

# BIOMEDICAL SCIENCES (BMS)

## **BMS 40196 INDIVIDUAL INVESTIGATION IN BIOMEDICAL SCIENCES (ELR) 1-3 Credit Hours**

(May be repeated for up to 6 credit hours) Research study under the direction of a BMS faculty mentor. Students majoring in biology (BSCI), biotechnology (BTEC), chemistry (CHEM), integrated life sciences (ILS) and physics (PHY) majors are eligible to enroll in this course, but must have 18 credit hours in their major completed.

**Prerequisite:** Minimum overall 2.750 GPA; and departmental and faculty mentor approvals required.

**Schedule Type:** Individual Investigation

**Contact Hours:** 3-9 other

**Grade Mode:** Standard Letter

**Attributes:** Experiential Learning Requirement

## **BMS 50701 CLINICAL NEUROANATOMY 3 Credit Hours**

(Slashed with BMS 70701)(Cross-listed with PSYC 43001, PSYC 53001 and PSYC 73001) Course examines the anatomical organization of the human brain, emphasizing functional aspects of various neural systems, neuroimaging and topics of clinical relevance. Students must have a conceptual understanding of central nervous system organization and memorization of specific neural structures and pathways, as well as knowledge of the impact of structure and systems dysfunction.

**Prerequisite:** Graduate standing and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

## **BMS 50702 CURRENT TECHNIQUES IN BEHAVIORAL NEUROSCIENCE 3 Credit Hours**

(Slashed with BMS 70702)(Cross-listed with PSYC 43002, PSYC 53002 and PSYC 73002) Course details current and advanced techniques used in behavioral neuroscience research. Emphasis is placed on understanding the theory behind each technique, and its use in understanding the neural mechanisms of behavior. Detailed protocols for each technique are also covered.

**Prerequisite:** Graduate standing and special approval from instructor.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

## **BMS 50703 NEURAL MECHANISMS OF LEARNING AND MEMORY 3 Credit Hours**

(Slashed with BMS 70703)(Cross-listed with PSYC 43003, PSYC 53003 and PSYC 73003) Course examines the neural and molecular mechanisms underlying learning and memory formation. Covers cellular mechanisms of learning, including long-term potentiation and basic electrophysiology in invertebrate and mammalian preps. Transcriptional and post-translational modifications required for learning and memory formation, genomic signaling and protein synthesis. Also covers structural changes of neurons associated with memory formation, and the different behavioral methods for studying memory.

**Prerequisite:** Graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

## **BMS 60120 LABORATORY TECHNIQUES IN BIOMEDICAL SCIENCES 2 Credit Hours**

(Repeatable once for credit) Minimum of two laboratory rotations per semester by arrangement with individual faculty members.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Research

**Contact Hours:** 2 other

**Grade Mode:** Satisfactory/Unsatisfactory

## **BMS 60196 INDIVIDUAL INVESTIGATION 1-3 Credit Hours**

(Repeatable for a maximum of 6 credit hours) (Cross-listed with BMS 70196) Directed investigation under supervision of faculty member in biomedical sciences and with prior approval.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Individual Investigation

**Contact Hours:** 1-3 other

**Grade Mode:** Standard Letter-IP

## **BMS 60198 RESEARCH 1-15 Credit Hours**

(Repeatable for credit) Research for master's level graduate students. Credits earned may be applied toward degree requirements if department approves.

**Prerequisite:** Graduate standing; and special approval of adviser.

**Schedule Type:** Research

**Contact Hours:** 1-15 other

**Grade Mode:** Satisfactory/Unsatisfactory-IP

## **BMS 60199 THESIS I 2-6 Credit Hours**

Thesis students must register for a minimum of 6 hours, 2 to 6 hours in a single semester distributed over several semesters if desired.

**Prerequisite:** Graduate standing; and special approval of adviser.

**Schedule Type:** Masters Thesis

**Contact Hours:** 2-6 other

**Grade Mode:** Satisfactory/Unsatisfactory-IP

## **BMS 60200 FOUNDATIONS OF NEUROSCIENCE 3 Credit Hours**

(Slashed with BMS 80200) (Cross-listed with BSCI 60200 and BSCI 80200) This is a graduate-level introductory neuroscience course that will survey aspects of molecular and cellular neuroscience, the biophysics of the nervous system, basic neuroanatomy, and the homeostatic regulation of the periphery. After completion of this course students should have an understanding of how cells of the nervous system work, how these cells interact with homeostatic systems important to the regulation of peripheral physiology and behavior, and the basic neuroanatomy of these regulatory systems, including major neurotransmitter and neuroendocrine systems. Upon completion of this course, students should be prepared for advanced neuroscience coursework.

