

BIOCHEMISTRY, BIOPHYSICS, AND MOLECULAR BIOLOGY (BBMB)

Courses primarily for undergraduates:

BBMB 1010: Introduction to Biochemistry

Credits: 2. Contact Hours: Lecture 2.

Foundational principles of the molecules and chemistry of life, including structure and function of biological molecules: protein, lipids, nucleic acids, and carbohydrates. Survey of modern biotechnology frontiers. (Typically Offered: Fall)

BBMB 1020: Introduction to Biochemistry Laboratory

Credits: 1.

Prereq: Credit or enrollment in CHEM 1770 and CHEM 1770L or CHEM 2010 and CHEM 2010L

Topics in the scientific background of biochemistry, such as macromolecules, metabolism, and catalysis. Laboratory experimentation covers biochemical concepts and the study of bio-molecules including proteins, lipids and nucleic acids. A significant component is practice in scientific communication. For students declaring or considering Biochemistry majors. (Typically Offered: Spring)

BBMB 1100: Biochemistry Learning Community I

Credits: 1. Contact Hours: Lecture 1.

Biochemistry Learning Community introducing the program of study, academic planning, and university resources. Survey of careers and research in biotechnology, medicine, and biophysics. Introduction to ISU research and faculty. Concurrent enrollment with BBMB 1010 highly recommended. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

BBMB 1110: Biochemistry Learning Community II

Credits: 1. Contact Hours: Lecture 1.

Biochemistry Learning Community serving an overview of career-development and research resources, including research opportunities, internships, lab skills, and leadership roles. Introductions to ISU research and faculty. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

BBMB 1200: The Biochemistry of Beer

(Cross-listed with FSHN 1200).

Credits: 2. Contact Hours: Lecture 2.

An introduction to the major classes of biomolecules, basic biochemical concepts, enzymology, metabolism and genetic engineering as they apply to the production and flavor of beer. All aspects of the biochemistry of beer will be covered, including the malting of barley, starch conversion, yeast fermentation and the chemical changes that occur during the aging of beer. Intended for non-majors. (Typically Offered: Fall)

BBMB 1200L: Biochemistry of Beer Laboratory

(Cross-listed with FSHN 1200L).

Credits: 1. Contact Hours: Laboratory 3.

Prereq: Credit or enrollment in BBMB 1200

An introduction to biochemical methods related to the production of beer. Laboratory exercises related to water chemistry, mash enzymology, hop compound extraction and analysis, and yeast biology will be performed. Closely follows the material being taught in BBMB 1200. Graduation Restriction: Natural science majors are limited to elective credit only. (Typically Offered: Fall)

BBMB 1210: Medicines, Drugs and You

Credits: 2. Contact Hours: Lecture 2.

An introduction to how medicines treat disease, what drug molecules look like, how they function, how they can be toxic, modern therapeutics ranging from over-the-counter pain relievers, antibiotics and anti-depressants, to anti-cancer chemotherapies. The differences between drugs and supplements. Intended for students of all majors. (Typically Offered: Spring)

BBMB 2010: Chemical Principles in Biological Systems

Credits: 2. Contact Hours: Lecture 2.

Prereq: Credit or enrollment in CHEM 3320

Survey of the chemical principles of biological systems including: water, organic chemistry of functional groups in biomolecules and biochemical cofactors, weak bonds and their contribution to biomolecular structure, oxidation-reduction reactions and redox potential, thermodynamic laws and bioenergetics, chemical equilibria and kinetics, inorganic chemistry in biological systems, data presentation. The subjects will be taught using molecules from biological systems as examples. Intended for majors in biochemistry. (Typically Offered: Spring)

BBMB 2210: Structure and Reactions in Biochemical Processes

Credits: 3. Contact Hours: Lecture 3.

Prereq: CHEM 1630, CHEM 1670, CHEM 1770 or CHEM 2010

Fundamentals necessary for an understanding of biochemical processes. Primarily for students in agriculture. Graduation Restriction: Not acceptable for credit toward a major in biochemistry, biophysics, or agricultural biochemistry. Credit for both BBMB 2210 and CHEM 2310 may not be applied toward graduation. (Typically Offered: Fall, Spring)

BBMB 3010: Survey of Biochemistry

Credits: 3. Contact Hours: Lecture 3.

