BIOMEDICAL SCIENCES (BMS)

Courses primarily for undergraduates:

BMS 3290: Anatomy and Physiology of Domestic Animals
Credits: 3. Contact Hours: Lecture 3.
Prereq: BIOL 2120 *and* BIOL 2120L
Survey of body systems of domestic animals. Provides a medical science orientation particularly useful to students in a preveterinary medicine curriculum. (Typically Offered: Spring)

BMS 4380: Principles of Physiology
(Dual-listed with BMS 5380).
Credits: 4. Contact Hours: Lecture 4.
Principles of neurophysiology, endocrine and reproductive physiology, muscle physiology, cardiovascular, respiratory, renal, and digestive physiology, and regulation of body fluid. (Typically Offered: Fall)

BMS 4390: Principles of Pharmacology
(Dual-listed with BMS 5390).
Credits: 4. Contact Hours: Lecture 4.
General principles of drug actions; drug disposition; drug acting or, cardiovascular, respiratory, renal, gastrointestinal, and endocrine systems; anti-inflammatory and antibiotic drug; anti-cancer drugs; anesthetics CNS stimulants; lifestyle drugs; drug addiction, abuse and dependence; drugs in sport; drugs for obesity; biopharmaceuticals and gene therapy; drug development. (Typically Offered: Spring)

BMS 4470: Introduction to Human Gross Anatomy
(Dual-listed with BMS 5470).
Credits: 4. Contact Hours: Lecture 2, Laboratory 6.
Examination of gross anatomy and neuroanatomy of the human. Laboratories will center on regional anatomy study through human cadaver dissection in addition to models, virtual learning solutions, radiologic imaging and case studies. (Typically Offered: Fall)

BMS 4480: Principles of Human Gross Anatomy
Credits: 4. Contact Hours: Lecture 2, Laboratory 6.
Repeatable, maximum of 2 times.
BMS 448 will be a laboratory-centered course that focuses on prosected human cadavers to develop an in-depth understanding of human anatomical function. The course will follow a regional approach and stress relationships between neighboring anatomical structures. During laboratory sessions, students teams will study anatomy from multiple individuals to gain an appreciation for anatomical variation and effects on the body from aging, disease, etc. Additional laboratory activities include study in osteology, radiograph interpretation and case studies. (Typically Offered: Spring, Summer)

BMS 4500X: Introduction to a Research Career in Industry
(Dual-listed with BMS 5500X/ VMPM 5500X). (Cross-listed with VMPM 4500X).
Credits: 1. Contact Hours: Lecture 2.
Explores research career paths in industry. Course will discuss ways students can prepare competitive applications and skill sets necessary for success. Concepts of regulatory constraints, quality management systems and intellectual property will also be introduced. Material will be presented by industry associates and leaders. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

BMS 4900H: Independent Study: Honors
Credits: 1-5. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

Courses primarily for graduate students, open to qualified undergraduates:

BMS 5010: Selected Research Methods in Biomedical Sciences
Credits: 3.
Experience in biomedical techniques in selected BMS laboratories that include but is not limited to cytochemical methods, molecular biological techniques, extracellular and intracellular unit recording, microiontophoresis, microinjection, spectrophoto-fluorometric analysis of chemicals, use of radioisotopes, radioimmunoassay, Ca2+ imaging, confocal microscopy, fluorescence microscopy, and immunocytochemistry. (Typically Offered: Fall, Spring, Summer)

BMS 5020: Methods in Biomedical Sciences
Credits: 3. Contact Hours: Laboratory 6.
Provides laboratory experience in the application of methods in biomedical sciences, including animal physiology and pharmacology laboratory techniques; human physiology recordings and urinalysis; pharmacokinetics; basic techniques in analytical laboratory; basic pathology, immunology, bacteriology, and virology laboratory techniques. (Typically Offered: Spring)

BMS 5030: Fundamentals of Biomedical Sciences
Credits: 1. Contact Hours: Lecture 1.
Institutional training essential for biomedical research, orientation to institutional career services and communication resources, professional development activities and practice with critical evaluation of data presentation and interpretation in biomedical literature. (Typically Offered: Fall)

BMS 5300: Principles of Morphology I
(Dual-listed with BMS 7333).
Credits: 6. Contact Hours: Lecture 4, Laboratory 6.
Anatomy of the dog and cat: from basics to clinical application. (Typically Offered: Fall)