**Prerequisite:** Graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

## **BMS 60251 THEORY AND PRACTICE OF CLONING AND GENETIC ENGINEERING 2 Credit Hours**

(Slashed with BMS 70251) Recent advances in the development and understanding of genetic engineering, genomic DNA organization and gene therapy will be discussed.

**Prerequisite:** BSCI 50158 and CHEM 50247 or BMS 60268; and graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 2 lecture

**Grade Mode:** Standard Letter

**BMS 60291 SEMINAR IN CELLULAR AND MOLECULAR BIOLOGY 1 Credit Hour**

(Repeatable for credit) (Slashed with BMS 70291) Credits may be applied toward degree if department approves.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Seminar

**Contact Hours:** 1 other

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 60295 SPECIAL TOPICS IN CELLULAR AND MOLECULAR BIOLOGY 1-5 Credit Hours**

(Repeatable for credit) (Slashed with BMS 70295) Study of subject or problem of current importance. Content dependent upon student requirements and on recent developments in field. Sections may be standard letter or satisfactory/unsatisfactory (S/U) graded.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 1-5 lecture

**Grade Mode:** Standard Letter

**BMS 60299 THESIS II 2 Credit Hours**

Thesis students must continue registration each semester until all degree requirements are met.

**Prerequisite:** 6 hours of BMS 60199; and graduate standing.

**Schedule Type:** Masters Thesis

**Contact Hours:** 2 other

**Grade Mode:** Satisfactory/Unsatisfactory-IP

**BMS 60440 CELLULAR AND MOLECULAR SIGNALING 3 Credit Hours**

(Cross-listed with BSCI 60440 and BSCI 70440 and BMS 70440) The relevant and current topics associated with cellular signaling is covered. Topics include receptor pharmacology, classes, and regulation, transcription factors, cell cycle signaling, and cell-cell communication.

**Prerequisite:** BSCI 40143 or BSCI 50143 or BSCI 70143; and graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 60441 MEDICAL PHYSIOLOGY 5 Credit Hours**

(Slashed with BMS 70441) Investigation of how the integration of biophysics, biochemistry and structure induces organ function in the cardiovascular, renal, respiratory, endocrine and gastrointestinal systems. Limited discussion of how pathologies alter normal organ function.

**Prerequisite:** Graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 5 lecture

**Grade Mode:** Standard Letter

**BMS 60450 MEDICAL PHYSIOLOGY II 3 Credit Hours**

(Cross-listed with BMS 70450) Biophysical and biochemical concepts of integrative organ system physiology in the human: renal, gastrointestinal and endocrine physiology.

**Prerequisite:** BSCI 40430; and graduate standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 60462 NEUROBIOLOGY: SYSTEMS AND BEHAVIOR 4 Credit Hours**

(Slashed with BMS 70462; Cross-listed with BSCI 60462 and BSCI 80462). Provides broad coverage of the parts of the central nervous systems and how they integrate sensory information, drive motor function and regulate behavior.

**Prerequisite:** BMS 60729 or BMS 70729; and graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 4 lecture

**Grade Mode:** Standard Letter

**BMS 60465 MEDICAL NEUROSCIENCE 6 Credit Hours**

(Slashed with BMS 70465) Detailed examination of human neuroanatomy and nervous system function.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Combined Lecture and Lab

**Contact Hours:** 5 lecture, 3 lab

**Grade Mode:** Standard Letter

**BMS 60491 SEMINAR IN MEDICAL PHYSIOLOGY 1 Credit Hour**

(Repeatable for credit) (Slashed with BMS 70491) Credits may be applied toward degree if department approves.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Seminar

**Contact Hours:** 1 other

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 60495 SPECIAL TOPICS IN PHYSIOLOGY 1-5 Credit Hours**

(Repeatable for credit) (Slashed with BMS 70495) Study of subject or problem of current importance. Content dependent upon student requirements and on recent developments in field. Sections may be standard letter or satisfactory/unsatisfactory (S/U) graded.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 1-5 lecture

**Grade Mode:** Standard Letter

**BMS 60501 INTRODUCTION TO PHARMACOLOGY 1 Credit Hour**

(Slashed with BMS 70501) Satisfactory/Unsatisfactory (S/U) graded. Basic aspects of pharmacology. Intended to provide a general understanding of fundamental concepts in pharmacology and opportunities for students to read and present peer-reviewed manuscripts covering introductory pharmacological concepts.

