Courses for Animal Science and Pre-Veterinary Science Majors  
Spring 2023

ANIMLSCI 103 – Introduction to Animal Management 4 credits, lab fee
In depth presentation of animal agriculture and its economic implications. Concepts of nutrition, reproduction, husbandry, and marketing will be presented for beef and dairy cattle, sheep, swine, poultry and horses. Lab emphasizes application of selected management practices for these animal species.
Prereq: ANIMLSCI 101 with a grade of C or better.

ANIMLSCI 251 – Dorset Sheep Management II 2 credits
Students will perform management activities that are required for the care of the UMass flock. Students will learn skills including: hoof trimming, vaccinating, parasite detection, pregnancy detection, lambing and neonatal care; make decisions regarding selection, breeding and culling, and learn to recognize signs of illness and administer treatments. Work with sheep poses health risks, including development of allergic reactions, physical injury, and exposure to zoonotic diseases. To mitigate these risks, compliance with University and Farm Biosecurity Protocols is required as well as appropriate attire including coveralls, disinfected boots and gloves.

ANIMLSCI 252 - Belted Galloway Management II 2 credits
Students will learn about the beef cattle production cycle and participate actively in all aspects of herd management, including handling, vaccinating, deworming, breeding, calving, halter breaking, weaning, feeding, fitting, showing, marketing, and maintaining the health and welfare of the herd. Students will also have the opportunity to visit local beef farms and attend livestock shows. This course provides exposure to the beef cattle production cycle and hands-on experience in all aspects of herd management. An emphasis is placed on understanding normal cattle behavior and practicing "sound stockmanship." Work with cattle poses health risks, including development of allergic reactions, physical injury, and exposure to zoonotic diseases. To mitigate these risks, compliance with University and Farm Biosecurity Protocols is required as well as appropriate attire including gloves, coveralls, and washable rubber boots or steel-toe boots.

ANIMLSCI 253 - Boer Goat Management II 2 credits
Boer Goat Management is an experiential learning opportunity. Students enrolled in this course develop practical skills pertaining to the daily management and welfare of the student-run UMass Boer Goat herd, including handling, feeding, vaccinating, breeding and assisting the herd veterinarian. In the Spring semester (ANILSCI253), students will have the opportunity to assist with the delivery of goat kids and will be responsible for charting their weekly growth for the remainder of the semester. Work with goats poses health risks, including development of allergic reactions, physical injury, and exposure to zoonotic diseases. To mitigate these risks, compliance with University and Farm Biosecurity Protocols is required as well as appropriate attire including coveralls, disinfected boots and gloves.

ANIMLSCI 254 - Poultry Management II 2 credits
Students will perform management activities that are required for the care of a group of poultry. Day old chicks will arrive soon after the semester begins and students will be responsible for all daily care including: feeding, cleaning, weekly weights, moving the coops on pasture, bird identification, record keeping, marketing and distributing the processed birds.
Work with poultry poses health risks, including development of allergic reactions, physical injury, and exposure to zoonotic diseases. To mitigate these risks, compliance with University and Farm Biosecurity Protocols is required as well as appropriate attire including coveralls, disinfected boots and gloves.

ANIMLSCI 256 - Equine Management II 2 credits
This course provides practical hands-on experience managing the university reproduction horse herd. Scientifically-based principles of equine management will be covered, including safe horse handling and restraint, nutrition application, stable management, pasture utilization, vaccination and deworming protocols. Additional
experience managing the university horse herd, including an introduction to all life stages of horses from foals to breeding stallions. Scientifically-based principles of equine management will be covered, including safety of horse and handler, advanced nutrition and health management of equine life stages, equine business applications, and preventive medicine. Work with horses poses health risks, including development of allergic reactions, physical injury, and exposure to zoonotic diseases. To mitigate these risks, all students must be trained in university safe horse handling protocols, comply with University and Farm Biosecurity practices, and wear appropriate attire including disinfected boots and gloves. Prereq – ANIMLSCI 236.

