DEPARTMENT OF ANIMAL AND VETERINARY SCIENCE

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Animal agriculture has a major role in providing the supply of high quality food, not only for the people of the United States, but also for those of other nations. Food and fiber obtained from animals include meat, milk, eggs, wool, and many by-products. Knowledge and skills resulting from a college education in this field will permit the graduate to contribute to improved production and health of the nation's livestock including beef, sheep, dairy, swine, poultry, horses, and companion animals.

In addition to classrooms and laboratories located in the Agricultural Science Building, the department's facilities include production centers for dairy, beef, and sheep, as well as a meats laboratory and livestock judging pavilion. Several breeds of animals are maintained for instructional purposes. The academic program is designed to prepare students for a variety of important and rewarding career opportunities. For more specific information, get in touch with the department head (208/885-6345).

To prepare students for the varied types of occupations available in animal agriculture, the Department of Animal and Veterinary Science offers a bachelor of science degree in animal and veterinary science with four options: business, dairy science, production and science/preveterinary. Each of these majors, while attempting to provide the students with a sound background in animal biology, has its separate emphasis on complementary academic training. One of the strongest features of these programs is the flexibility provided. Each major permits the student to plan the precise course of study that will best prepare him or her for the area of work that he or she desires to enter. The department also offers a minor in animal science for students desiring a background in animal agriculture to complement their major field of study.

The B.S.A.V.S. business option is designed for students who desire a career as entry level into management positions in livestock-related industries. This option is oriented toward business, economics, and agricultural economics, in addition to a sound background in production animal agriculture. With appropriate choices of elective courses, students can also prepare themselves for positions with financial institutions involved with the animal agriculture industry.

An option in dairy science (B.S.A.V.S.) helps prepare students for careers in one of Idaho's fastest growing industries. This option offers introductory and advanced course work and "hands on training" at a modern dairy center. Specific courses are taught in dairy nutrition, forage crops, dairy reproduction and physiology, dairy cattle evaluation, dairy products and processing, physiology of lactation, herd health management, agriculture power and machines, and farm management. Students are eligible to participate in the cooperative of university dairy students (CUDS) program.

The option in production (B.S.A.V.S.) is designed for students who desire to pursue a career in livestock production, graduate work in one of the varied disciplines in animal sciences (nutrition, breeding, physiology, growth, endocrinology, meats, etc.), or for employment by companies that require intensive training in animal biology. This option is also excellent training for those interested in Cooperative Extension.

The science/pre-veterinary option (B.S.A.V.S.) is offered for students interested in veterinary school or a graduate program involving any of the disciplines of animal biology. It is typically a 4-yr program of study, but for a few students the 3+1 program will be of interest. If, after successful completion of 99 credits of required courses (first 3 years of the 4-yr program, the student is admitted to a recognized college of veterinary medicine and completes the first year of veterinary school (equivalent of at least 32 credits), that first year will constitute the senior year at UI and the student will be awarded a B.S. A.V.S. at UI.

The department offers a graduate program leading to the Master of Science degree with a major in animal science and a Doctor of Philosophy degree with a major in animal physiology. The department offers areas of specialization in nutrition, reproductive physiology, embryo physiology, animal growth and development, meat science, and animal diseases with orientation towards beef cattle, dairy cattle, horses, sheep, and fish. The department also participates in university interdisciplinary programs in reproductive biology, and molecular and agricultural genetic engineering.

Graduate work in the department is designed to prepare the student for work in research, extension, teaching, and industry. Thesis projects are diverse in scope and range in design from studying very fundamental biological questions to application of scientific knowledge to animal production and management. Facilities available for graduate student research include herds and flocks of major livestock breeds, ruminant nutrition and physiology laboratories, biomedical research laboratories, a university-operated dairy, meat science laboratory, and a 500-head experimental feedlot. Active cooperation is maintained with federal research agencies located on and off campus.

Graduate student assistantships are available on a competitive basis each year. Inquiries should be directed to the department's graduate program coordinator.

Courses

See course description section for courses in Animal and Veterinary Science (AVS).

Animal and Veterinary Science Undergraduate Curricular Requirements

Animal and Veterinary Science (B.S.A.V.S.)