**Prerequisite:** Graduate standing.

**Schedule Type:** Seminar

**Contact Hours:** 1 other

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 60502 MOLECULAR PHARMACOLOGY 4 Credit Hours**

(Slashed with BMS 70502) General principles of pharmacology including metabolism, action, interactions, side effects, toxicity and therapeutic use of select drug topics. Focus is placed on the molecular and cellular targets of drug action.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 4 lecture

**Grade Mode:** Standard Letter

**BMS 60503 PHARMACOLOGY JOURNAL REVIEW 1 Credit Hour**  
 (Repeatable maximum four times) (Slashed with BMS 70503)  
 Satisfactory/Unsatisfactory (S/U) graded. Review and discussion of advanced pharmacology journal articles. Students will present and critique articles from peer-viewed publications and actively participate in discussions. Background in physiology and biochemistry required.  
**Prerequisite:** Graduate standing.  
**Schedule Type:** Seminar  
**Contact Hours:** 1 other  
**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 60504 CHEMOTHERAPY AND TOXICOLOGY 2 Credit Hours**  
 (Slashed with BMS 70504) Specialized topics in chemotherapy of microbial and neoplastic diseases as well as principles of toxicology.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 2 lecture  
**Grade Mode:** Standard Letter

**BMS 60505 DRUG DISCOVERY AND CLINICAL PHARMACOLOGY 2 Credit Hours**  
 (Slashed with BMS 70505) Basic concepts underlying drug discovery and clinical pharmacology including principles of pharmacokinetics, metabolism, pharmacogenomics and drug design.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 2 lecture  
**Grade Mode:** Standard Letter

**BMS 60506 HERBALS AND SUPPLEMENTS 2 Credit Hours**  
 (Slashed with BMS 70506) Provides an understanding of the basic scientific, therapeutic and pharmacological principles underlying the use of medicinal plants, herbal medications, natural products, vitamins, minerals and supplements.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 2 lecture  
**Grade Mode:** Standard Letter

**BMS 60550 MEDICAL PHARMACOLOGY I 3 Credit Hours**  
 (Cross-listed with BMS 70550) General principles of pharmacology including metabolism, action, interactions, side effects, toxicity and therapeutic use of drugs.  
**Prerequisite:** Graduate standing.  
**Schedule Type:** Lecture  
**Contact Hours:** 3 lecture  
**Grade Mode:** Standard Letter

**BMS 60551 MEDICAL PHARMACOLOGY II 3 Credit Hours**  
 (Slashed with BMS 70551) Continuation of BMS 60550.  
**Prerequisite:** BMS 60550; and graduate standing.  
**Schedule Type:** Lecture  
**Contact Hours:** 3 lecture  
**Grade Mode:** Standard Letter

**BMS 60591 SEMINAR IN PHARMACOLOGY 1 Credit Hour**  
 (Repeatable for credit) (Slashed with BMS 70591) Credits may be applied toward degree if department approves. Repeated registration permitted.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Seminar  
**Contact Hours:** 1 other  
**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 60595 SPECIAL TOPICS IN PHARMACOLOGY 1-5 Credit Hours**  
 (Repeatable for credit) (Slashed with BMS 70595) Study of subject or problem of current importance. Content dependent upon student requirements and on recent developments in field. Sections may be standard letter or satisfactory/unsatisfactory (S/U) graded.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 1-5 lecture  
**Grade Mode:** Standard Letter

**BMS 60596 INDIVIDUAL INVESTIGATION IN PHARMACOLOGY 1-3 Credit Hours**  
 (Repeatable for credit) (Cross-listed with BMS 70596) Experience with various laboratory techniques and procedures used in pharmacological research with application to experimental designs.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Individual Investigation  
**Contact Hours:** 3 other  
**Grade Mode:** Standard Letter-IP

