Courses

Biochemistry and Molecular Biology (BC)

BC 192  Biochemistry Freshman Seminar  Credits: 2 (1-0-1)
Course Description: Introduction to curriculum and career options for biochemistry majors.
Prerequisite: None.
Registration Information: Must register for lecture and recitation.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

BC 295  Introductory Independent Study  Credits: Var[1-3] (0-0-0)
Course Description: Apply principles and knowledge being learned in first and second year life sciences and chemistry courses.
Prerequisite: LIFE 102 or CHEM 112, may be taken concurrently.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 351  Principles of Biochemistry  Credits: 4 (4-0-0)
Course Description: Structure and function of biological molecules; biocatalysis; metabolism and energy transduction.
Prerequisite: (BZ 110 or BZ 120 or LIFE 102) and (CHEM 241 or CHEM 245 or CHEM 341 or CHEM 345).
Registration Information: For majors in biological sciences, engineering, and preprofessional students in the health sciences. Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 353  Pre-Health Genetics  Credits: 4 (4-0-0)
Course Description: Applies and extends the biochemical concepts learned in BC 351 to macromolecules and molecular processes based on nucleic acids.
Prerequisite: BC 351.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 360  Responsible Conduct in Biochemical Research  Credit: 1 (1-0-0)
Course Description: Research ethics and the responsible conduct of research.
Prerequisite: LIFE 212.
Registration Information: Sophomore standing. Biochemistry majors only. This is a partial semester course.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 401  Comprehensive Biochemistry I  Credits: 3 (3-0-0)
Course Description: Macromolecular structure and dynamics; membranes; enzymes; bioenergetics.
Prerequisite: (CHEM 245 or CHEM 343, may be taken concurrently or CHEM 346, may be taken concurrently) and (MATH 155 or MATH 160).
Registration Information: Sophomore standing. Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 403  Comprehensive Biochemistry II  Credits: 3 (3-0-0)
Course Description: Metabolic pathways and their regulation; cellular biochemistry.
Prerequisite: (BC 351 or BC 401) and (CHEM 245 or CHEM 341 or CHEM 345).
Restriction: Must not be a: Freshman.
Registration Information: Sophomore standing. Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 404  Comprehensive Biochemistry Laboratory  Credits: 2 (0-6-0)
Course Description: Experimental approaches to studying macromolecules, metabolism, and gene expressions.
Prerequisite: (BC 401, may be taken concurrently) and (CHEM 246 or CHEM 344 or CHEM 346) and (LIFE 212 and LIFE 203).
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 405  Comprehensive Biochemistry II--Honors Recitation  Credit: 1 (0-0-1)
Course Description: Read and discuss current literature related to material presented in BC 403.
Prerequisite: None.
Registration Information: Must have concurrent registration in BC 403. For students participating in the Honors program.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 406  Investigative Biochemistry: Protein Biochemistry  Credits: 2 (0-4-0)
Course Description: Advanced inquiry-based protein chemistry and molecular biology lab.
Prerequisite: BC 404.
Registration Information: This is a partial semester course.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

BC 406A  Investigative Biochemistry: Protein Biochemistry  Credits: 2 (0-4-0)
Course Description: Advanced inquiry-based protein chemistry and molecular biology lab.
Prerequisite: BC 404.
Registration Information: This is a partial semester course.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

BC 406B  Investigative Biochemistry: Molecular Genetics  Credits: 2 (1-3-0)
Course Description: Advanced biochemical and molecular biological techniques and a problem-solving approach to molecular genetics.
Prerequisite: BC 404.
Registration Information: Must register for lecture and laboratory.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.
BC 406C Investigative Biochemistry: Cellular Biochemistry Credits: 2 (1-3-0)
Course Description: Advanced biochemical and molecular biological techniques and a problem-solving approach to cellular biochemistry.
Prerequisite: BC 404.
Registration Information: Must register for lecture and laboratory.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