ANIMLSCI 285 – Cellular & Molecular Biology (Spring)(Summer) 3 credits This course is evenly divided between molecular and cellular aspects of biology and is designed to prepare sophomores for upper level science courses such as genetics, biochemistry, immunology, and the physiology of reproduction. Topics covered include: DNA packaging and X-inactivation, enzymes and DNA replication, polymerase chain reaction and forensics, protein structure, cellular structure and signaling, extracellular matrix, and cell division and death. Problem sets will be based on analysis of primary journal articles. Prereq: BIOLOGY 151 or BIOLOGY 161H with a grade of C or better AND CHEM 111 or CHEM 121H or with a grade of C- or better.

ANIMLSCI 291C – Biotechnology Research Experience I 1 credit This is a 1 credit discovery-based research tutorial experience emphasizing cellular and molecular approaches. Students will be responsible for submitting an abstract to their faculty sponsor detailing their work on Science Day at the end of the spring semester. Students should meet with their potential faculty sponsor to discuss whether there are open positions, projects available, and how many hours of work in the lab or facility and outside are expected. Faculty sponsor must email contract to mjschnei@umass.edu for enrollment.

ANIMLSCI 291M – Biotechnology Research Experience I 1 credit This is a 1 credit discovery-based research tutorial experience emphasizing animal models. Students will be responsible for submitting an abstract to their faculty sponsor detailing their work on Science Day at the end of the spring semester. Students should meet with their potential faculty sponsor to discuss whether there are open positions, projects available, and how many hours of work in the lab or facility and outside are expected. Faculty sponsor must email contract to mjschnei@umass.edu for enrollment.

ANIML SCI 296T - Introduction to Teaching Animal Science 1-2 credits Students gain experience in teaching all aspects of Animal Science courses. Students must have successfully completed the course and related pre-requisites for the course they plan to TA in. Students must submit an application and will be expected to demonstrate specific competencies related to labs and assisting students; and lead review sessions. For Moodle access, students must complete FERPA certification on SPIRE in Student Home > TA FERPA Agreement prior to requesting enrollment from instructor. Instructors send list of TA's to Undergraduate Program Office to add course to student's schedule. Repeatable once for credit.

ANIMLSICI 297B ST – Artificial Insemination Certification (Spring break) 1 credit This course is conducted during spring break of each year to introduce students to the concepts and procedures involved in the artificial insemination of dairy and beef cattle. The instructor will accompany students to Pennsylvania where they will receive instruction from a professional in the artificial insemination industry. Student participants earn a certificate of completion. Capacity is limited, there is an additional fee. Instructor Consent required.

ANIMLSICI 297D ST Dairy Calf Management II 2 credits This is a two credit experiential learning class that involves the daily care, feeding, and management of pre- and post-weaned dairy calves. Students are expected to attend weekly management meetings and to complete a two week feeding block. This course requires close quarter work with dairy calves. Under the best of circumstances (use of appropriate personal protective equipment) there is a small but significant risk of contracting zoonotic
diseases. To mitigate this risk student purchase and use of coveralls and water proof boots is required. Additional PPE (personal protective equipment) will be provided. Students must be committed and understand the responsibilities of this course. Students must have access to transportation and must also complete UMass EH&S training within 2 weeks of class start date.

**ANIMLSCI 297L ST – Bay State Livestock Classic 1 credit** The grooming and showing of cattle, sheep, goats and horses are taught through hands-on experience and presentation of the animals in a show organized by the students each spring. The show is open to the public and is held at the Hadley Farm. No previous experience needed. Class meets one evening every other week. Students arrange mutually convenient times to meet with coaches to learn grooming and showing techniques. Additional requirements may apply.

**ANIMLSCI 297P ST – Bay State Livestock Classic Coaching & Management 2 credits** Department Consent required. This course may not be repeated for credit.

