673.}

**BIOC 474. Methods of Recombinant DNA Technology. 3 Credits.**

Principles and techniques of recombinant DNA construction, gene cloning, and analysis of gene structure. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 460. Co-req: BIOC 461. Recommended: ZOO 315. {Also offered for graduate credit - see BIOC 674.}

**BIOC 475. Computer Applications in Biochemistry and Molecular Biology. 3 Credits.**

This course will cover basic and advanced biochemical calculations and the use of computer programs to make these calculations. Programs for the presentation of data and seminars will also be presented. Prereq: BIOC 460. {Also offered for graduate credit - see BIOC 675.}

**BIOC 483. Cellular Signal Transduction Processes and Metabolic Regulations. 3 Credits.**

Advanced topics in regulation of metabolic processes including signal transduction, reversible and irreversible covalent modification, hormonal effects, protein turnover, and related phenomena. 2 lectures. {Also offered for graduate credit - see BIOC 683.}

**BIOC 487. Molecular Biology of Gene Expression. 3 Credits.**

This is an advanced undergraduate course designed to analyze current information regarding biochemistry and molecular biology of gene expression and regulation in prokaryotes, eukaryotes and archaea, with primary emphasis on eukaryotic systems. Prereq: BIOC 460, BIOC 461.

**BIOC 491. Seminar. 1-5 Credits.**

**BIOC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

**BIOC 493. Undergraduate Research. 1-5 Credits.**

**BIOC 494. Individual Study. 1-5 Credits.**

**BIOC 496. Field Experience. 1-15 Credits.**

**BIOC 499. Special Topics. 1-5 Credits.**

**BIOC 660. Foundations of Biochemistry and Molecular Biology I. 3 Credits.**

Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. {Also offered for undergraduate credit - see BIOC 460.}.

**BIOC 661. Foundations of Biochemistry and Molecular Biology II. 3 Credits.**

Interrelations between metabolic pathways and controls, with emphasis on mammalian systems; biochemistry of specialized tissues, fluids, and hormones; regulation of gene expression in eukaryotes; genetic defects in metabolism. 3 lectures. {Also offered for undergraduate credit - see BIOC 461.}.

**BIOC 673. Methods of Biochemical Research. 4 Credits.**

Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 701 and BIOC 660 or equivalent of BIOC 660. {Also offered for undergraduate credit - see BIOC 473.}.

**BIOC 674. Methods of Recombinant DNA Technology. 3 Credits.**

Principles and techniques of recombinant DNA construction, gene cloning, and analysis of gene structure. 1 lecture, 2 three-hour laboratories. Recommended co-req: BIOC 702. {Also offered for undergraduate credit - see BIOC 474.}.

**BIOC 675. Computer Applications in Biochemistry and Molecular Biology. 3 Credits.**

This course will cover basic and advanced biochemical calculations and the use of computer programs to make these calculations. Programs for the presentation of data and seminars will also be presented. Prereq: BIOC 660. {Also offered for undergraduate credit - see BIOC 475.}.

**BIOC 683. Cellular Signal Transduction Processes and Metabolic Regulation. 3 Credits.**

Advanced topics in regulation of metabolic processes including signal transduction, reversible and irreversible covalent modification, hormonal effects, protein turnover, and related phenomena. 2 lectures. Prereq: BIOC 702. F (alternate years) {Also offered for undergraduate credit - see BIOC 483.}.

**BIOC 690. Graduate Seminar. 1-3 Credits.**

**BIOC 696. Special Topics. 1-5 Credits.**

**BIOC 701. Comprehensive Biochemistry I. 4 Credits.**

Comprehensive treatment of the chemistry and biochemistry of proteins, nucleic acids, carbohydrates, lipids, vitamins, hormones, and the specific metabolism of these substances. 4 lectures.

**BIOC 702. Comprehensive Biochemistry II. 4 Credits.**

Comprehensive treatment of the chemistry and biochemistry of proteins, nucleic acids, carbohydrates, lipids, vitamins, hormones, and the specific metabolism of these substances. 4 lectures. Recommended: BIOC 701.

**BIOC 716. Protein and Enzyme Biochemistry. 3 Credits.**

Advanced topics in protein properties and structure, and the influence of these factors on enzyme kinetics and mechanism. 3 lectures. Prereq: BIOC 702. S (alternate years).

**BIOC 719. Molecular Biology of Gene Expression and Regulation. 3 Credits.**

Advanced topics in molecular biology and regulation in prokaryotes, eukaryotes, and archaea; early events in developmental gene expression. 3 lectures. Prereq: BIOC 702. F (alternate years).

**BIOC 723. Structural Basis of Membrane Transport and Signaling. 3 Credits.**

Advanced topics discussing how three-dimensional structures of membrane proteins dictate their function in coordinating the extracellular environment with intracellular processes. Prereq: BIOC 660 or BIOC 701.

**BIOC 790. Graduate Seminar. 1-3 Credits.**

**BIOC 791. Temporary/Trial Topics. 1-5 Credits.**

**BIOC 793. Individual Study/Tutorial. 1-5 Credits.**

**BIOC 796. Special Topics. 1-5 Credits.**

**BIOC 798. Master's Thesis. 1-10 Credits.**

**BIOC 892. Graduate Teaching Experience. 1-6 Credits.**

**BIOC 899. Doctoral Dissertation. 1-15 Credits.**