BMS 5310: Principles of Morphology II
(Dual-listed with BMS 7331).
Credits: 4. Contact Hours: Lecture 2, Laboratory 6.
Comparative and topographic atomy of horse, ruminants, pig, and chicken. (Typically Offered: Spring)

BMS 5330: Biomedical Sciences I
(Dual-listed with BMS 7333).
Credits: 6. Contact Hours: Lecture 5, Laboratory 3.
Microscopic anatomy and physiology of cells, tissues, cardiovascular system, respiratory system, and urinary system. (Typically Offered: Fall)

BMS 5340: Biomedical Sciences II
(Dual-listed with BMS 7334).
Credits: 6. Contact Hours: Lecture 5, Laboratory 3.
Microscopic anatomy of the immune system and integument. Microscopic anatomy and physiology of the digestive system, endocrine system, and reproductive system. (Typically Offered: Spring)

BMS 5350: Molecular and Cellular Basis of Disease
Credits: 1. Contact Hours: Lecture 1.
Descriptions of molecular and cellular biology, especially as it pertains to veterinary medicine. Discussions of cellular components, cellular functions and anomalies thereof. Emphasis placed on divergences relevant to companion animals and livestock. (Typically Offered: Spring)

BMS 5370: Neuroanatomy
(Dual-listed with BMS 7337).
Credits: 3. Contact Hours: Lecture 2, Laboratory 2.
Neuroanatomy of domestic animals. (Typically Offered: Spring)

BMS 5380: Principles of Physiology
Credits: 4. Contact Hours: Lecture 4.
Principles of neurophysiology, endocrine and reproductive physiology, muscle physiology, cardiovascular, respiratory, renal, and digestive physiology, and regulation of body fluid. (Typically Offered: Fall)

BMS 5390: Principles of Pharmacology
(Dual-listed with BMS 4390).
Credits: 4. Contact Hours: Lecture 4.
General principles of drug actions; drug disposition; drug acting or, cardiovascular, respiratory, renal, gastrointestinal, and endocrine systems; anti-inflammatory and antibiotic drug; anti-cancer drugs; anesthetics CNS stimulants; lifestyle drugs; drug addiction, abuse and dependence; drugs in sport; drugs for obesity; biopharmaceuticals and gene therapy; drug development. (Typically Offered: Spring)

BMS 5420A: Introduction to Molecular Biology Techniques: DNA Techniques
(Cross-listed with BBMB 5420A/ EEOB 5420A/ FSHN 5420A/ GDCB 5420A/ HORT 5420A/ NREM 5420A/ NUTRS 5420A/ VDPAM 5420A/ VMPM 5420A).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

BMS 5420B: Introduction to Molecular Biology Techniques: Protein
(Cross-listed with BBMB 5420B/ EEOB 5420B/ FSHN 5420B/ GDCB 5420B/ HORT 5420B/ NREM 5420B/ NUTRS 5420B/ VDPAM 5420B).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
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)

BMS 5420C: Introduction to Molecular Biology Techniques: Cell Techniques
(Cross-listed with BBMB 5420C/ EEOB 5420C/ FSHN 5420C/ GDCB 5420C/ HORT 5420C/ NREM 5420C/ NUTRS 5420C/ VMPM 5420C/ VDPAM 5420C).
Credits: 1. Contact Hours: Laboratory 2.
Repeatable.
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)

BMS 5420D: Introduction to Molecular Biology Techniques: Plant Transformation
(Cross-listed with BBMB 5420D/ EEOB 5420D/ FSHN 5420D/ GDCB 5420D/ HORT 5420D/ NREM 5420D/ NUTRS 5420D/ VMPM 5420D/ VDPAM 5420D).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: Agrobacterium and particle gun-mediated transformation of tobacco, Arabidopsis, and maize, and analysis of tranformants. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

BMS 5420E: Introduction to Molecular Biology Techniques: Proteomics
(Cross-listed with BBMB 5420E/ EEOB 5420E/ FSHN 5420E/ GDCB 5420E/ HORT 5420E/ NREM 5420E/ NUTRS 5420E/ VMPM 5420E/ VDPAM 5420E).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

BMS 5420F: Introduction to Molecular Biology Techniques: Metabolomics
(Cross-listed with BBMB 5420F/ EEOB 5420F/ FSHN 5420F/ GDCB 5420F/ HORT 5420F/ NREM 5420F/ NUTRS 5420F/ VMPM 5420F/ VDPAM 5420F).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
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)