**ANIMLSCI 298 - Practicum All faculty, by arrangement. 1-3 credits/semester** Join Handshake - https://umass.joinhandshake.com/, complete contract with faculty advisor.

**ANIMLSCI 302 – Development and Training of the Horse 3 credits** This course will build on information learned in Equine Behavior and Learning Theory. Students will develop evidence-based methodologies for training the horse in-hand and under saddle. Focus on the cognitive and physical development of the horse through all life stages from foal to adult. Prereq: ANIMLSCI 301

**ANIMLSCI 320 - Animal Business Management 3 credits** Students will develop an understanding of and proficiency in applying the various economic principles and business management analysis concepts which aid an owner/operator in the decisions involved in the organization and operation of an animal-related firm for continuous profit and production efficiency. Prereq: ANIMLSCI 103 or instructor permission. Open to ANSCI/PREVET junior or senior majors only.

**ANIMLSCI 332 - Basic Animal Nutrition and Feeding 4 credits, lab fee** This course provides a detailed study of macro and micronutrients, their digestion, absorption, and metabolism by various domesticated animal species for maintenance and production. Introduction to feeding programs. Prereq: ANIMLSCI 220 or by permission of the instructor.

**ANIMLSCI 366 - Veterinary Microbiology Lab 2 credits, lab fee** A team-oriented microbiology laboratory course for skill development and discovery, focusing on the importance of microbes in animal health and disease; laboratory exercises designed to encourage students to develop and test hypotheses and to think critically about their observations. Prereqs: BIOLOGY 152 with a C or better and BIOLOGY 153 with a C or better. Note: Must have completed MICROBIO 310 (or the equivalent) or be concurrent enrollment. Open to ANSCI/PREVET/VETTECH majors only.

**ANIMLSCI 382 – Small Animal Nursing 3 credits** An overview of small animal nursing skills and technical procedures commonly performed by veterinary technicians and veterinary assistants in a private practice setting with a focus on the canine and feline patient. Topics include an introduction to the types of veterinary practices, veterinary medical records, patient medical history and physical exam, restraint and handling, preventative health programs, sampling and diagnostics techniques, medical and surgical nursing, veterinary dentistry, and emergency and critical care. Prereq: ANIMLSCI 220 with a grade of C or better.
ANIMLSCI 385 – Biotechnology Laboratory 3 credits, lab fee

Students will receive practical experience in basic and advanced cell and molecular biology techniques used in biotechnology and research laboratories. The course first focuses on cell culture techniques, including seeding, maintenance, and cryopreservation. Subsequently, the differences between molecular analysis of transcription and translation will be addressed (RNA/cDNA, protein). For these analyses, cell cultures in their native form will be compared with bleomycin induced DNA damaged cell cultures. Overall, this course establishes a general understanding of cell growth physiology. In the later part, in situ detection of Ki-67 while preserving cytoarchitecture as well as FACS analysis complete the picture of cell growth.

Prerequisites: ANIMLSCI 285 or BIOLOGY 285 or BIOCHEM 285

ANIMLSCI 391C – Biotechnology Research Experience II – Cellular & Molecular 2 credits

This is a 2 credit discovery-based research tutorial experience emphasizing cellular and molecular approaches. See page 22 for departmental requirements for presenting your results. Students should meet with their potential faculty sponsor to discuss whether there are open positions, projects available, and how many hours of work in the lab or facility and outside are expected. Faculty sponsor must email contract to mjschnei@umass.edu for enrollment.

ANIMLSCI 391M – Biotechnology Research Experience II – Animal Models 2 credits

This is a 2 credit discovery-based research tutorial experience emphasizing animal models. See page 22 for departmental requirements for presenting your results. Students should meet with their potential faculty sponsor to discuss whether there are open positions, projects available, and how many hours of work in the lab or facility and outside are expected. Faculty sponsor must email contract to mjschnei@umass.edu for enrollment.