Required course work includes the university requirements (see regulation J-3) and:

AVS 109	The Science of Animals that Serve Humanity (4 cr)
AVS 209	Science of Animal Husbandry (4 cr)
AVS 305	Animal Nutrition (3 cr)
AVS 371, AVS 373	Anatomy and Physiology and Lab (4 cr)
Biol 115	Cells and the Evolution of Life (4 cr)
Comm 101	Fundamentals of Public Speaking (2 cr)
Stat 251	Statistical Methods (3 cr)

One of the following (3 cr):

Engl 313	Business Writing (3 cr)
Engl 317	Technical Writing (3 cr)

One of the following (3 cr):

Math 143	Pre-calculus Algebra and Analytical Geometry (3 cr)
Math 160	Survey of Calculus (4 cr)
Math 170	Analytic Geometry and Calculus I (4 cr)

Complete one of the following four options:

A. Business Option

Acct 201	Introduction to Financial Accounting (3 cr)
Acct 202	Introduction to Managerial Accounting (3 cr)
AgEc 278	Farm and Ranch Management (4 cr)
AgEc 289	Agricultural Markets and Prices (3 cr)
AVS 306	Feeds and Ration Formulation (4 cr)
AVS 363	Animal Products for Human Consumption (4 cr)
AVS 450	Issues in Animal Agriculture (1 cr)
BLaw 265	Legal Environment of Business (3 cr)
Chem 275	Carbon Compounds (3 cr)
Econ 201	Principles of Macroeconomics (3 cr)
Econ 202	Principles of Microeconomics (3 cr)

Business electives (6 cr)
6 crs of Upper Division Ag Econ

One of the following (3 cr):

AgEc 301	Managerial Economics: Production (3 cr)
AgEc 302	Managerial Economics: Consumption & Markets (3 cr)

One of the following (3 cr):

AgEc 301	Managerial Economics: Production (3 cr)
AgEc 302	Managerial Economics: Consumption & Markets (3 cr)

One of the following (3-4 cr):

AVS 222	Animal Reproduction and Breeding (3 cr)
AVS 452	Physiology of Reproduction (4 cr)

One of the following (4 cr):
Chem 101 Introduction to Chemistry I (4 cr)
Chem 111 Principles of Chemistry I (4 cr)

One of the following (3 cr):
AVS 472 Dairy Cattle Management (3 cr)
AVS 474 Beef Cattle Science (3 cr)

One of the following (3 cr):
AVS 466 Equine Science and Management (3 cr)
AVS 468 Companion Animal Biology & Management (3 cr)
AVS 472 Dairy Cattle Management (3 cr)
AVS 474 Beef Cattle Science (3 cr)

Courses to total 120 credits for this degree

B. Dairy Science Option
AgEc 278 Farm and Ranch Management (4 cr)
AgEc 289 Agricultural Markets and Prices (3 cr)
AVS 172 Principles and Practices of Dairy Science (2 cr)
AVS 306 Feeds and Ration Formulation (4 cr)
AVS 330 Genetics of Livestock Improvement (3 cr)
AVS 363 Animal Products for Human Consumption (4 cr)
AVS 411 Ruminant Nutrition (3 cr)
AVS 450 Issues in Animal Agriculture (1 cr)
AVS 463 Growth and Lactation (3 cr)
AVS 471 Animal Disease Management (3 cr)
AVS 472 Dairy Cattle Management (3 cr)
AVS 475 Advanced Dairy Cattle Management (3 cr)
Chem 275 Carbon Compounds (3 cr)
Econ 202 Principles of Microeconomics (3 cr)

One of the following (3-4 cr):
AVS 222 Animal Reproduction and Breeding (3 cr)
AVS 452 Physiology of Reproduction (4 cr)

One of the following (4 cr):
Chem 101 Introduction to Chemistry I (4 cr)
Chem 111 Principles of Chemistry I (4 cr)

One of the following (3 cr):
Biol 250 General Microbiology (3 cr)
MMBB 154 Introductory Microbiology (3 cr)

One of the following (1-2 cr):
Biol 255 General Microbiology Lab (2 cr)
MMBB 155 Introductory Microbiology Laboratory (1 cr)