BMS 5420G: Introduction to Molecular Biology Techniques: Genomic
(Cross-listed with BBMB 5420G/ EEOB 5420G/ FSHN 5420G/ GDCB 5420G/ HORT 5420G/ NREM 5420G/ NUTRS 5420G/ VMPM 5420G/ VDPAM 5420G).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

BMS 5430: Pharmacology and Therapeutics
(Dual-listed with BMS 7443).
Credits: 3. Contact Hours: Lecture 3.
Pharmacology and therapeutic uses of fluids, antimicrobial and antiparasitic drugs, clinical use of veterinary drugs, and adverse drug reactions. (Typically Offered: Fall)

BMS 5470: Introduction to Human Gross Anatomy
(Dual-listed with BMS 4470).
Credits: 4. Contact Hours: Lecture 2, Laboratory 6.
Examination of gross anatomy and neuroanatomy of the human. Laboratories will center on regional anatomy study through human cadaver dissection in addition to models, virtual learning solutions, radiologic imaging and case studies. (Typically Offered: Fall)

BMS 5500X: Introduction to a Research Career in Industry
(Dual-listed with BMS 4500/ VMPM 4500). (Cross-listed with VMPM 5500X).
Credits: 1. Contact Hours: Lecture 2.
Explores research career paths in industry. Course will discuss ways students can prepare competitive applications and skill sets necessary for success. Concepts of regulatory constraints, quality management systems and intellectual property will also be introduced. Material will be presented by industry associates and leaders. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

BMS 5540: General Pharmacology
(Dual-listed with BMS 7354). (Cross-listed with TOX 5540).
Credits: 3. Contact Hours: Lecture 3.
General principles; drug disposition; drugs acting on the nervous, cardiovascular, renal, gastrointestinal, and endocrine systems. (Typically Offered: Spring)

BMS 5560: Cellular, Molecular and Developmental Neuroscience
(Cross-listed with NEURO 5560/ GDCB 5560).
Credits: 3. Contact Hours: Lecture 3.
Fundamental principles of neuroscience including cellular and molecular neuroscience, nervous system development, and regulatory systems. Offered odd-numbered years. (Typically Offered: Fall)

BMS 5750: Cell Biology
(Cross-listed with TOX 5750).
Credits: 3. Contact Hours: Lecture 3.
A multi-instructor course covering major topics in cell structure and function, including: universal features of prokaryotic and eukaryotic cells, types of utilization and conversion of energy, genetic control of cell shape and functionality, internal organization of cells, communication between cells and their environment, development of multicellular systems. Students have to write a term paper. (Typically Offered: Fall)

BMS 5900A: Anatomy
Credits: 1-7. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 5900B: Physiology
Credits: 1-7. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 5900C: Pharmacology
Credits: 1-7. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 5900D: Cell Biology
Credits: 1-7. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 5990: Creative Component
Credits: 1-3. Repeatable.
Prereq: Instructor Permission for Course
Creative component for non-thesis Master of Science degree. (Typically Offered: Fall, Spring, Summer)

Courses for graduate students:

BMS 6880: Research Review
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
A forum for BMS students to gain experience in the critical exchange of ideas through oral presentation and discussion of scientific information. (Typically Offered: Fall)

BMS 6900A: Anatomy
Credits: 1-5. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 6900B: Physiology
Credits: 1-5. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 6900C: Pharmacology
Credits: 1-5. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 6900D: Cell Biology
Credits: 1-5. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 6980A: Seminar: Attendance
Credits: Required. Contact Hours: Lecture 1.
Repeatable.
(Typically Offered: Fall, Spring)

BMS 6980B: Seminar: Attendance and Presentation
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Attendance and presentation required. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring, Summer)

BMS 6980C: Seminar: Attendance and Report
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Attendance to all BMS seminars and written reports are required.
(Typically Offered: Fall, Spring)

BMS 6990A: Research: Anatomy
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 6990B: Research: Physiology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 6990C: Research: Pharmacology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 6990D: Research: Cell biology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

Courses primarily for professional curriculum students:

BMS 7330: Principles Of Morpholgy I
(Dual-listed with BMS 7333).
Credits: 6. Contact Hours: Lecture 4, Laboratory 6.
Prereq: 10 credits in biological sciences or permission of instructor
Anatomy of the dog and cat: from basics to clinical application.
(Typically Offered: Fall)

