

# BIOCHEMISTRY (BIOC)

Subject-area course lists indicate courses currently active for offering at the University of Louisville. Not all courses are scheduled in any given academic term. For class offerings in a specific semester, refer to the Schedule of Classes ([https://csprd.louisville.edu/psps/ps\\_class/EMPLOYEE/PSFT\\_CS/c/COMMUNITY\\_ACCESS.CLASS\\_SEARCH./x/?state=62dab551a0d600a5e8237359c50704e59007&duo\\_code=sjUx20STj21RwVEu0371YpJl6f0a5A](https://csprd.louisville.edu/psps/ps_class/EMPLOYEE/PSFT_CS/c/COMMUNITY_ACCESS.CLASS_SEARCH./x/?state=62dab551a0d600a5e8237359c50704e59007&duo_code=sjUx20STj21RwVEu0371YpJl6f0a5A)).

500-level courses generally are included in both the undergraduate- and graduate-level course listings; however, specific course/section offerings may vary between semesters. Students are responsible for ensuring that they enroll in courses that are applicable to their particular academic programs.

## Course Fees

Some courses may carry fees beyond the standard tuition costs to cover additional support or materials. Program-, subject- and course-specific fee information can be found on the Office of the Bursar website (<https://louisville.edu/bursar/tuitionfee/university-fees/>).

### BIOC 545. Biochemistry I 3 Units

**Term Typically Offered:** Fall Only

**Description:** Chemistry of amino acids, protein structure and function; metabolism of carbohydrates, fats and amino acids.

**Note:** Credit may not be earned in both BIOC 545 and BIOC 645.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### BIOC 547. Advanced Biochemistry II 3 Units

**Term Typically Offered:** Spring Only

**Prerequisite(s):** BIOC 545 Biochemistry of nucleotides and nucleic acids; RNA, DNA and protein biosynthesis, biomembrane phenomena, enzyme properties, kinetics, and control mechanisms; ligand binding.

**Description:**

**Note:** Credit may not be earned in both BIOC 547 and BIOC 647.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### BIOC 603. Special Topics in Biochemistry 1-4 Units

**Prerequisite(s):** BIOC 645 and BIOC 647 (or concurrently), or consent of instructor.

**Description:** Arranged to fit individual needs on topics of current interest or to receive some advanced training or conduct research project.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### BIOC 606. Biochemistry Seminar 1 Unit

**Description:** Both Fall and Spring semesters.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### BIOC 611. Techniques in Biomolecular Interactions 4 Units

**Term Typically Offered:** Fall Only

**Prerequisite(s):** Student must be registered in the graduate school.

**Description:** Biochemical, molecular, and bioinformatic techniques to understand cellular interactions, including chromatin associations that inform DNA structure, editing, and gene expression; protein-protein interactions; and protein: ligand associations that influence enzyme activity.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### BIOC 613. Biochemistry Laboratory 2-4 Units

**Grading Basis:** Pass/Fail

**Description:** The course will consist of participation in the research programs of two laboratories in the department. A half-semester will be devoted to each laboratory. Pass/Fail grading.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### BIOC 619. Research 1-15 Units

**Grading Basis:** Pass/Fail

**Description:** Biochemistry research.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### BIOC 620. Scientific Method and Grant Writing 2 Units

**Grading Basis:** Pass/Fail

**Term Typically Offered:** Spring Only

**Prerequisite(s):** Restricted to students in the Biochemistry and Molecular Genetics graduate programs; permission of course director.

**Description:** This objective of this course is to introduce students to the fundamentals of grantsmanship. The topics incorporate all aspects for grant application process as well as overview of the scientific method, generation of hypotheses, and research design. Student-directed learning is a major component for this course with the summative event being completion of a grant proposal. A reiterative writing process for proposal development will be ongoing throughout the course.

**Note:** May be repeated once for up to 4 credits.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### BIOC 630. Responsible Conduct of Research: Survival Skills and Research Ethics 1-4 Units

**Grading Basis:** Pass/Fail

**Description:** The topics covered include 11 areas of Research Compliance training mandated by the NIH for training grants and focuses on contemporary research ethics in biomedical sciences.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