Courses to total 120 credits for this degree

C. Production Option
AgEc 278 Farm and Ranch Management (4 cr)
AgEc 289 Agricultural Markets and Prices (3 cr)
AVS 222 Animal Reproduction and Breeding (3 cr)
AVS 306 Feeds and Ration Formulation (4 cr)
AVS 330 Genetics of Livestock Improvement (3 cr)
AVS 363 Animal Products for Human Consumption (4 cr)
AVS 411 Ruminant Nutrition (3 cr)
AVS 450 Issues in Animal Agriculture (1 cr)
AVS 471 Animal Disease Management (3 cr)
Chem 275 Carbon Compounds (3 cr)
Econ 202 Principles of Microeconomics (3 cr)
REM 221 or For 221 Ecology (3 cr)
300 or 400 level Life science elective (chosen from Biol, Ent, Fish, MMBB, PlSc, REM, Soil, or WLF) (3 cr)

One of the following (3-4 cr):
AVS 222 Animal Reproduction and Breeding (3 cr)
AVS 452 Physiology of Reproduction (4 cr)

One of the following (4 cr):
Chem 101 Introduction to Chemistry I (4 cr)
Chem 111 Principles of Chemistry I (4 cr)

One of the following (3 cr):
Biol 250 General Microbiology (3 cr)
MMBB 154 Introductory Microbiology (3 cr)

One of the following (1-2 cr):
Biol 255 General Microbiology Lab (2 cr)
MMBB 155 Introductory Microbiology Laboratory (1 cr)

One of the following (2-3 cr):
REM 151 Rangeland Principles (2 cr)
REM 456 Integrated Rangeland Management (3 cr)

One of the following (3 cr):
AVS 472 Dairy Cattle Management (3 cr)
AVS 474 Beef Cattle Science (3 cr)

One of the following (3 cr):
AVS 466 Equine Science and Management (3 cr)
AVS 468 Companion Animal Biology & Management (3 cr)
AVS 472 Dairy Cattle Management (3 cr)
AVS 474 Beef Cattle Science (3 cr)

Courses to total 120 credits for this degree

D. Science/Preveterinary Option
AVS 452 Physiology of Reproduction (4 cr)
Biol 116 Organisms and Environments (4 cr)
Chem 111 Principles of Chemistry I (4 cr)
Chem 112 Principles of Chemistry II (5 cr)
Chem 277, Chem 278 Organic Chemistry I and Lab (4 cr)
Phys 111, Phys 111L General Physics I and Lab (4 cr)
Phys 112, Phys 112L General Physics II and Lab (4 cr)

One of the following (3-4 cr):
Biol 310, Biol 315 Genetics and Lab (4 cr)
Gene 314 General Genetics (3 cr)

One of the following (3 cr):
Biol 250 General Microbiology (3 cr)
MMBB 154 Introductory Microbiology (3 cr)

One of the following (1-2 cr):
Biol 255 General Microbiology Lab (2 cr)
MMBB 155 Introductory Microbiology Laboratory (1 cr)

One of the following (3-4 cr):
Biol 300 Survey of Biochemistry (3 cr)
Biol 380 Biochemistry I (4 cr)

First Year in Veterinary School (32 cr) or the following courses:
AVS 306 Feeds and Ration Formulation (4 cr)
AVS 330 Genetics of Livestock Improvement (3 cr)
AVS 450 Issues in Animal Agriculture (1 cr)
AVS 471 Animal Disease Management (3 cr)
Biol or MMBB elective, 300-level or above (3 cr)

One of the following (3 cr):
AVS 451 Endocrine Physiology (3 cr)
AVS 463 Growth and Lactation (3 cr)
Biol 423 Comparative Vertebrate Physiology (3 cr)
Biol 432 or MMBB 409 Immunology (3 cr)
Biol 447 or MMBB 432 Virology (3 cr)
Biol 474 Principles of Developmental Biology (3 cr)
Biol 483 Mammalogy (3 cr)
Chem 372 Organic Chemistry II (3 cr)
MMBB 460 Microbial Physiology (3 cr)

One of the following (3 cr):
AVS 472 Dairy Cattle Management (3 cr)
AVS 474 Beef Cattle Science (3 cr)

One of the following (3 cr):
AVS 466 Equine Science and Management (3 cr)
AVS 468 Companion Animal Biology & Management (3 cr)
AVS 472 Dairy Cattle Management (3 cr)
AVS 474 Beef Cattle Science (3 cr)

Courses to total 120 credits for this degree

Animal and Veterinary Science Academic Minor Requirements

Animal Science Minor

AVS 109 The Science of Animals that Serve Humanity (4 cr)
AVS 209 Science of Animal Husbandry (4 cr)