Prereq: CHEM 2310 or CHEM 3310

A survey of biochemistry: structure and function of amino acids, proteins, carbohydrates, lipids, and nucleic acids; enzymology; metabolism; biosynthesis; and selected topics. Graduation Restriction: Only one of BBMB 3010, 3030, or 3160 may count toward graduation; Not acceptable for credit toward a major in Biochemistry. (Typically Offered: Fall, Spring, Summer)

BBMB 3030: General Biochemistry

Credits: 3. Contact Hours: Lecture 3.

Prereq: CHEM 3310

Biochemistry for pre-health professions and biomedical engineering: structure and function of amino acids, proteins, carbohydrates, lipids and nucleic acids; enzyme activity; metabolism; DNA replication; RNA transcription; protein translation. Graduation Restriction: only one of BBMB 3010, 3030, or 3160 may count toward graduation; not acceptable for credit toward a major in Biochemistry. (Typically Offered: Spring)

BBMB 3110: Writing Scientific Reports in Biochemistry

Credits: 1.

Prereq: Credit or concurrent enrollment in BBMB 3120

Data analysis, presentation, and writing reports in biochemistry. Concurrent enrollment in BBMB 3120 recommended. (Typically Offered: Fall, Spring)

BBMB 3120: Experimental Research Skills in Biochemistry

Credits: 2. Contact Hours: Lecture 1, Laboratory 3.

Prereq: BBMB 1020 AND (credit or concurrent enrollment in CHEM 1780 or CHEM 2010)

Inquiry-based introduction to biochemical techniques such as protein purification, enzymatic assays, solution preparation, hypothesis formation and testing, data analysis, high-throughput methodology, and research record keeping. Concurrent enrollment in BBMB 3110 recommended. (Typically Offered: Fall, Spring)

BBMB 3160: Principles of Biochemistry

Credits: 3. Contact Hours: Lecture 3.

Prereq: BIOL 3140; (CHEM 2310 or CHEM 3310)

Biological systems at the molecular level; chemistry of biological macromolecules, enzyme function and regulation, basic metabolic pathways; integration of metabolism in diverse living systems. For students in biology and related majors who do not require the more rigorous treatment of biochemistry found in BBMB 4040/4050. Graduation Restriction: Only one of BBMB 3010, 3030, or 3160 may count toward graduation; Not acceptable for credit toward a major in Biochemistry. (Typically Offered: Fall, Spring)

BBMB 4040: Biochemistry I

Credits: 3. Contact Hours: Lecture 3.

Prereq: CHEM 2310 or CHEM 3310

Survey of biochemistry for undergraduate majors in biochemistry and related fields. The first of a comprehensive two semester series with BBMB 4050. Chemistry of amino acids, proteins, carbohydrates, and lipids; protein structure, function, and regulation; carbohydrate metabolism. BIOL 3140 strongly recommended. Graduation Restriction: Credit for both BBMB 4200 and the BBMB 4040 - 4050 sequence may not be applied toward graduation. (Typically Offered: Fall, Spring, Summer)

BBMB 4050: Biochemistry II

Credits: 3. Contact Hours: Lecture 3.

Prereq: BBMB 4040

Survey of biochemistry for undergraduate majors in biochemistry and related fields. The second of a comprehensive two semester series after BBMB 4040. Metabolism of carbohydrates, amino acids, nucleotides and lipids; formation, turnover, and molecular relationships among DNA, RNA, and proteins; genetic code; regulation of gene expression; and selected topics in molecular physiology. Graduation Restriction: Credit For Either BBMB 420 Or The BBMB 404,405 Sequence, But Not Both, May Be Applied Toward Graduation. (Typically Offered: Fall, Spring, Summer)

BBMB 4100: Analysis of Scientific Literature

Credits: 2. Contact Hours: Lecture 2.

Repeatable, maximum of 2 times.

