

BIOCHEMISTRY PROGRAM

Coordinator: *Arthur W. Bull (Chemistry)*

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Biochemistry Committee: *Sitaramayya Ari (Chemistry), Arik Dvir (Biological Sciences), John M. Finke (Chemistry), Anne L. Hitt (Biological Sciences), Susmit Swas (Biological Sciences)*

This interdepartmental program offers a Bachelor of Science degree with a major in biochemistry. The biochemistry program is based on faculty resources and research facilities in the departments of Biological Sciences and Chemistry. The curriculum is designed to prepare students for a career in biochemical research, graduate study in biochemistry or molecular biology, or professional education in medicine, dentistry or other health sciences.

The specialized research facilities for cellular and analytical biochemistry at Oakland University include tissue culture facilities, an ultracentrifugation laboratory, isotope laboratories with beta and gamma counters, equipment for gas and high pressure liquid chromatography, and GC/MS, UV-vis, fluorescence, NMR, EPR, laser Raman, and atomic absorption spectrometers. Recent biochemical instrumentation acquisitions include a flow cytometer, a radioisotopic image analyzer, automated capillary electrophoresis, confocal microscope and DNA sequencer.

Undergraduate students in the biochemistry program have access to faculty research laboratories and are encouraged to participate in various ongoing research programs such as studies in metabolism, gene expression, hormone action, immunochemistry, molecular biology, molecular genetics and macromolecular structure. The minimum requirement for a B.S. in biochemistry is 124 credits, including course work in biological sciences (16 credits), chemistry (32 credits) and biochemistry (12 credits) as detailed below. No more than 8 credits of course work used to fulfill the requirements of a major or minor in biology may be used to fulfill the requirements of a major in biochemistry. Courses used to fulfill the requirements for a major in biochemistry may not be used simultaneously to fulfill the requirements for a major or minor in chemistry.

Admission to major standing

Students may apply for major standing after completion of 18 credits of chemistry and at least 8 credits of biology from the requirements listed below, with a grade point average (GPA) of at least 2.50 in those courses. The biochemistry committee must approve major standing and a detailed plan of study at least three semesters prior to graduation.

Requirements for the Bachelor of Science degree in biochemistry

Students wishing to select the biochemistry major should prepare a detailed plan of study in consultation with a member of the Biochemistry Committee. To earn the Bachelor of Science degree with a major in biochemistry, students must complete:

1. 16 or more credits of biology chosen in consultation with the biochemistry program coordinator from the following courses: BIO 111, 113, 309, 310, 319, 320, 321, 322, 323, 324 or 341. Other appropriate courses may be approved on an individual basis.
2. 32 credits of chemistry, including CHM 157-158 (or 167-168), 234-235, 237, 325, 342 and 343.
3. 12 or more credits of biochemistry including BCM 453, 454 and 457 and additional credits selected from the following courses: BIO 407, 423, 441; CHM 458, 553, 554, 581; or BCM 490. Other appropriate courses may be approved on an individual basis.
4. Corequisites in mathematics (MTH 154 and 155) and physics (PHY 151 and 152). STA 226 and CHM 220 are recommended electives.
5. Admission to major standing as described above at least three semesters prior to graduation.

Program honors

Program honors may be granted to graduating seniors in biochemistry on the basis of high academic achievement (minimum 3.60 overall grade point average) and excellence in biochemical research at Oakland University.

Pre-medical studies concentration: medicine, dentistry, optometry and veterinary medicine

The Bachelor of Science degree with a major in biochemistry provides students with all the requirements for a pre-medical studies concentration with the exception of PHY 158, which needs to be completed. The Bachelor of Science degree and the Bachelor of Arts degree with a major in chemistry provide students with all the requirements for a pre-medical studies concentration with the exception of PHY 158, which must be completed, and five courses in biology/biochemistry. Students interested in a medical career should refer to the pre-medical studies concentration in medicine, dentistry, optometry and veterinary medicine (Other Academic Options) and consult with the biology or biochemistry adviser and with the pre-medical studies adviser, Professor Keith Berven.

Course Offerings

The program offers selected courses from this catalog as warranted by student needs and availability of faculty. Specific offerings for each term may be found in the Schedule of Classes.

BCM 453 Biochemistry I (3)

First course in a comprehensive biochemistry sequence. Structure and function of proteins, carbohydrates and lipids. Enzyme mechanisms, kinetics and regulation. Bioenergetics and catabolism.

Identical with CHM 453.

Prerequisite: CHM 235.

BCM 454 Biochemistry II (3)

Metabolic pathways and control. Nucleic acid structure, function and processing, including regulation of gene expression. Selected topics in molecular physiology. Identical with CHM 454.

Prerequisite: BCM/CHM 453.

BCM 457 Biochemistry Laboratory (3)

Techniques of extraction, separation, identification and quantification of biomolecules, including electrophoresis, chromatography and radioisotope techniques, with emphasis on mathematical treatment of experimental data. Identical with CHM 457. *Satisfies the university general education requirement for the capstone experience. Satisfies the university general education requirement for a writing intensive course in the major. Prerequisite for writing intensive; completion of the university writing foundation requirement.*

Prerequisite: BCM/CHM 453, which may be taken concurrently.

BCM 489 Biotechnology Internship (2, 3 or 4)

The application of biochemical principles and methods in an off-campus technical setting that has been pre-approved by program committee. Does not count toward major credit. Graded S/U.

May be repeated for a maximum of 6 credits.

Prerequisite: BCM 453, approved major standing, permission of instructor.

BCM 490 Biochemistry Research (1, 2, 3 or 4)

Laboratory experience in biochemical research requiring at least four hours of work per week per credit. May be repeated for credit. Graded S/U or numerically by written arrangement with faculty research mentor. Graded option requires a written report of research accomplishments and is limited to a total of 4 credits.

Prerequisite: permission of instructor.