BC 411 Physical Biochemistry Credits: 4 (3-0-1)
Course Description: Thermodynamics; reaction rates; quantum chemistry; spectroscopy; macromolecular folding and interactions; ligand binding; enzyme kinetics; membranes.
Prerequisite: (BC 351 with a minimum grade of B or BC 401) and (CHEM 113) and (MATH 161 or MATH 255).
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

BC 441 3D Molecular Models for Biochemistry Credit: 1 (0-1.5-.5)
Course Description: Computer instruction to construct 3D models of proteins and nucleic acids using leading software.
Prerequisite: BC 401, may be taken concurrently.
Registration Information: Must register for laboratory and recitation.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

BC 463 Molecular Genetics Credits: 3 (3-0-0)
Course Description: Molecular basis of gene structure, replication, repair, recombination, and expression.
Prerequisite: (BC 401 with a minimum grade of C, may be taken concurrently) or BC 351 with a minimum grade of C or BC 401) and (LIFE 210B and (BC 351, may be taken concurrently or BC 401, may be taken concurrently).
Registration Information: Credit not allowed for both BC 463 and BC 563.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

BC 464 Molecular Genetics Recitation Credit: 1 (0-0-1)
Course Description: Methods used to study the molecular basis of gene structure, replication, repair, recombination, and expression.
Prerequisite: (LIFE 210B) and (BC 351, may be taken concurrently or BC 401, may be taken concurrently).
Registration Information: Must have concurrent registration in BC 463.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

BC 465 Molecular Regulation of Cell Function Credits: 3 (3-0-0)
Course Description: Molecular regulation of cell organization, membrane formation, organelle biogenesis, cell communication, shape and motility, growth, aging, and death.
Prerequisite: (LIFE 210) and (BC 403, may be taken concurrently or BC 351).
Registration Information: Sections may be offered: Online. Credit not allowed for both BC 465 and BC 565.
Terms Offered: Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 466 Molecular Regulation of Cell Function-Honors Credit: 1 (0-0-1)
Course Description: Discussions of current articles in cell biology including methods and molecular mechanisms that explain cell behavior in health and disease.
Prerequisite: None.
Registration Information: Must have concurrent registration in BC 465.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 467 Biochemistry of Disease Credits: 3 (3-0-0)
Course Description: Biochemical basis of specific human diseases.
Prerequisite: BC 401.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 475 Mentored Research Credits: 3 (0-6-1)
Course Description: Plan and conduct mentored research with weekly discussion of progress, presentation at all-university symposium, and submission of written report.
Prerequisite: BC 404.
Registration Information: Must register for laboratory and recitation. Maximum of 9 credits allowed in course.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 484 Supervised College Teaching Credits: Var[1-18] (0-0-0)
Course Description: Assist in teaching selected courses in biochemistry and molecular biology.
Prerequisite: None.
Registration Information: A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 487A Internship Credits: Var[1-18] (0-0-0)
Course Description: Work experience with an approved preceptor outside of a university laboratory environment.
Prerequisite: BC 401 and BC 403 and BC 404.
Registration Information: Written consent of instructor. Minimum GPA of 2.0.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 487B Internship: International Credits: Var[1-18] (0-0-0)
Course Description: Research in foreign host laboratory in contact with CSU mentor.
Prerequisite: BC 401 and BC 463 and BC 495 - at least 1 credit.
Registration Information: Selection by departmental committee. BC 495 (one credit in lab of CSU mentor).
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.
BC 493  Senior Seminar  Credit: 1 (0-0-1)
Course Description: Critical analysis of selected literature in biochemistry and molecular biology.
Prerequisite: None.
Registration Information: BC 401 or concurrent registration.
Terms Offered: Fall, Spring.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 495  Independent Study  Credits: Var[1-18] (0-0-0)
Course Description: Faculty-directed exploration of areas of special interest in biochemistry and molecular biology.
Prerequisite: None.
Registration Information: Minimum cumulative GPA of 3.0.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 496  Group Study  Credits: Var[1-18] (0-0-0)
Course Description: Faculty-directed exploration of areas of special interest in biochemistry and molecular biology.
Prerequisite: None.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 498  Research  Credits: Var[1-6] (0-0-0)
Course Description: Supervised laboratory research in biochemistry and molecular biology.
Prerequisite: None.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 499A  Thesis: Laboratory Research-Based  Credits: 3 (0-0-3)
Course Description: Laboratory-based research thesis.
Prerequisite: None.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 499B  Thesis: Literature Based  Credits: 3 (0-0-3)
Prerequisite: BC 493.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 499C  Thesis: Literature-based in Health and Med Sci  Credits: 3 (0-0-3)
Course Description: Thesis - Literature-based in Health and Med. Sci.
Prerequisite: BC 493.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 499D  Thesis: Literature-based in Pre-Pharmacy  Credits: 3 (0-0-3)
Course Description: Thesis - Literature-based in Pre-Pharmacy.
Prerequisite: BC 493.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 499E  Thesis: Literature-based in Neurobiochemistry  Credits: 3 (0-0-3)
Course Description: Thesis - Literature-based in Neurobiochemistry.
Prerequisite: BC 493, may be taken concurrently.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 499F  Thesis: Literature-Based in Data Science  Credits: 3 (0-0-3)
Course Description: Thesis - Literature-based in Data Science.
Prerequisite: BC 493.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