Prereq: Credit or enrollment in BBMB 4040 or BBMB 5040

Examination and discussion of current research reports in biochemistry, biophysics, genetics, molecular and cell biology. Critical evaluation and analysis of scientific data and experimental design in research literature. (Typically Offered: Fall, Spring)

BBMB 4110: Techniques in Biochemical Research

Credits: 4. Contact Hours: Lecture 2, Laboratory 8.

Prereq: Credit or enrollment in CHEM 3320

Capstone biochemistry laboratory grounded in inquiry-driven research methodologies. Laboratory techniques include molecular cloning, enzyme kinetics, electrophoresis, spectrophotometry, and chromatography. Emphasis on structure-function relationships, purification, characterization, and quantification of biomolecules. Multi-week projects promote collaboration, critical thinking, and advanced scientific/technical writing. (Typically Offered: Fall)

BBMB 4200: Mammalian Biochemistry

Credits: 3. Contact Hours: Lecture 3.

Prereq: CHEM 3320 and BIOL 3140

Structure and function of proteins; enzymology; biological oxidation; chemistry and metabolism of carbohydrates, lipids, amino acids and nucleic acids; protein synthesis and the genetic code; relationship of biochemistry to selected mammalian diseases. Biochemistry of mammals emphasized. Graduation Restriction: Not acceptable for credit toward a major in Biochemistry. Credit for both BBMB 4200 and the BBMB 4040 - 4050 sequence may not be applied toward graduation. (Typically Offered: Fall, Spring)

BBMB 4300: Prokaryotic Diversity and Ecology

(Dual-listed with MICRO 5300). (Cross-listed with MICRO 4300).

Credits: 3. Contact Hours: Lecture 3.

Prereq: MICRO 3020; MICRO 3020L

Survey of the diverse groups of prokaryotes emphasizing important and distinguishing metabolic, phylogenetic, morphological, and ecological features of members of those groups. Offered odd-numbered years. (Typically Offered: Spring)

BBMB 4450: Molecular Cell Signaling

(Dual-listed with BBMB 5450).

Credits: 2. Contact Hours: Lecture 2.

Prereq: BBMB 4050 or BBMB 4200; or BBMB 5060 and BBMB 5070

Molecular mechanisms of cellular signaling including receptor activation, desensitization and cross talk, signal transduction pathways, nuclear receptors, growth factor and extracellular matrix activators, protein kinases, caspase and transcription factor downstream signals, and lipids, gases and cyclic nucleotides as regulators of cell signaling. Course content includes current literature, student and instructor presentations and, for BBMB 5450 students only, research proposal writing and review. Offered even-numbered years. (Typically Offered: Spring)

BBMB 4610: Molecular Biophysics

(Dual-listed with BBMB 5610).

Credits: 2. Contact Hours: Lecture 2.

Prereq: CHEM 1780; PHYS 2320 or PHYS 2320H

Physical methods for the study of molecular structure and organization of biological materials. X-ray diffraction, nuclear magnetic resonance, hydrodynamics and fluorescence spectroscopy. Registration for the graduate credit commits the student to graduate-level examinations, which differ from undergraduate-level examinations in the number and/or difficulty of questions. (Typically Offered: Spring)

BBMB 4900: Independent Study

Credits: 1-3. Repeatable.

Prereq: Instructor Permission for Course

Independent study with a faculty mentor. Graduation Restriction: No more than 9 credits of BBMB 4900 may count toward graduation. (Typically Offered: Fall, Spring, Summer)

BBMB 4970X: Biochemistry Program Outcomes Assessment

Credits: Required. Contact Hours: Lecture 0.5.

Assessment of Biochemistry program curriculum and educational objectives to be reviewed by the BBMB Department for continuous program improvement. Assessment administered as one capstone exam offered in late Spring and exit survey for student feedback. Offered on a satisfactory-fail basis only. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

BBMB 4990: Undergraduate Research

Credits: 1-5. Repeatable.

Prereq: Instructor Permission for Course

Independent research under faculty guidance. (Typically Offered: Fall, Spring, Summer)

Courses primarily for graduate students, open to qualified undergraduates:

BBMB 5040: Amino Acids and Proteins

Credits: 2. Contact Hours: Lecture 2.