BMS 7331: Principles of Morphology II
(Dual-listed with BMS 5310).
Credits: 4. Contact Hours: Lecture 2, Laboratory 6.
Prereq: First-year classification in veterinary medicine. BMS 3300
Comparative and topographic anatomy of horse, ruminants, pig, and chicken. (Typically Offered: Spring)

BMS 7333: Biomedical Sciences I
(Dual-listed with BMS 5330).
Credits: 6. Contact Hours: Lecture 5, Laboratory 3.
Prereq: First-year classification in veterinary medicine or graduate student status
Microscopic anatomy and physiology of cells, tissues, cardiovascular system, respiratory system, and urinary system. (Typically Offered: Fall)

BMS 7334: Biomedical Sciences II
(Dual-listed with BMS 5340).
Credits: 6. Contact Hours: Lecture 5, Laboratory 3.
Prereq: First-year classification in veterinary medicine or graduate student status
Microscopic anatomy of the immune system and integument. Microscopic anatomy and physiology of the digestive system, endocrine system, and reproductive system. (Typically Offered: Spring)

BMS 7335: Molecular and Cellular Basis of Disease
Credits: 1. Contact Hours: Lecture 1.
Descriptions of molecular and cellular biology especially as it pertains to veterinary medicine. Discussions of cellular components, cellular functions and anomalies thereof. Emphasis placed on divergences relevant to companion animals and livestock. (Typically Offered: Fall)

BMS 7336: Veterinary Nutrition
Credits: 2. Contact Hours: Lecture 2.
Introduce basic biochemical aspects of metabolism and function of energy, protein, fat, minerals and vitamins in the diet. Determine nutrient requirements of food animals, pets, and horses under various physiological states. Understand fate of various nutrients in simple stomached animals, ruminants, and cecal fermenters. Discuss clinical nutrition problems specific to each species. (Typically Offered: Fall)

BMS 7337: Neuroanatomy
(Dual-listed with BMS 5370).
Credits: 3. Contact Hours: Lecture 2, Laboratory 2.
Neuroanatomy of domestic animals. (Typically Offered: Spring)

BMS 7339: Clinical Foundations I
(Cross-listed with VCS 7339).
Credits: 1. Contact Hours: Lecture 1, Laboratory 2.
Canine physical examination; basic behavior, animal handling and restraint; medical record keeping. (Typically Offered: Fall)

BMS 7345: Case Study I
Credits: 1. Contact Hours: Laboratory 2.
Clinical applications of basic sciences taught concurrently in the fall semester of the first year curriculum in veterinary medicine. (Typically Offered: Fall)

BMS 7346: Case Study II
Credits: 1. Contact Hours: Laboratory 2.
Clinical applications of basic sciences taught concurrently in the spring semester of the first year curriculum in veterinary medicine. (Typically Offered: Spring)

BMS 7354: General Pharmacology
(Dual-listed with TOX 3540). (Cross-listed with TOX 7354).
Credits: 3. Contact Hours: Lecture 3.
General principles; drug disposition; drugs acting on the nervous, cardiovascular, renal, gastrointestinal, and endocrine systems. (Typically Offered: Spring)

BMS 7401: Intro to Aquatic Animal Medicine
(Dual-listed with AECL 4010). (Cross-listed with AECL 7401).
Credits: 1.
8-week course. Introductory course with focus on fin fish production, health and medicine. Course content will help define future roles for veterinarians, producers, and service providers. Emphasis will be placed on water-evaluation, anatomy, pathology, infectious diseases, nutrition, regulatory constraints in production, food safety, biosecurity and current research. Field trip to aquaculture facility. (Typically Offered: Spring)

BMS 7403: Behavior of Domestic Animals
Credits: 1. Contact Hours: Lecture 1.
Prereq: Classification in veterinary medicine
Normal and abnormal behavior of domestic animals. Offered odd-numbered years. (Typically Offered: Spring)

BMS 7443: Pharmacology and Therapeutics
(Dual-listed with BMS 5430).
Credits: 3. Contact Hours: Lecture 3.
Pharmacology and therapeutic uses of fluids, antimicrobial and antiparasitic drugs, clinical use of veterinary drugs, and adverse drug reactions. (Typically Offered: Fall)

BMS 7490: Independent Study
Credits: 1-5. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

BMS 7496: International Experience
Credits: 1-12. Repeatable.
Prereq: Vet Med classification or permission of instructor
International Preceptorships and Study Abroad Group programs. Opportunities for students to be involved in applied clinical, production, and/or research experiences in international locations. The course consists of 40 hour per week experiential learning opportunities. (Typically Offered: Spring)