ANIMLSCI 392A – Careers in Animal Science 1 credit

The seminar series will feature presentations by agricultural and animal science professionals in the fields of Animal Health, Animal Nutrition, Genetics, Biotechnology and others. Topics will include resume preparation, interview skills, internship opportunities and web-based employment search guides.

ANIMLSCI 396T - Intermediate Teaching in Animal Science 1-2 credits

Students gain experience in teaching all aspects of Animal Science courses. Students must have successfully completed the course and related pre-requisites for the course they plan to TA in. Students must submit an application and will be expected to demonstrate specific competencies related to labs and assisting students; and lead review sessions. For Moodle access, students must complete FERPA certification on SPIRE in Student Home > TA FERPA Agreement prior to requesting enrollment from instructor. Instructors send list of TA's to Undergraduate Program Office to add course to student's schedule. Prereq: 4 credits of ANIMLSCI 296T. Repeatable once for credit.

ANIMLSCI 397G – Special Topics – Therapeutic Riding and Instruction 3 credits

Students will learn about equine-assisted services, including equine-assisted therapy, equine-assisted learning, horsemanship, and interactive vaulting. This course will focus on the approaches and benefits of these services to individuals with intellectual, physical, sensory, and/or psychosocial disabilities across the lifespan. This course consists of both classroom based learning as well as field experience at the UMass Hadley Farm. No horse experience is required, but students should be comfortable interacting with horses.

ANIMLSCI 397N – Special Topics – Exotic Animal Medicine 3 credits

This course is designed to focus on the most common exotic animals kept as pets. Anatomical and physiological differences
between exotic animal pets and other domestic animals will be discussed. Principles of husbandry, handling and clinical techniques will be covered. Review of common diseases and the types of treatment of those common diseases will be covered. Laws governing the ownership of exotic animal pets will be discussed.

**ANIMLSCI 397T – Special Topics - Sea Turtle Preservation in Costa Rica  3 credits – Additional fees required.** This is a travel course to Costa Rica and is organized in collaboration with Animal Experience International (AEI) Canada. Students will help sea turtles in the waters off the Osa Peninsula in Costa Rica. Students will assist with in-water research that is conducted by the research team to assess the threats that sea turtles are exposed to in the area. Turtles will be carefully captured and tagged, weight and body measurements will be recorded, and samples will be collected before the turtles are released once again into the ocean. In the service-learning aspect of the course, students will participate in activities to help restore lost habitat through mangrove restoration. In addition, students will assist in a local spay/neuter clinic. This course will also immerse students in a different culture, exposing them to species of animals they have not worked with before and providing them with an opportunity to become engaged global citizens.

Students interested in taking this course should apply through the UMass Amherst International Programs Office in October prior to registration for the course for the subsequent Spring semester. Payment by each student of course-related costs is required. This payment covers the bulk of the student's travel and activity expenses and is paid directly to the IPO after acceptance to the course. Additional expense while traveling is limited to payment for some meals and any personal expenditures elected by the students.

A valid passport is required to travel to Costa Rica. Students participating in the course are required to be vaccinated against Rabies and Covid-19. Students are encouraged to visit their doctor before departure for a health checkup, to update immunizations and discuss their preparedness for the activities in Costa Rica. Students are advised to read the information at the Department of State website [https://travel.state.gov/content/passports/en/country/costa-rica.html](https://travel.state.gov/content/passports/en/country/costa-rica.html) and the Center for Disease Control and Prevention [http://wwwnc.cdc.gov/travel/destinations/traveler/none/costa-rica](http://wwwnc.cdc.gov/travel/destinations/traveler/none/costa-rica) for other vaccinations and preventative measures that are recommended. Prerequisites: BIOLOGY 151, 152, and 153 with a grade of C or better

**ANIMLSCI 398 - Practicum  1-3 credits/semester.** Join Handshake - [https://umass.joinhandshake.com/](https://umass.joinhandshake.com/), complete contract with faculty advisor. Can be repeated for credit up to 15 credits total for career.