One of the following (3 cr):
AVS 222 Animal Reproduction and Breeding (3 cr)
AVS 452 Physiology of Reproduction

Six credits from the following AVS 300-level or higher courses:
AVS 305 Animal Nutrition (3 cr)

AVS 306	Feeds and Ration Formulation (4 cr)
AVS 363	Animal Products for Human Consumption (4 cr)
AVS 330	Genetics of Livestock Improvement (3 cr)
AVS 363	Animal Products for Human Consumption (4 cr)
AVS 411	Ruminant Nutrition (3 cr)
AVS 471	Animal Disease Management (3 cr)

Three credits of the following:

AVS 466	Equine Science and Management (3 cr)
AVS 472	Dairy Cattle Management (3 cr)
AVS 474	Beef Cattle Science (3 cr)

Courses to total 20 credits for this minor

Animal and Veterinary Science Graduate Degree Programs

Candidates must fulfill the requirements of the College of Graduate Studies and of the Department of Animal and Veterinary Science. See the College of Graduate Studies section for the general requirements applicable to all degrees.

Master of Science. The M.S. degree may be earned in animal science. To qualify for full admission, candidates must fulfill the requirements of the Graduate College and have an overall grade-point average of 3.0 or better (4.0 scale) for their undergraduate study. Acceptance of students not having this minimum grade-point average is possible, subject to recommendation by the department's Graduate Committee. Applicants must submit scores received on the Graduate Record Examination general (aptitude) test.

The M.S. degree requires a minimum of 30 credits, at least 18 of which must be in courses numbered 500 and above. No more than 10 of the 500-level credits may be from research and thesis. Courses at the 300 level in supporting fields may be used as part of the M.S. degree program. All graduate students are required to complete the departmental graduate seminar twice during the degree program. Students are also required to assist with teaching during their graduate training.

Applicants for the M.S. degree program in animal science who have completed their undergraduate program in fields that are not closely related to animal science will be required to complete deficiency courses as determined by the candidate's committee and approved by the department's Graduate Committee. The following are considered essential in an applicant's undergraduate program: chemistry and biochemistry (minimum of 12 credits); calculus; animal nutrition; animal breeding; physiology and/or endocrinology; one products course; and one animal production and management course. Specific animal production courses may be required as determined on an individual candidate basis.

Doctor of Philosophy. The Ph.D. degree may be earned in animal physiology. To qualify for admission, candidates must fulfill the requirements of the Graduate College and have an overall grade-point average of 3.25 or better (on a 4.00 scale) for their undergraduate and graduate work. Applicants must submit scores received in the Graduate Record Examination (aptitude test).

Applicants who have completed their previous degrees in fields not closely related to animal and veterinary science may be required to complete deficiencies as determined by the candidate's committee and approved by the department's Graduate Committee.

The Ph.D. degree in animal physiology requires a minimum of 78 credits beyond the B.S. or professional degree, at least 52 credits of which must be in courses numbered 500 and above. Thirty-nine credits of the 78 must be in courses other than AVS 600 (doctoral research and dissertation). Courses at the 300 level may not be used as part of the Ph.D. degree program. Doctoral students are required to complete the departmental graduate seminar each semester it is offered during the degree program. Students are also required to assist with teaching during their graduate training. Doctoral students must demonstrate competence in experimental design and data analysis prior to completion of the degree.

ANIMAL AND VETERINARY SCIENCE COURSES

Mark A. McGuire, Dept. Head (213 Ag. Sc. Bldg. 83844-2330; phone 208/885-6345).

AVS 105 Survey of the Science of Livestock Production and Management (1-3 cr, max 3)
This course is designed to introduce the student to the principles of animal production and management through knowledge and skills pertaining to nutrition, reproduction, diseases, breeding, genetics, anatomy, and physiology in livestock. Course will be offered for 1 credit in the Fall and 2 in the Spring.

AVS 109 The Science of Animals that Serve Humanity (4 cr)
Role of animal agriculture in providing food, work, and pleasure for mankind; intro to animal genetics, physiology, endocrinology, nutrition, and other disciplines essential for an understanding of the contributions of animals in the expanding human population. Cooperative: open to WSU degree-seeking students.