Prereq: Junior, Senior, or Graduate Standing

Protein structure and chemistry including protein folding, examples of enzyme functions and mechanisms, methods of protein expression, purification, and analysis, and elementary enzyme kinetics. (Typically Offered: Fall, Spring)

BBMB 5050: Bioenergetics and Metabolism

Credits: 2. Contact Hours: Lecture 2.

Prereq: Junior, Senior, or Graduate Standing

Examination of catabolic pathways involved in the oxidation of organic and inorganic molecules, and energy metabolism involving inputs from light or other non-light sources. Central metabolism and glycolysis, fermentation, aerobic and anaerobic respiration, photosynthesis. (Typically Offered: Fall)

BBMB 5060: Membrane Biochemistry

Credits: 2. Contact Hours: Lecture 2.

Prereq: Junior, Senior, or Graduate Standing

Analysis of the structure and functions of biological lipids and membranes. Mechanisms of membrane transport, trafficking, and signaling mechanisms. Investigation of the structures, roles, and biogenesis of transmembrane proteins. (Typically Offered: Fall, Spring)

BBMB 5070: Biochemistry of Nucleic Acids

Credits: 2. Contact Hours: Lecture 2.

Prereq: Junior, Senior, or Graduate Standing

Analysis of the chemical structure, function, synthesis, and metabolism of nucleic acids. Chemical characterization of nucleotides, polynucleotides, DNA, and RNA. Analysis of transcription, translation, and the genetic code. (Typically Offered: Fall, Spring)

BBMB 5100: Molecular Biology and Biochemistry of RNA

Credits: 2. Contact Hours: Lecture 2.

Prereq: Graduate Standing or Permission of Instructor

Biochemical processes that define structure and function of nucleic acids. Emphasis on the molecular processes that take place during synthesis, processing, and function of different RNA species; review of recent advances in RNA research. Offered odd-numbered years. (Typically Offered: Fall)

BBMB 5120: Principles of Glycobiology

Credits: 2. Contact Hours: Lecture 2.

Prereq: Graduate Standing or Permission of Instructor

Structure, synthesis, and functions of glycans, glycoproteins, glycolipids, and glycosylated secondary metabolites in prokaryotic and eukaryotic organisms. Fundamental role of glycans in living organisms along with the most advanced techniques used for their characterization. Biotechnological applications of glycans and glycoconjugates for human needs. Offered even-numbered years. (Typically Offered: Spring)

BBMB 5300: Prokaryotic Diversity and Ecology

(Dual-listed with MICRO 4300). (Cross-listed with MICRO 5300).

Credits: 3. Contact Hours: Lecture 3.

Prereq: (MICRO 3020 and MICRO 3020L) or Graduate Classification

Survey of the diverse groups of prokaryotes emphasizing important and distinguishing metabolic, phylogenetic, morphological, and ecological features of members of those groups. Offered odd-numbered years. (Typically Offered: Spring)

BBMB 5310: Plant Biochemistry

Credits: 2. Contact Hours: Lecture 2.

Prereq: BBMB 3010

In-depth exploration of plant biochemistry with a focus on the unique aspects of plants versus heterotrophic organisms. Analysis of unique pathways, metabolic trafficking between unique organelles and tissues, and techniques for their characterization. Offered even-numbered years. (Typically Offered: Spring)

BBMB 5320: Enzyme Kinetics and Mechanisms

Credits: 2. Contact Hours: Lecture 2.

Prereq: Graduate Standing or Permission of Instructor

Advanced concepts of enzyme kinetics and catalysis. Experimental methods for determining kinetic and chemical reaction mechanisms. Enzyme structure/function relationships and the role of dynamics in catalysis. Offered odd-numbered years. (Typically Offered: Spring)

BBMB 5420A: Introduction to Molecular Biology Techniques: DNA Techniques

(Cross-listed with BMS 5420A/ EEOB 5420A/ FSHN 5420A/ GDCB 5420A/ HORT 5420A/ NREM 5420A/ NUTRS 5420A/ VDPAM 5420A/ VMPPM 5420A).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1. Repeatable.