**ANIMLSCI 398D – Service Dog Training  3 credits** Application to enroll/foster/train a service dog must be made prior to the beginning of the semester to Sarah Meikle, Director, Diggity Dogs Service Dogs (Email: sarah@indogswetrust.org; Website: https://indogswetrust.org/foster/). Students and their roommates attend an orientation session and must be approved by the director prior to their enrollment in the class by the VASCI department. A two semester commitment for enrollment in the class is requested. Alternatively, students can apply to be relief fosters or do internships. Weekly training logs and classes, monthly progress reports, weekly two-hour classroom training and monthly individual classroom assessments at the training facility in Greenfield, MA, are required. Students must provide their own transportation to the training center in Greenfield. Dogs live with the student fosters, and students provide food. Other expenses such as veterinary care, are covered by Diggity Dogs Service Dogs.

Course instructor, Dr. Telfer will coordinate enrollment of approved fosterers in the class with the director of Diggity Dogs Service Dogs, Sarah Meikle. This class is designed to provide students with an understanding of canine communication, health, handling and development and hands-on experience in training psychiatric, medical assist/alert, and mobility assistance service dogs. Diggity Dogs contacts with a breeder who provides dogs to be trained; when you enroll you will be assigned a dog. This course
requires a serious commitment of time and effort that involves fostering and training a dog. Fostering entails that the dog lives with you, you are responsible for feeding, training and care, and that the dog accompanies you to most, but not necessarily all, of the places you go. Diggity Dogs will work with you to provide respite care as necessary (i.e. exam periods). Because these dogs are service dogs in training, they can legally live in the dorms and go places that other dogs are banned from going.

**ANIMLSCI 402 - Equine Rehabilitation 3 credits, lab fee**  The purpose of this course is to provide students with a fundamental understanding of the biomechanics of the horse from a rehabilitator’s perspective. Students will be introduced to the core concepts of physiotherapy including integrated therapies and modalities currently used in equine physical therapy and rehabilitation. Students will actively engage with real equine patients at the UMass Rehabilitation Clinic at the UMass Hadley Farm. Students will be prepared to enter into any rehabilitation program to become a certified equine rehab specialist. Prereq: ANIMLSCI 401

**ANIMLSCI 421 - Wildlife Reproduction (Spring) 3 credits**  This course explores comparative reproductive biology in terrestrial and marine wildlife and domesticated animals. It will encompass lectures, open discussion, and problem-based learning built on cases and experiences acquired in the field, literature, lecture topics and discussions. Topics will include: i) Functional Anatomy ii) Embryology iii) Reproductive Endocrinology and Life cycles iv) Reproductive Technologies v) Chemical and Physical Restraint of Animals vi) Problems and Policy Associated with Endangered Species vii) Management of Wildlife in National Parks, Game Ranches and Zoos viii) Contraception ix) Conservation techniques to solve problems of environmental change and international development; human-wildlife conflict x) Careers and Training/Job opportunities. Prereq: ANIMLSCI 220 or equivalent or instructor consent.

**ANIMLSCI 445A - Equine Reproduction Lab 1 credit**  Equine Reproduction will provide understanding and hands-on opportunity in equine reproduction. Specifically, semen collection, evaluation and processing practice; discussion in mare breeding management and use of hormones; preparation of the mare for breeding; modulation of the estrous cycle; contraception; introduction to embryo transfer. Additionally, the mares in the breeding program at the UMass will be worked-on during laboratories and students will be able to participate in teasing and decision-making on breeding management and assisting in foaling. Client based cases may also be introduced during lab sessions. Prereq: ANIMLSCI 220