**BMS 60729 CELLULAR AND MOLECULAR NEUROSCIENCE 4 Credit Hours**  
 (Slashed with BMS 70729) The relation of aspects of the neurosciences to the fundamental properties of nervous tissue, establishing a firm base in experimental neurobiology.  
**Prerequisite:** Graduate standing; and special approval of instructor.  
**Schedule Type:** Lecture  
**Contact Hours:** 4 lecture  
**Grade Mode:** Standard Letter

**BMS 60751 CURRENT RESEARCH IN AUDITORY NEUROBIOLOGY 1 Credit Hour**  
 (Slashed with BMS 70751) (Repeatable for a maximum of four credit hours) Presentation-based by faculty in the Auditory Neuroscience Group. Topics will vary each semester. Each class presentation will highlight recent advances in auditory neurobiology, cover relevant background, and involve discussion of methodology, experimental design, and interpretive issues related to the research. Students will prepare a presentation on a topic chosen in conjunction with one of the faculty members. Assessment is based on presentation quality and active participation throughout the semester.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Seminar  
**Contact Hours:** 1 lecture  
**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 60791 SEMINAR IN NEUROBIOLOGY 1 Credit Hour**  
 (Repeatable for credit) (Cross-listed with BMS 70791) Credits may be applied toward degree if department approves.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Seminar  
**Contact Hours:** 1 other  
**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 60795 SPECIAL TOPICS IN NEUROBIOLOGY 1-5 Credit Hours**  
 (Repeatable for credit) (Slashed with BMS 70795) Study of problems of current importance. Content dependent on student requirements and on developments in field. Sections may be standard letter or satisfactory/unsatisfactory (S/U) graded.  
**Prerequisite:** Graduate standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 1-5 lecture  
**Grade Mode:** Standard Letter

**BMS 61000 RESPONSIBLE CONDUCT OF RESEARCH 1 Credit Hour**  
(Slashed with BMS 71000; Cross-listed with PHIL 61000) Introduction to professional and ethical conduct of research. Topics include codes and laws governing research, identification of scientific misconduct, plagiarism, authorship and intellectual properties, ethical animal and human research.

**Prerequisite:** Graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 1 lecture

**Grade Mode:** Standard Letter

**BMS 61001 INTRODUCTION TO BIOMEDICAL SCIENCES 1 Credit Hour**

(Slashed with BMS 71001) Seminar for all students in Biomedical Sciences. Repeat registration permitted.

**Prerequisite:** Graduate Standing in the School of Biomedical Sciences; Biological Anthropology, Biomedical mathematics, Cellular and Molecular Biology, Neurosciences, Pharmacology, Physiology Interdisciplinary.

**Schedule Type:** Seminar

**Contact Hours:** 1 lecture

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 68610 HUMAN GROSS ANATOMY I 4 Credit Hours**

(Cross-listed with BMS 78610) An intensive survey of human macromorphology. Lecture two hours per week. Laboratory six hours per week.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 4 lecture

**Grade Mode:** Standard Letter

**BMS 68611 HUMAN GROSS ANATOMY II 3 Credit Hours**

(Slashed with BMS 78611) An intensive survey of human macromorphology; a 10 week course which continues BMS 6/78610. Lecture two hours per week. Laboratory six hours per week.

**Prerequisite:** BMS 68610; and graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 70120 LABORATORY TECHNIQUES IN BIOMEDICAL SCIENCES 2 Credit Hours**

(Repeatable once for credit) (Cross-listed with BMS 60120) Minimum of two laboratory rotations per semester by arrangement with individual faculty members. May be repeated once.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Research

**Contact Hours:** 2 other

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 70196 INDIVIDUAL INVESTIGATION 1-3 Credit Hours**

(Repeatable for credit) (Cross-listed with BMS 60196) Directed investigation under supervision of faculty member in biomedical sciences and with prior approval.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Individual Investigation

**Contact Hours:** 1-3 other

**Grade Mode:** Standard Letter-IP

**BMS 70251 THEORY AND PRACTICE OF CLONING AND GENETIC ENGINEERING 2 Credit Hours**

(Slashed with BMS 60251) Recent advances in the development and understanding of genetic engineering, genomic DNA organization and gene therapy will be discussed.