BC 511  Structural Biology I  Credits: 4 (3-0-1)
Course Description: Structural principles of biological macromolecules and techniques of structural analysis.
Prerequisite: BC 401, may be taken concurrently.
Terms Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

BC 512  Principles of Macromolecular Structure  Credit: 1 (1-0-0)
Course Description: Physical interactions controlling folding and solution behavior of biological macromolecules, including proteins, nucleic acids, and membranes.
Prerequisite: BC 411, may be taken concurrently.
Terms Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

BC 513  Enzymology  Credit: 1 (1-0-0)
Course Description: Kinetic methods, mechanism, and regulation of enzyme catalysis.
Prerequisite: BC 403.
Terms Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 517  Metabolism  Credits: 2 (2-0-0)
Course Description: Design and regulation of metabolic pathways.
Prerequisite: BC 351 and BC 403.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 521  Principles of Chemical Biology  Credits: 3 (3-0-0)
Also Offered As: CHEM 521.
Course Description: Principles of chemical biology. Chemical methods for understanding and controlling the structure and function of biopolymers.
Prerequisite: CHEM 245 or CHEM 343 or CHEM 346.
Registration Information: Credit not allowed for both BC 521 and CHEM 521.
Terms Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
**BC 563  Molecular Genetics  Credits: 4 (3-0-1)**

**Course Description:** Mechanisms of replication, transcription, processing, translation, and packaging of genetic material, emphasizing original literature and methods.

**Prerequisite:** BC 401 and LIFE 210.

**Restriction:** None.

**Registration Information:** Must register for lecture and recitation. Credit not allowed for both BC 563 and BC 463.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 565  Molecular Regulation of Cell Function  Credits: 4 (3-0-1)**

**Course Description:** Molecular regulation of cell organization, membrane formation, organelle biogenesis, cell communication, shape and motility, growth, aging, and death.

**Prerequisite:** BC 563 or BC 463, or may be taken concurrently.

**Restriction:** (LIFE 210) and (BC 351 or BC 403, may be taken concurrently).

**Registration Information:** Credit not allowed for both BC 565 and BC 465.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 566  Advanced Topics in Mitotic Processes  Credit: 1 (1-0-0)**

**Course Description:** Mitotic spindle, microtubules, kinetochores, and molecular motors, specifically during cell division.

**Prerequisite:** BC 465 or BC 565.

**Restriction:** Written consent of instructor.

**Registration Information:** Written consent of instructor.

**Terms Offered:** Fall, Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 571  Quantitative Biochemistry  Credit: 1 (1-0-0)**

**Course Description:** Introduction to statistics, error analysis, and curve fitting of biochemical data with a focus on practical examples.

**Prerequisite:** BC 511, may be taken concurrently.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 589  Current Trends in Molecular Biosciences  Credits: 2 (1-2-0)**

**Course Description:** Biochemical and molecular biological foundations of molecular genetics/genetic engineering; molecular analysis of genes.