AVS 172 Principles and Practices of Dairy Science (2 cr)
An overview of the dairy industry and the science of producing milk and reproduction, udder health and mastitis, milk marketing, and dairy product quality and safety; approved management practices for dairy enterprise. Cooperative: open to WSU degree-seeking students.

AVS 209 Science of Animal Husbandry (4 cr).
Fundamental concepts of animal husbandry and its foundation in the science of animal production; introduction to the technical subject matter of animal production. Three lec and one 2-hr lab a week.
Prereq: *AVS 109*

AVS 222 Animal Reproduction and Breeding (3 cr)
Provides fundamental information about reproduction, lactation, and breeding of domestic animals; topics include functional anatomy, basic physiology, and endocrinology relating to reproduction and lactation; animal breeding involves the mathematical and conceptual framework of genetic evaluation.

AVS 263 Live Animal and Carcass Evaluation (3 cr)
Evaluation and selection of cattle, sheep, and swine for herd replacement; evaluation of market animals; carcass evaluation and grading, slaughter procedures, and factors that affect quality and quantity of meat; visual and objective appraisals. One lec and two 3-hr lab a wk; four 1-day and four 1/2-day field trips or equiv time. Cooperative: open to WSU degree-seeking students.

AVS 299 (s) Directed Study (1-6 cr, max 6)
Graded P/F.
Prereq: *Permission of department*

AVS 305 Animal Nutrition (3 cr)
Introduction of the concepts and principles of animal nutrition; fundamentals of nutrients and their digestion and metabolism; various biochemical pathways and processes for nutrient utilization; nutrition fundamentals for a range of monogastric and ruminant animals. Recommended Preparation: Biol 115 and Chem 111. Cooperative: open to WSU degree-seeking students.
Prereq: *AVS 109*

AVS 306 Feeds and Ration Formulation (4 cr)
Application of principles of nutrition to ration formulation for poultry and livestock; evaluating feedstuffs for use in ration formulation. Three lec and one 2-hr lab a wk. Recommended Preparation: AVS 305. Cooperative: open to WSU degree-seeking students.

AVS 330 Genetics of Livestock Improvement (3 cr)
Genetic principles applied to breeding of farm animals. Cooperative: open to WSU degree-seeking students.
Prereq: *AVS 109*

AVS 363 Animal Products for Human Consumption (4 cr)
Same as FS 363. The meat, dairy, and egg industries, including product produced, processed, safety (HACCP), nutrition, distribution, quality, quantity, palatability, health, cooking, home storage, and consumer concerns. Special clothing and equipment required. Three lecture credits and one 3-hour lab per week. Recommended Preparation: Biol 115. Cooperative: open to WSU degree-seeking students.

AVS 371 Anatomy and Physiology (3 cr)
Structure and function of tissues and organ systems of domestic and wild animals.
Prereq: *Biol 115*

AVS 398 (s) Internship (cr arr)
Cooperative programs with producers, allied industry and food processing industries within the state. Graded P/F.
Prereq: *Permission*

AVS 373 Anatomy and Physiology Lab (1 cr)
Students will perform dissections and examine the relationship between the organization of tissues and their distinct function within the animal. Field trips may be incorporated should teaching opportunities arise though most instruction will be confined to the Physiology and Anatomy laboratory and classroom. (Fall only)
Prereq: *AVS 109, Biol 115, and Animal and Veterinary Science major*
Coreq: *AVS 371*

AVS J409/J509 Growth Physiology Inquisition (2 cr, max arr)
This course will develop skills in critical review of literature in Growth Physiology. Students will study set journal articles describing original research and present their review to the study group in a team participation format. Active participation of the study group, led by the primary reviewer is an essential component of the course. Graduate students are encouraged to take the course multiple times (e.g., each semester). Student performance is evaluated using a six criterion Rubric. For undergraduate credit, students are evaluated across 2-3 achievement levels per criterion. For graduate credit, students are evaluated across 4 achievement levels per criterion as shown in the Course Outline. Recommended Preparation: AVS J451/J551.