Prereq: Graduate Standing or Permission of Instructor

Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

BBMB 5420B: Introduction to Molecular Biology Techniques: Protein

(Cross-listed with BMS 5420B/ EEOB 5420B/ FSHN 5420B/ GDCB 5420B/ HORT 5420B/ NREM 5420B/ NUTRS 5420B/ VDPAM 5420B).

Credits: 1. Repeatable.

Prereq: Graduate Standing or Permission of Instructor

Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. Offered on a satisfactory-fail basis only. (Typically Offered: Spring, Summer)

BBMB 5420C: Introduction to Molecular Biology Techniques: Cell Techniques

(Cross-listed with BMS 5420C/ EEOB 5420C/ FSHN 5420C/ GDCB 5420C/ HORT 5420C/ NREM 5420C/ NUTRS 5420C/ VMPPM 5420C/ VDPAM 5420C).

Credits: 1. Contact Hours: Laboratory 2. Repeatable.

Prereq: Graduate Standing or Permission of Instructor

Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. ular biology techniques and related procedures. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

BBMB 5420E: Introduction to Molecular Biology Techniques: Proteomics

(Cross-listed with BMS 5420E/ EEOB 5420E/ FSHN 5420E/ GDCB 5420E/ HORT 5420E/ NREM 5420E/ NUTRS 5420E/ VMPPM 5420E/ VDPAM 5420E).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.

Repeatable.

Prereq: Graduate Standing or Permission of Instructor

Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

BBMB 5420F: Introduction to Molecular Biology Techniques:**Metabolomics**

(Cross-listed with BMS 5420F/ EEOB 5420F/ FSHN 5420F/ GDCB 5420F/ HORT 5420F/ NREM 5420F/ NUTRS 5420F/ VMPPM 5420F/ VDPAM 5420F).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.

Repeatable.

Prereq: Graduate Standing or Permission of Instructor

Includes: metabolomics and the techniques involved in metabolite profiling. For non-chemistry majoring students who are seeking analytical aspects into their biological research projects. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

BBMB 5450: Molecular Cell Signaling

(Dual-listed with BBMB 4450).

Credits: 2. Contact Hours: Lecture 2.

Prereq: (BBMB 5060 AND BBMB 5070) OR Graduate Classification

Molecular mechanisms of cellular signaling including receptor activation, desensitization and cross talk, signal transduction pathways, nuclear receptors, growth factor and extracellular matrix activators, protein kinases, caspase and transcription factor downstream signals, and lipids, gases and cyclic nucleotides as regulators of cell signaling. Course content includes current literature, student and instructor presentations and, for BBMB 5450 students only, research proposal writing and review. Offered even-numbered years. (Typically Offered: Spring)

BBMB 5490: Nuclear Magnetic Resonance Spectroscopy

(Cross-listed with CHEM 5490).

Credits: 3. Contact Hours: Lecture 3.

Prereq: Graduate Standing or Permission of Instructor

Theoretical principles of NMR, practical aspects of experimental NMR, solution and solid state NMR, methodologies for molecule characterization, protein structure determination, NMR relaxation, and recent advances. (Typically Offered: Spring)

BBMB 5530: Current Research in Chemical and Physical Biology

Credits: 2. Contact Hours: Lecture 2.

Prereq: Graduate Standing or Permission of Instructor

Principles and applications of chemical and physical methods to analyze biological structures and function ranging from cells to individual biomolecules. Offered even-numbered years. (Typically Offered: Fall)

BBMB 5610: Molecular Biophysics

(Dual-listed with BBMB 4610).

Credits: 2. Contact Hours: Lecture 2.

Prereq: Graduate Standing or Permission of Instructor

Physical methods for the study of molecular structure and organization of biological materials. X-ray diffraction, nuclear magnetic resonance, hydrodynamics and fluorescence spectroscopy. Registration for the graduate credit commits the student to graduate-level examinations, which differ from undergraduate-level examinations in the number and/or difficulty of questions. (Typically Offered: Spring)

BBMB 5610L: Laboratory in Molecular Biophysics

Credits: 2. Contact Hours: Lecture 1, Laboratory 3.

Prereq: Senior or Graduate classification or Permission of Instructor

Practice in methods of X-ray diffraction, nuclear magnetic resonance, hydrodynamics and fluorescence spectroscopy as applied to macromolecules. (Typically Offered: Spring)

BBMB 5690: Structural Bioinformatics

(Cross-listed with BCB 5690/ COMS 5690/ CPRE 5690/ GDCB 5690).