<b>BIOC 640. Principles of Biochemistry</b> <b>Term Typically Offered:</b> Spring Only <b>Prerequisite(s):</b> Consent of instructor. <b>Description:</b> Covers general aspects of biochemistry with special emphasis given to areas applicable to dentistry. Topics include protein structure and function; chemistry and metabolism of carbohydrates, lipids, amino acids, and nucleotides; molecular genetics; nutritional biochemistry; calcification; and molecular endocrinology. Clinical conferences keyed to current lecture topics are presented by clinical faculty. For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>5 Units</b>	<b>BIOC 661. Molecular Mechanisms of Toxicology</b> <b>Term Typically Offered:</b> Spring Only <b>Description:</b> Molecular interactions of drugs and toxicants on cellular processes; including foreign compound metabolism, signal transduction, cell cycle, DNA repair/DNA replication are covered and put in context topics in molecular epidemiology. <b>Note:</b> Crosslisted with PHTX 661.  For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>3 Units</b>
<b>BIOC 645. Advanced Biochemistry I</b> <b>Term Typically Offered:</b> Fall Only <b>Prerequisite(s):</b> Students must be registered in the graduate school. <b>Description:</b> Chemistry of amino acids, protein structure and function; metabolism of carbohydrates, fats and amino acids. For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>4 Units</b>	<b>BIOC 662. Biomedical Research Data Analysis Methods</b> <b>Term Typically Offered:</b> Summer Only <b>Prerequisite(s):</b> Currently enrolled graduate students in good standing. <b>Description:</b> A lecture and discussion course designed for graduate students desiring to learn the basic statistical methods and data presentation approaches that are used in biomedical research. <b>Note:</b> This course requires permission from the instructor.  For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>1 Unit</b>
<b>BIOC 646. Nucleic acids and information metabolism</b> <b>Term Typically Offered:</b> Fall, Spring <b>Description:</b> This course addresses conceptual understanding of molecular biology principles with respect to cellular storage, integrity, control, and use of genetic information, with focus on nucleic acids and protein synthesis. Students must be registered in the graduate school. For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>1 Unit</b>	<b>BIOC 663. High-Throughput Sequencing Data Analysis</b> <b>Term Typically Offered:</b> Fall Only <b>Prerequisite(s):</b> Students must be registered in the graduate school and are expected to have a basic understanding of molecular biology. <b>Description:</b> Permission from the course director is needed for students not meeting these prerequisites. High-Throughput Sequencing Data Analysis will focus on current issues in bioinformatics, including: next generation sequencing; microRNA and mRNA integrative analysis; epigenetics, metagenomics, personalized genomics, and single cell sequencing. For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>3 Units</b>
<b>BIOC 647. Advanced Biochemistry II</b> <b>Term Typically Offered:</b> Spring Only <b>Prerequisite(s):</b> BIOC 545 or BIOC 645 or consent of instructor. <b>Description:</b> Biochemistry of nucleotides and nucleic acids; RNA, DNA and protein biosynthesis, biomembrane phenomena, enzyme properties, kinetics, and control mechanisms; ligand binding. <b>Note:</b> Credit may not be earned in both BIOC 547 and BIOC 647.  For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>4 Units</b>	<b>BIOC 667. Cell Biology</b> <b>Term Typically Offered:</b> Spring Only <b>Prerequisite(s):</b> One quarter of graduate level biochemistry or consent of instructor. <b>Description:</b> An advanced treatment of contemporary cell biology including membrane structure and function, cytoskeleton, signal transduction, regulation of cell cycle, apoptosis, and molecular mechanisms of cellular differentiation. Graded. For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>3 Units</b>
<b>BIOC 648. Journal Club in Biochemistry and Molecular Genetics</b> <b>Grading Basis:</b> Pass/Fail <b>Term Typically Offered:</b> Fall Only <b>Description:</b> This course will consist of student presentations of primary, peer-reviewed literature featuring current knowledge and techniques relevant to biochemical, molecular, and genetic understanding of molecular and cellular processes in health and disease. For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>1 Unit</b>		
<b>BIOC 649. Protein Function: from interactions to enzyme control</b> <b>Term Typically Offered:</b> Fall, Spring <b>Description:</b> This course is focused on the conceptual understanding of biochemical principles related to protein interactions and general enzymology and enzyme function. Students must be enrolled in the graduate school. For class offerings for a specific term, refer to the Schedule of Classes ( <a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a> )	<b>1 Unit</b>		

**BIOC 668. Molecular Biology 3-4 Units**

**Term Typically Offered:** Spring Only

**Prerequisite(s):** Student must be registered in the graduate school.

**Description:** Students are expected to have a basic understanding of molecular biology principles and protein structure. Best preparation for succeeding in the course is previous course in biochemistry and experience with reading scientific literature. Permission from the Course Director is needed for students not meeting these prerequisites. This course examines the fundamental principles of molecular biology as they apply to mechanisms controlling gene expression. Topics include: transcriptional and post-transcriptional regulation of gene expression; RNA and miRNA biology; and protein synthesis and regulation. An emphasis will be on student-directed learning requiring completion of pre-class reading, and in-class discussion of current literature.

**Note:** Crosslisted with BIOL 668.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

**BIOC 670. Biomedical Genetics and Genomics 3-5 Units**

**Term Typically Offered:** Fall Only

**Prerequisite(s):** Students must be registered in the Graduate School.

**Description:** This course examines the fundamental principles of genetics and genomics as they apply to biomedical research. Topics include: Mendelian, population, quantitative genetics, epigenetics, and bioinformatics. An emphasis will be on reading and critiquing current literature.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

**BIOC 675. Cancer Biology 4 Units**

**Prerequisite(s):** BIOC 545 or BIOC 645 or equivalents.

**Description:** A comprehensive course on cancer biology with emphasis on molecular mechanisms and research. Topics will include: the public health impact of cancer, molecular mechanisms of carcinogenesis and metastasis, host-tumor interactions, current and future molecular therapies and prevention, apoptosis, tumor immunology, cancer genetics and genomics, prevention, metabolism in cancer cells, signal transduction, cell cycle, and oncogenes and tumor suppressor genes. There will also be clinical-based lectures.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

**BIOC 680. Biomolecular Interactions 2 Units**

**Prerequisite(s):** BIOC 645 and BIOC 647 or equivalents.

**Description:** This course examines techniques used to characterize biomolecules and their interactions including surface plasmon resonance, equilibrium dialysis, microcalorimetry, analytical ultracentrifugation, dynamic light scattering and absorption fluorescence and circular dichroism spectroscopies.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

**BIOC 816. Special Project-Biochemistry 1-16 Units**

**Description:** This course is to be arranged to fit individual needs to cover topics of current interest or to participate in research projects or to receive some advance training.

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