**Prerequisite:** BSCI 50158 and CHEM 50247 or BMS 60268; and doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 2 lecture

**Grade Mode:** Standard Letter

**BMS 70291 SEMINAR IN CELLULAR AND MOLECULAR BIOLOGY 1 Credit Hour**

(Repeatable for credit) (Slashed with BMS 60291) Credits may be applied toward degree if department approves.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Seminar

**Contact Hours:** 1 other

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 70295 SPECIAL TOPICS IN CELLULAR AND MOLECULAR BIOLOGY 1-5 Credit Hours**

(Repeatable maximum ten times for credit) (Slashed with BMS 60295) Study of subject or problem of current importance. Content dependent upon student requirements and on recent developments in field.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 1-5 lecture

**Grade Mode:** Standard Letter

**BMS 70440 CELLULAR AND MOLECULAR SIGNALING 3 Credit Hours**

(Cross-listed with BSCI 60440 and BSCI 70440 and BMS 60440) The relevant and current topics associated with cellular signaling will be covered. Topics include receptor pharmacology, classes and regulation, transcription factors, cell cycle signaling and cell-cell communication.

**Prerequisite:** BSCI 40143 or BSCI 50143 or BSCI 70143; and doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 70441 MEDICAL PHYSIOLOGY 5 Credit Hours**

(Slashed with BMS 60441) Investigation of how the integration of biophysics, biochemistry and structure induces organ function in the cardiovascular, renal, respiratory, endocrine and gastrointestinal systems. Limited discussion of how pathologies alter normal organ function.

**Prerequisite:** Doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 5 lecture

**Grade Mode:** Standard Letter

**BMS 70450 MEDICAL PHYSIOLOGY II 3 Credit Hours**

(Cross-listed with BMS 60450) Biophysical and biochemical concepts of integrative organ system physiology in the human: renal, gastrointestinal and endocrine physiology.

**Prerequisite:** BSCI 40430; and one year college physics and college chemistry (including organic); and doctoral standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 70462 NEUROBIOLOGY: SYSTEMS AND BEHAVIOR 4 Credit Hours**  
 (Slashed with BMS 60462; Cross-listed with BSCI 60462 and BSCI 80462)  
 Provides broad coverage of the parts of the central nervous systems and how they integrate sensory information, drive motor function and regulate behavior.  
**Prerequisite:** BMS 60729 or BMS 70729; and doctoral standing.  
**Schedule Type:** Lecture  
**Contact Hours:** 4 lecture  
**Grade Mode:** Standard Letter

**BMS 70465 MEDICAL NEUROSCIENCE 6 Credit Hours**  
 (Slashed with BMS 60465) Detailed examination of human neuroanatomy and nervous system function.  
**Prerequisite:** Doctoral standing; and special approval.  
**Schedule Type:** Combined Lecture and Lab  
**Contact Hours:** 5 lecture, 3 lab  
**Grade Mode:** Standard Letter

**BMS 70491 SEMINAR IN MEDICAL PHYSIOLOGY 1 Credit Hour**  
 (Repeatable for credit) (Slashed with BMS 60491) Credits may be applied toward degree if department approves.  
**Prerequisite:** Doctoral standing; and special approval.  
**Schedule Type:** Seminar  
**Contact Hours:** 1 other  
**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 70495 SPECIAL TOPICS IN PHYSIOLOGY 1-5 Credit Hours**  
 (Repeatable for credit) (Slashed with BMS 60495) Study of subject or problem of current importance. Content dependent upon student requirements and on recent developments in field. Sections may be standard letter or satisfactory/unsatisfactory (S/U) graded.  
**Prerequisite:** Doctoral standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 1-5 lecture  
**Grade Mode:** Standard Letter

**BMS 70501 INTRODUCTION TO PHARMACOLOGY 1 Credit Hour**  
 (Slashed with BMS 60501) Satisfactory/Unsatisfactory (S/U) graded. Basic aspects of pharmacology. Intended to provide a general understanding of fundamental concepts in pharmacology and opportunities for students to read and present peer-reviewed manuscripts covering introductory pharmacological concepts.  
**Prerequisite:** Doctoral standing.  
**Schedule Type:** Seminar  
**Contact Hours:** 1 other  
**Grade Mode:** Satisfactory/Unsatisfactory-IP