**ANIMLSCI 454 – Dairy Herd Management 4 credits**  with lab. Managerial problems and practices associated with successful dairying in the Northeast and the U.S. Includes dairy cattle nutrition, selection, breeding, lactation, and waste management. Students expected to participate in lectures. Prereq: ANIMLSCI 332

**ANIMLSCI 456 - Research Animal Management II 3 credits**  This course offers hands-on experience, a further look at in-depth rodent strains and characteristics, breeding schemes, environmental enrichments and identification methods. Humane care, handling, management and routine techniques and practices for each species used in research labs including: mice, rats, Syrian hamsters, rabbits, Xenopus frogs, African bullfrogs and Leopard frogs. Prereq: ANIMLSCI 455. Open to Junior/Senior ANSCI/PREVET majors only.

**ANIMLSCI 475 – Veterinary Pathology 3 credits**  This course relates the normal physiology of the animal to the consequences of abnormal physiology and discusses what effects this will have on organs and tissues in the body. Topics that will be explored include mechanisms of tissue destruction and repair,
abnormal growth processes and neoplasia, circulatory disturbances, principles of epidemiology and public health and the immunology of inflammation, autoimmunity and infectious disease. Prereq: A grade of C or better in ANIMLSCI 220 and either ANIMLSCI 285 or BIOCHEM 285 or BIOLOGY 285.

ANIMLSCI 487 (formerly 390E) - Fundamental Vertebrate Embryology 3 credits, lab fee This course is designed to teach the basic principles of embryology including, germ layer establishment, body axis determination, induction, determination, competence and differentiation. The course will have a lecture component that will describe how an embryo is shaped from a single cell and a laboratory component that will allow students to observe developmental stages and perform classical experiments that are used to demonstrate the basic principles described. Open to senior ANIMLSCI majors concentrating in Biotechnology or by instructor permission. Prerequisites: Biology 151 & 152 AND ANIMLSCI 285 or BIOCHEM 285 or BIOLOGY 285, all with a grade of C or better.

ANIMLSCI 491C – Biotechnology Research Experience III – Cellular & Molecular 3 credits This is a 3 credit discovery-based research tutorial experience emphasizing cellular and molecular approaches. See page 22 for departmental requirements for presenting your results. Students should meet with their potential faculty sponsor to discuss whether there are open positions, projects available, and how many hours of work in the lab or facility and outside are expected. Faculty sponsor must email contract to mjschnei@umass.edu for enrollment.

ANIMLSCI 491M – Biotechnology Research Experience III – Animal Models 3 credits This is a 3 credit discovery-based research tutorial experience emphasizing animal models. See page 22 for departmental requirements for presenting your results. Students should meet with their potential faculty sponsor to discuss whether there are open positions, projects available, and how many hours of work in the lab or facility and outside are expected. Faculty sponsor must email contract to mjschnei@umass.edu for enrollment.

ANIMLSCI 494 G1 – Integrative Experience - Good Intentions 3 credits Focuses on understanding and solving problems that have arisen, at least in part, from human-animal interactions. While these interactions frequently originate with the best of intentions, the consequences are often unexpected and not very good. Through reading primary peer-reviewed literature as well as web postings, students will acquire the specific knowledge, which, combined with information from their previous courses in their major and general education classes, will form the basis for group and class discussions.

ANIMLSCI 494 T1 – Integrative Experience Integrating Learning and Research 1 credit This highly interactive seminar class is designed to enhance your Departmental Honors Thesis Experience by examining your general education acquired skills to more successfully participate in your thesis and to think more deeply about the impact general education courses have had on how you approach aspects of your individual capstone. Real-world skills and issues will be implemented and discussed including: organizing a departmental "how to get involved with research" night, debating the ethics of embryonic stem cell research and learning how to deliver effective research presentations. Prereq: 499Y

ANIMLSCI 496T - Advanced Teaching in Animal Science 1-2 credits Students gain experience in teaching all aspects of Animal Science courses. Students must have successfully completed the course and related pre-requisites for the course they plan to TA in. Students must submit an application and will be expected to demonstrate specific competencies related to labs and assisting students; and lead review sessions. For Moodle access, students must complete FERPA certification on SPIRE in Student Home > TA FERPA Agreement prior to requesting enrollment from instructor. Instructors send list of TA's to
Undergraduate Program Office to add course to student's schedule. Pre-req: 4 credits of ANIMLSCI 396T. Repeatable once for credit.