**Prerequisite:** None.

**Restriction:** Must be a Graduate, Professional.

**Registration Information:** B.S. or B.A. in biology or chemistry; secondary school teaching certification required. Offered as an online course only.

**Term Offered:** Summer.

**Grade Modes:** S/U within Student Option, Trad within Student Option.

**Special Course Fee:** No.

**BC 598  Research  Credits: Var[1-9] (0-0-0)**

**Course Description:** Biochemistry research in a research laboratory.

**Prerequisite:** BC 401.

**Registration Information:** Written consent of advisor.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 601  Responsible Conduct in Biochemistry  Credit: 1 (1-0-0)**

**Course Description:** Design of experiments; error and fraud, publishing/grant application submission, scientific misconduct, classic examples of fraud, case studies.

**Prerequisite:** None.

**Restriction:** Must be a Graduate, Professional.

**Term Offered:** Spring (even years).

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 611  Structural Biology II  Credits: 2 (2-0-0)**

**Course Description:** Structure and interactions of biological macromolecules related to function.

**Prerequisite:** BC 511.

**Restriction:** Must be a Graduate, Professional.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 663  Gene Expression  Credits: 2 (2-0-0)**

**Course Description:** Eukaryotic transcription mechanisms with emphasis on methods of study and regulatory mechanisms.

**Prerequisite:** BC 563.

**Restriction:** Must be a Graduate, Professional.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 665A  Advanced Topics in Cell Regulation: Microscopic Methods  Credits: 2 (2-0-0)**

**Course Description:** Analysis of cell behavior, function and regulation.

**Prerequisite:** BC 565.

**Restriction:** Must be a Graduate, Professional.

**Terms Offered:** Fall, Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 665B  Advanced Topics in Cell Regulation: Modern Methods  Credits: 2 (2-0-0)**

**Course Description:** Modern methods in cell biology.

**Prerequisite:** BC 565.

**Restriction:** Must be a Graduate, Professional.

**Terms Offered:** Fall, Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BC 695  Independent Study  Credits: Var[1-18] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** S/U Sat/Unsat Only.

**Special Course Fee:** No.

**BC 698  Research  Credits: Var[1-18] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** S/U Sat/Unsat Only.

**Special Course Fee:** No.
BC 699 Thesis Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

BC 701 Grant Proposal Writing and Reviewing Credit: 1 (1-0-0)
Course Description: Didactic and hands-on experience with locating funding sources, writing effective grant proposals, and the review process in the bio-molecular sciences.
Prerequisite: (BC 403) and (BC 511, may be taken concurrently) and (BC 563, may be taken concurrently).
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 711A Advanced Topics in Structural Biology: Protein Structure and Function Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 511 and BC 611.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 711B Advanced Topics in Structural Biology: Membrane Proteins Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 511 and BC 611.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 711C Advanced Topics in Structural Biology: Protein-DNA Interactions Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 511 and BC 611.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 711D Advanced Topics in Structural Biology: Biomolecular Spectroscopy Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 511 and BC 611.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 711E Advanced Topics in Structural Biology: Biomolecular NMR Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 511 and BC 611.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 711F Advanced Topics in Structural Biology: Macromolecular X-ray Crystallography Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 511 and BC 611.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 763A Advanced Molecular Genetics Topics: Chromatin and Transcription Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 663, may be taken concurrently.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 763B Advanced Molecular Genetics Topics: Transcriptional Control - Co-Activators and Corepressors Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 663, may be taken concurrently.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 763C Advanced Molecular Genetics Topics: Concepts and Techniques of Genetic Analysis Credit: 1 (1-0-0)
Course Description:
Prerequisite: BC 663, may be taken concurrently.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

BC 784 Supervised College Teaching Credits: Var[1-3] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 793 Seminar Credit: 1 (0-0-1)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

BC 795 Independent Study Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.
BC 796  Group Study  Credits: Var[1-5] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

BC 798  Research  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

BC 799  Dissertation  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.