**BMS 70502 MOLECULAR PHARMACOLOGY 4 Credit Hours**  
 (Slashed with BMS 60502) General principles of pharmacology including metabolism, action, interactions, side effects, toxicity and therapeutic use of select drug topics. Focus is placed on the molecular and cellular targets of drug action.  
**Prerequisite:** Doctoral standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 4 lecture  
**Grade Mode:** Standard Letter

**BMS 70503 PHARMACOLOGY JOURNAL REVIEW 1 Credit Hour**  
 (Repeatable maximum four times) (Slashed with BMS 60503) Review and discussion of advanced pharmacology journal articles. Students will present and critique articles from peer-viewed publications and actively participate in discussions. Background in physiology and biochemistry required. Satisfactory/Unsatisfactory (S/U) graded.  
**Prerequisite:** Doctoral standing.  
**Schedule Type:** Seminar  
**Contact Hours:** 1 other  
**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 70504 CHEMOTHERAPY AND TOXICOLOGY 2 Credit Hours**  
 (Slashed with BMS 60504) Specialized topics in chemotherapy of microbial and neoplastic diseases as well as principles of toxicology.  
**Prerequisite:** Doctoral standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 2 lecture  
**Grade Mode:** Standard Letter

**BMS 70505 DRUG DISCOVERY AND CLINICAL PHARMACOLOGY 2 Credit Hours**  
 (Slashed with BMS 60505) Basic concepts underlying drug discovery and clinical pharmacology including principles of pharmacokinetics, metabolism, pharmacogenomics and drug design.  
**Prerequisite:** Doctoral standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 2 lecture  
**Grade Mode:** Standard Letter

**BMS 70506 HERBALS AND SUPPLEMENTS 2 Credit Hours**  
 (Slashed with BMS 60506) Provides an understanding of the basic scientific, therapeutic and pharmacological principles underlying the use of medicinal plants, herbal medications, natural products, vitamins, minerals and supplements.  
**Prerequisite:** Doctoral standing; and special approval.  
**Schedule Type:** Lecture  
**Contact Hours:** 2 lecture  
**Grade Mode:** Standard Letter

**BMS 70550 MEDICAL PHARMACOLOGY I 3 Credit Hours**  
 (Cross-listed with BMS 60550) General principles of pharmacology including metabolism, action, interactions, side effects, toxicity and therapeutic use of drugs.  
**Prerequisite:** Doctoral standing.  
**Schedule Type:** Lecture  
**Contact Hours:** 3 lecture  
**Grade Mode:** Standard Letter

**BMS 70551 MEDICAL PHARMACOLOGY II 3 Credit Hours**  
 (Slashed with BMS 60551) Continuation of BMS 70550.  
**Prerequisite:** BMS 70550; and doctoral standing.  
**Schedule Type:** Lecture  
**Contact Hours:** 3 lecture  
**Grade Mode:** Standard Letter

**BMS 70591 SEMINAR IN PHARMACOLOGY 1 Credit Hour**  
 (Repeatable for credit) (Cross-listed with BMS 60591) Credits may be applied toward degree if department approves.  
**Prerequisite:** Doctoral standing; and special approval.  
**Schedule Type:** Seminar  
**Contact Hours:** 1 other  
**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 70595 SPECIAL TOPICS IN PHARMACOLOGY 1-5 Credit Hours**

(Repeatable for credit) (Slashed with BMS 60595) Study of subject or problem of current importance. Content dependent upon student requirements and on recent developments in field. Sections may be standard letter or satisfactory/unsatisfactory (S/U) graded.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 1-5 lecture

**Grade Mode:** Standard Letter

**BMS 70596 INDIVIDUAL INVESTIGATION IN PHARMACOLOGY 1-3 Credit Hours**

(Repeatable for credit) (Cross-listed with BMS 60596) Experience with various laboratory techniques and procedures used in pharmacological research with application to experimental designs.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Individual Investigation

