BIOCHEMISTRY (BIOC)

BIOC 2124 (a, INS, MCSR) Biochemistry and Cell Biology
Jake Muscato; Aimee Eldridge.
Every Fall. Fall 2024. Enrollment limit: 35.

Focuses on the structure and function of cells as we have come to know them through the interpretation of direct observations and experimental results. Emphasis is on the scientific (thought) processes that have allowed us to understand what we know today, emphasizing the use of genetic, biochemical, and optical analysis to understand fundamental biological processes. Covers details of the organization and expression of genetic information, and the biosynthesis, sorting, and function of cellular components within the cell. Concludes with examples of how cells perceive signals from other cells within cell populations, tissues, organisms, and the environment. Three hours of lab each week. Not open to students who have credit for Biology 2423. (Same as: BIOL 2124)

Prerequisites: BIOL 1102 or BIOL 1109 or Placement in BIOL 2000 level.

Previous terms offered: Fall 2023, Fall 2022, Fall 2021, Fall 2020.

BIOC 2320 (a, MCSR) Biochemistry
Danielle Dube; Kate Farnham.
Every Spring. Spring 2025. Enrollment limit: 36.

Focuses on the chemistry of living organisms. Topics include structure, conformation, and properties of the major classes of biomolecules (proteins, nucleic acids, carbohydrates, and lipids); enzyme mechanisms, kinetics, and regulation; metabolic transformations; energetics and metabolic control. Lectures and four hours of laboratory work per week. This course satisfies a requirement for the biochemistry major. (Same as: CHEM 2320)

Prerequisites: CHEM 2260 or CHEM 2261.

Previous terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021.

BIOC 2423 (a, INS) Biochemistry of Cellular Processes
Jake Muscato.
Non-Standard Rotation. Spring 2025. Enrollment limit: 35.

Explores the biochemical mechanisms that underlie the basis of life. Starts with the chemistry of proteins, DNA, lipids, and carbohydrates to build the main elements of a cell. Moves on to the process of gene organization and expression, emphasizing the biochemical mechanisms that regulate these events. Explores next the organization of the cell with emphasis on genetic and biochemical regulation. Concludes with specific examples of multicellular interactions, including development, cancer, and perception of the environment. This course does NOT satisfy a requirement for the biochemistry major and is not open to students who have credit for Biology 2124. Students who intend to enroll in Biology 2124 should not register for Biology 2423. (Same as: BIOL 2423)

Prerequisites: Two of: either BIOL 1102 or BIOL 1109 or BIOL 2100 or higher and CHEM 1092 or either CHEM 1102 or CHEM 1109 or CHEM 2250.

Previous terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021.

BIOC 2504 (a) Cellular Signaling
Michael Fine.
Every Spring. Spring 2025. Enrollment limit: 35.

All cells signal through a variety of mechanisms. Cells take advantage of these signaling pathways to communicate intrinsically, through their local environment, and across entire systems throughout the body. This course will focus on broad types of signaling pathways that have been observed and defined across many fields of biology and introduce students to concepts such as lipid signaling, the immune synapse, and signaling pathways in cancer and other pathologies. Topics of exploration include bioactive lipid signaling, autocrine, cell-cell signaling, and paracrine signaling. We will expand into systemic endocrine signaling and the hypothalamic-pituitary-adrenal axis (HPA) and discuss more complicated signaling systems such as what happens during oncogenesis and the communication between the gut microbiome and the brain. (Same as: BIOL 2504, NEUR 2504)

Prerequisites: Three of: either BIOL 1102 or BIOL 1109 or Placement in BIOL 2000 level and CHEM 1092 or either CHEM 1102 or CHEM 1109 or Placement in CHEM 2000/1109 or Placement in CHEM 2000 level and BIOL 2000 - 2499.

BIOC 3320 (a, MCSR) Molecular Biophysics
Non-Standard Rotation. Enrollment limit: 16.

This course will take a quantitative approach relying on principles from thermodynamics, kinetics and mechanics to explore how the structure, function and assembly of molecular components like lipids, proteins and DNA govern biological systems and their physical-chemical behavior. Topics will include: (1) lipid membrane organization and lipid-protein interactions, (2) transport mechanisms, (3) compartmentalization through liquid-liquid phase separation, and (4) mechanisms of force generation through molecular motors and cytoskeletal polymers. Emphasis throughout the course will be placed on experimental methodologies employed in these topic areas such as optical microscopy, single-molecule approaches, and force spectroscopies. The format will be a combination of lectures, discussions and journal article presentations. (Same as: CHEM 3320)

Prerequisites: Two of: PHYS 1130 and CHEM 2320 (same as BIOC 2320).

Previous terms offered: Fall 2023.