AVS J411/J511 Ruminant Nutrition (3 cr)
Intro to anatomy of digestive tract of ruminant; focus on ruminal and postruminal carbohydrate, protein, and lipid metabolism; ruminal bacteria, protozoa and fungi, microbe-microbe interactions and their role in nutrients utilization; compartmentation of the rumen and microbial protein synthesis; practical aspects of ruminant nutrition and intro to current feeding systems; research techniques in studying ruminal degradation and digesta kinetics. Additional projects/assignments reqd for grad cr. (Alt/yrs)
Prereq: *Permission*

AVS 450 Issues in Animal Agriculture (1 cr)
The capstone experience for seniors in AVS; students will present information on selected topics and propose solution to current problems; emphasis on problem solving using integration of information across disciplines.
Prereq: *Senior standing*

AVS J451/J551 Endocrine Physiology (3 cr)
Structure and physiology of glands of internal secretion and their hormonal effects on processes of growth, development, metabolism, and production of vertebrates; minor emphasis on invertebrates. Completion of term paper reqd for grad cr. Recommended Preparation: Biol 380. Cooperative: open to WSU degree-seeking students.

AVS 452 Physiology of Reproduction (4 cr)
Physiology of reproduction; growth, structure, development, endocrinology, and control of reproductive function with emphasis on farm animals. Three lec and one 2-hr lab a wk. Cooperative: open to WSU degree-seeking students.

AVS J463/J563 Growth and Lactation (3 cr)
Principles of growth and lactation. Hormonal, nutritional, and metabolic control of bone, muscle, adipose, and mammary tissue development; regulation of lactation. Additional projects/assignments reqd for grad cr.

AVS 466 Equine Science and Management (3 cr)
Study of the industry as well as basic principles of equine science and management, including conformation and selection, anatomy, form to function, nutrition and feeding, behavior, health, reproduction, marketing,

facilities and business management. Two lec, and one 2-hr lab a wk. Cooperative: open to WSU degree-seeking students.
Prereq: *Junior standing and AVS 222, AVS 371 and AVS 305 or Permission*

AVS 468 Companion Animal Biology & Management (3 cr)
Application of the principles of reproduction, nutrition, genetics, health, and economics to the production and management of companion animals – dogs, cats, birds, small mammals, and fish. Three 1-hr lec per week. (Fall only)
Prereq: *Junior standing and AVS 222, AVS 371 and AVS 305 or Permission*

AVS 471 Animal Disease Management (3 cr)
Principles of immunity and disease resistance, transmission, and prevention; clinical signs, pathogenesis, and control of major diseases of economic importance in domestic animals.
Prereq: *Junior standing*

AVS 472 Dairy Cattle Management (3 cr)
Establishing a dairy farm, housing and managing large dairy herds, selection of breeding cattle, and marketing quality milk. One 4-day field trip. Recommended Preparation: AVS 222 or equiv. Cooperative: open to WSU degree-seeking students.

AVS 474 Beef Cattle Science (3 cr)
Breeding, feeding, and management; commercial and purebred enterprises; management of beef cattle on ranges, pasture, and in the feedlot. One 1-day field trip. Recommended Preparation: AVS 222 or equiv. Cooperative: open to WSU degree-seeking students.

AVS 475 Advanced Dairy Management (3 cr)
Application of concepts of dairy cattle management to practical situations. One lec and 1-2 hrs of lab a wk. Recommended Preparation: AVS 472. Cooperative: open to WSU degree-seeking students.

AVS 499 (s) Directed Study (1-6 cr, max arr)

AVS 500 Master's Research and Thesis (cr arr)

AVS 501 (s) Seminar (cr arr)

AVS 502 (s) Directed Study (cr arr)
Graded P/F.
Prereq: *Permission*

AVS 503 (s) Workshop (cr arr)

AVS 504 (s) Special Topics (cr arr)

AVS 509 Growth Physiology Inquisition (2 cr, max arr)
See AVS J409/J509.

AVS 511 Ruminant Nutrition (3 cr)
See AVS J411/J511.

AVS 551 Endocrine Physiology (3 cr)
See AVS J451/J551

AVS 563 Growth and Lactation (3 cr)
See AVS J463/J563.

AVS 567 Advanced Physiology (4 cr)
An advanced review of physiology designed to emphasize the interaction between structure and function of specialized cells, tissues, organs and systems. The systems to be covered will include but are not limited to, the mammalian cell, hematology neurophysiology, muscle physiology, cardiovascular physiology, pulmonary physiology, renal physiology and whole animal metabolism. Recommended preparation: undergraduate physiology, biology, cell biology, and/or biochemistry. (Spring, alt/odd yrs)

AVS 598 (s) Internship (cr arr)

AVS 600 Doctoral Research and Dissertation (cr arr)

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