**Contact Hours:** 1-3 other

**Grade Mode:** Standard Letter-IP

**BMS 70701 CLINICAL NEUROANATOMY 3 Credit Hours**

(Slashed with BMS 50701)(Cross-listed with PSYC 43001, PSYC 53001 and PSYC 73001). Course examines the anatomical organization of the human brain, emphasizing functional aspects of various neural systems, neuroimaging and topics of clinical relevance. Students must have a conceptual understanding of central nervous system organization and memorization of specific neural structures and pathways, as well as knowledge of the impact of structure and systems dysfunction.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 70702 CURRENT TECHNIQUES IN BEHAVIORAL NEUROSCIENCE 3 Credit Hours**

(Slashed with BMS 50702)(Cross-listed with PSYC 43002, PSYC 53002 and PSYC 73002) Course details current and advanced techniques used in behavioral neuroscience research. Emphasis is placed on understanding the theory behind each technique, and its use in understanding the neural mechanisms of behavior. Detailed protocols for each technique are also covered.

**Prerequisite:** Doctoral standing and special approval from instructor.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 70703 NEURAL MECHANISMS OF LEARNING AND MEMORY 3 Credit Hours**

(Slashed with BMS 50703)(Cross-listed with PSYC 43003, PSYC 53003 and PSYC 73003) Course examines the neural and molecular mechanisms underlying learning and memory formation. Covers cellular mechanisms of learning, including long-term potentiation and basic electrophysiology in invertebrate and mammalian preps. Transcriptional and post-translational modifications required for learning and memory formation, genomic signaling and protein synthesis. Also covers structural changes of neurons associated with memory formation, and the different behavioral methods for studying memory.

**Prerequisite:** Doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 70729 CELLULAR AND MOLECULAR NEUROSCIENCE 4 Credit Hours**

(Slashed with BMS 60729) The relation of aspects of the neurosciences to the fundamental properties of nervous tissue, establishing a firm base in experimental neurobiology.

**Prerequisite:** Doctoral standing; and special approval of instructor.

**Schedule Type:** Lecture

**Contact Hours:** 4 lecture

**Grade Mode:** Standard Letter

**BMS 70751 CURRENT RESEARCH IN AUDITORY NEUROBIOLOGY 1 Credit Hour**

(Slashed with BMS 60751) (Repeatable for a maximum of four credit hours) Presentation-based by faculty in the Auditory Neuroscience Group. Topics will vary each semester. Each class presentation will highlight recent advances in auditory neurobiology, cover relevant background, and involve discussion of methodology, experimental design, and interpretive issues related to the research. Students will prepare a presentation on a topic chosen in conjunction with one of the faculty members. Assessment is based on presentation quality and active participation throughout the semester.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Seminar

**Contact Hours:** 1 lecture

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 70791 SEMINAR IN NEUROBIOLOGY 1 Credit Hour**

(Repeatable for credit) (Slashed with BMS 60791) Credits may be applied toward degree if department approves.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Seminar

**Contact Hours:** 1 other

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 70795 SPECIAL TOPICS IN NEUROBIOLOGY 1-5 Credit Hours**

(Repeatable for credit) (Slashed with BMS 60795) Study of problems of current importance. Content dependent on student requirements and on developments in field. Sections may be standard letter or satisfactory/unsatisfactory (S/U) graded

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 1-5 lecture

**Grade Mode:** Standard Letter

**BMS 71000 RESPONSIBLE CONDUCT OF RESEARCH 1 Credit Hour**

(Slashed with BMS 61000; Cross-listed with PHIL 61000) Introduction to professional and ethical conduct of research. Topics include codes and laws governing research, identification of scientific misconduct, plagiarism, authorship and intellectual properties, ethical animal and human research.

**Prerequisite:** Doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 1 lecture

**Grade Mode:** Standard Letter

**BMS 71001 INTRODUCTION TO BIOMEDICAL SCIENCES 1 Credit Hour**

(Slashed with BMS 61001) Introductory seminar for new students in Biomedical Sciences graduate programs. This seminar will expose students to the different faculty research programs available in the program.

**Prerequisite:** Doctoral standing in Biomedical Sciences.

**Schedule Type:** Seminar

**Contact Hours:** 1 lecture

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 78610 HUMAN GROSS ANATOMY I 4 Credit Hours**  
(Cross-listed with BMS 68610) An intensive survey of human macromorphology. Lecture two hours per week. Laboratory six hours per week.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 4 lecture

**Grade Mode:** Standard Letter

**BMS 78611 HUMAN GROSS ANATOMY II 3 Credit Hours**  
(Cross-listed with BMS 68611) An intensive survey of human macromorphology; a 10 week course which continues BMS 6/78610. Lecture two hours per week. Laboratory six hours per week.

