**BIOCHEMISTRY (BCHE)**

**BCHE 2280 Physical Models of Biological Systems**
Classic case studies of successful reductionistic models of complex phenomena, emphasizing the key steps of making estimates, using them to figure out which physical variables and phenomena will be most relevant to a given system, finding analogies to purely physical systems whose behavior is already known, and embodying those in a mathematical model, which is often implemented in computer code. Topics may include bacterial genetics, genetic switches and oscillators; systems that sense or utilize light; superresolution and other new microscopy methods; and vision and other modes of sensory transduction.

Fall
Also Offered As: PHYS 2280
Prerequisite: (PHYS 0101 OR PHYS 0151) AND MATH 1400 AND (MATH 1410 OR MATH 1610)
1 Course Unit

**BCHE 2999 Undergraduate Research Projects**
Independent Research.
Fall or Spring
1-2 Course Units

**BCHE 3000 Senior Research Projects**
Research in standing faculty groups in any School for special cases beyond participation in BCHE 404. Proposal required before the end of the add period in any given semester.
Fall or Spring
1 Course Unit

**BCHE 4597 Biochemistry Laboratory**
Students participate in research projects associated with the laboratories of individual faculty investigators. Students commit a minimum of 15 hours/week to original research. In addition to research and class assignments, students attend class meetings to present and discuss their own research and related work. Strong speaking and writing skills are required. Each student must contact the course instructor with information regarding research group (faculty principal investigator) in the spring term before the fall term of BCHE 4597. BCHE 4597 is a year-long course required for the Biochemistry major. Majors complete 2 cu of BCHE 4597. Initial registration must occur in Fall term, with 0 cu earned after Fall term and 2 cu earned after Spring term. BCHE 4597 is taken in a student's final year as an undergraduate.
Fall or Spring
Corequisite: CHEM 5510
1 Course Unit

**BCHE 4597A Biochemistry Laboratory**
Students carry out mentored research broadly relevant to biomolecular science within the groups of individual faculty investigators on or near the Penn campus. Students commit a minimum of 15 hours/week to original research in their host laboratories. In addition to research and assignments, students meet to present and discuss scientific research. Course activities and assignments complement the research effort. Developing effective scientific presentations is an emphasis. Each student must contact the course instructor with information regarding research group (faculty principal investigator) in the spring term prior the fall term of BCHE 4597A. BCHE 4597A and BCHE 4597B is a year-long, 2 cu course required of the Biochemistry major. The course is taken in a Biochemistry major's final year as an undergraduate.
Fall or Spring
1 Course Unit

**BCHE 4597B Biochemistry Laboratory**
Students carry out mentored research broadly relevant to biomolecular science within the groups of individual faculty investigators on or near the Penn campus. Students commit a minimum of 15 hours/week to original research in their host laboratories. In addition to research and assignments, students meet to present and discuss scientific research. Course activities and assignments complement the research effort. Developing effective scientific presentations is an emphasis. Each student must contact the course instructor with information regarding research group (faculty principal investigator) in the spring term prior the fall term of BCHE 4597A. BCHE 4597A and BCHE 4597B is a year-long, 2 cu course required of the Biochemistry major. The course is taken in a Biochemistry major's final year as an undergraduate.
Fall or Spring
1 Course Unit