Credits: 3. Contact Hours: Lecture 3.

Prereq: Graduate Standing or Permission of Instructor

Molecular structures including genes and gene products: protein, DNA and RNA structure. Structure determination methods, structural refinement, structure representation, comparison of structures, visualization, and modeling. Molecular and cellular structure from imaging. Analysis and prediction of protein secondary, tertiary, and higher order structure, disorder, protein-protein and protein-nucleic acid interactions, protein localization and function, bridging between molecular and cellular structures. Molecular evolution. (Typically Offered: Fall)

BBMB 5900: Special Topics

Credits: 1-30. Repeatable.

Prereq: Instructor Permission for Course

By arrangement.

BBMB 5920: Workshop in Bioinformatics and Computational Biology

(Cross-listed with BCB 5920).

Credits: 1. Contact Hours: Lecture 1.

Repeatable, maximum of 3 times.

Prereq: Graduate Standing or Permission of Instructor

Workshop to prepare for careers in science with professional development, including a survey of science careers using MyIDP, a career development tool. Topics include navigating career paths, internships, application portfolios, and appropriate use of social media. Emphasis on CV preparation, cover letters, job interviews, and elevator talks. Students will prepare, and evaluate grant proposals. (Typically Offered: Fall)

BBMB 5930: Workshop in Biochemistry and Biophysics

Credits: 1. Repeatable.

Prereq: Graduate Standing or Permission of Instructor

Workshops in selected topics in biochemistry and biophysics. Credit in this course does not meet the requirement for advanced graduate electives in Biochemistry. Spring only: BBMB Undergraduate Research Symposium participation. Scheduled class meetings are required in addition to attending the symposium. (Typically Offered: Fall, Spring)

Courses for graduate students:

BBMB 6150: Molecular Immunology

(Cross-listed with MICRO 6150/ VMPPM 6150).

Credits: 3. Contact Hours: Lecture 3.

Current topics in molecular aspects of immunology: T and B cell receptors; major histocompatibility complex; antibody structure; immunosuppressive drugs and viruses; and intracellular signaling pathways leading to expression of genes that control and activate immune function. Offered odd-numbered years. (Typically Offered: Fall)

BBMB 6610: Advanced Topics in Neuroscience

(Cross-listed with GDCB 6610/ KIN 6610/ NEURO 6610).

Credits: 3. Contact Hours: Lecture 3.

Students will present three journal articles and two overview lectures on topics in neuroscience that are related but outside of their own research interest. Offered even-numbered years. (Typically Offered: Spring)

BBMB 6750: Nucleic Acid Structure and Function

Credits: 2. Contact Hours: Lecture 2.

In-depth discussion of nucleic acid properties, structures and structure/function relationships. Interactions between nucleic acids and proteins will be emphasized. Offered even-numbered years. (Typically Offered: Fall)

BBMB 6810: Advanced Seminar

Credits: 1. Contact Hours: Lecture 1.

Repeatable.

Student presentations. (Typically Offered: Fall, Spring)

BBMB 6820: Departmental Seminar

Credits: Required. Contact Hours: Lecture 1.

Repeatable.

Faculty, staff and invited guest research seminar. (Typically Offered: Fall, Spring)

BBMB 6960: Research Seminar

(Cross-listed with AGRON 6960/ PLBIO 6960/ FOR 6960/ GDCB 6960/ HORT 6960).

Credits: 1. Contact Hours: Lecture 1.

Repeatable.

Research seminars by faculty and graduate students. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

BBMB 6980: Seminar in Molecular, Cellular, and Developmental Biology

(Cross-listed with MCDB 6980/ GDCB 6980/ MICRO 6980/ VMPPM 6980).

Credits: 1-2. Contact Hours: Lecture 2.

Repeatable.

Student and faculty presentations. (Typically Offered: Spring)

BBMB 6990: Research

Credits: 1-30. Repeatable.

Prereq: Instructor Permission for Course

Research. (Typically Offered: Fall, Spring)