**Prerequisite:** BMS 6/78610; and Doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 78630 PRINCIPLES OF BIOLOGICAL ANTHROPOLOGY 3 Credit Hours**

(Slashed with ANTH 68630) Graduate-level introduction to the field of biological anthropology. Topics include genetics, human variation, fossil and modern primates and early man.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 78637 BIOANTHROPOLOGICAL DATA ANALYSIS I 5 Credit Hours**

(Cross-listed with ANTH 68637) Examination of methods of univariate and bivariate experimental design. This survey emphasizes tests of hypothesis and estimation techniques with both classical and nonparametric procedures.

**Prerequisite:** Doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 5 lecture

**Grade Mode:** Standard Letter

**BMS 78638 BIOANTHROPOLOGICAL DATA ANALYSIS II 3 Credit Hours**

(Cross-listed with ANTH 68638) This survey of multivariate analysis in anthropology includes one-sample data exploration, multiple sample problems and regression methods. It also includes computer applications.

**Prerequisite:** BMS 78637; and Doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 78691 SEMINAR IN BIOLOGICAL ANTHROPOLOGY 1 Credit Hour**

(Repeatable for credit) Credits may be applied toward degree if department approves.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Seminar

**Contact Hours:** 1 other

**Grade Mode:** Satisfactory/Unsatisfactory

**BMS 78692 FIELD WORK IN PALEOANTHROPOLOGY 1-5 Credit Hours**

(Repeatable for credit) Excavation and/or field survey of miocene and/or plio-pleistocene hominid localities.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Field Experience

**Contact Hours:** 1-5 other

**Grade Mode:** Standard Letter

**BMS 78695 SPECIAL TOPICS IN BIOLOGICAL ANTHROPOLOGY 1-5 Credit Hours**

(Repeatable for credit) Study of subject or problem of current importance. Content dependent upon student requirements and on recent developments in field. Sections may be standard letter or satisfactory/unsatisfactory (S/U) graded.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 1-5 lecture

**Grade Mode:** Standard Letter

**BMS 80198 RESEARCH 1-15 Credit Hours**

(Repeatable for credit) Research for doctoral students who have not yet passed candidacy examination.

**Prerequisite:** Doctoral standing; and special approval of adviser.

**Schedule Type:** Research

**Contact Hours:** 1-15 other

**Grade Mode:** Satisfactory/Unsatisfactory-IP

**BMS 80199 DISSERTATION I 15 Credit Hours**

(Repeatable for credit) Doctoral dissertation, for which registration in at least two semesters is required, first of which will be semester in which dissertation work is begun and continuing until the completion of 30 hours. Students must successfully complete the doctoral exam before taking this course.

**Prerequisite:** Doctoral standing; and special approval.

**Schedule Type:** Dissertation

**Contact Hours:** 15 other

**Grade Mode:** Satisfactory/Unsatisfactory-IP

**BMS 80200 FOUNDATIONS OF NEUROSCIENCE 3 Credit Hours**

(Slashed with BMS 60200) (Cross-listed with BSCI 60200 and BSCI 80200) This is a graduate-level introductory neuroscience course that will survey aspects of molecular and cellular neuroscience, the biophysics of the nervous system, basic neuroanatomy, and the homeostatic regulation of the periphery. After completion of this course students should have an understanding of how cells of the nervous system work, how these cells interact with homeostatic systems important to the regulation of peripheral physiology and behavior, and the basic neuroanatomy of these regulatory systems, including major neurotransmitter and neuroendocrine systems. Upon completion of this course, students should be prepared for advanced neuroscience coursework.

**Prerequisite:** Doctoral standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**BMS 80299 DISSERTATION II 15 Credit Hours**

(Repeatable for credit) Continuing registration of doctoral students who have completed the initial 30 hours of dissertation and continuing until all degree requirements are met.

**Prerequisite:** 30 hours of BMS 80199; and Doctoral standing.

**Schedule Type:** Dissertation

**Contact Hours:** 15 other

**Grade Mode:** Satisfactory/Unsatisfactory-IP