**ANIMLSCI 497L ST - Winter Traveling Dairy Management  1 credit**  There are additional fees; see instructor for scholarship application. This course is conducted collaboratively with other New England Land Grant institutions. Students and faculty collectively tour dairies and dairy related facilities during the first week in January. UMass students meet with the faculty advisor for a series of weekly discussion sessions to talk about each of the destinations.

**ANIMLSCI 497N – Small Animal Emergency and Critical Care  3 credits.** This lecture course emphasizes the theoretical and practical aspects of emergency and critical care in the management of medical and traumatic emergencies by the veterinary technician. Recognition, assessment, and treatment of common small animal emergencies such as cardiovascular shock, respiratory crisis, gastrointestinal emergency, and musculoskeletal trauma. Prerequisite: ANIMLSCI 415 Open to Vet Tech students and AnSci and PreVet students with permission of instructor. This course includes a one day Saturday lab on the Mount Ida Campus to allow students to complete in-person training for RECOVER CPR certification.

**ANIMLSCI 498 - Practicum 1-3 credits/semester**  Join Handshake - https://umass.joinhandshake.com/ complete contract with faculty advisor.

**ANIMLSCI 498S - Equine Enterprise II  3 credits**  Continuation of Equine Enterprise I. Capstone experience will focus on improvements and efficiency of the equine boarding operation at the UMass Hadley Farm, weekly evaluation of strengths and weaknesses, client feedback, and marketing of the business. Required weekly meetings and student committee assignments. Lab time includes weekly shifts at the facility. End of semester student presentations of a comprehensive annual report. Prereq. ANIMLSCI 398S

**ANIMLSCI 521 - Physiology of Reproduction  4 credits** with lab, lab fee  Comparative aspects of anatomy, embryology, endocrinology, and physiology of reproduction and lactation. Participation required. Prereq: ANIMLSCI 220 or equivalent.

**ANIMLSCI H521 - Physiology of Reproduction with Honors Colloquium  1 credit** Comparative aspects of anatomy, embryology, endocrinology, and physiology of reproduction and lactation. The course covers the most recent cellular and molecular findings related to mammalian fertilization in depth as well as the technical and ethical issues associated with the application of newly developed assisted reproductive technologies such as intracytoplasmic sperm injection (ICSI) and cloning of animal stem cells. The application of these technologies is discussed whether it applies to animals of agricultural importance, wildlife, or humans. In addition, students are required to select a subject from one of the discussed topics in the class. This subject of choice must be then thoroughly researched followed by a 15 minute presentation towards the end of the course. Students will be graded based on class participation as well as the content and style of the presentation of the selected topic. Prereq: ANIMLSCI 220 or equivalent AND previous or concurrent enrollment in ANIMLSCI 521.

**ANIMLSCI 572 – Molecular Immunology  3 credits**  Introduction to immunology and how mammals utilize innate and adaptive mechanisms to control pathogenic organisms including bacteria, viruses, protozoa and helminths. Prereq: ANIMLSCI 285 or BIOCHEM 285 or BIOLOGY 285. Open to Juniors and Seniors only, or by consent of instructor.

**ANIMLSCI 596 - Independent Study All faculty, by arrangement**  Under the direct supervision of a UMass faculty sponsor, examples of appropriate independent study
outputs include: papers, posters, oral reports or a portfolio of work. A 1 credit independent study course averages 3 hours of work per week over 15 weeks of the fall or spring semester, or 45 hours total per semester. Credits may vary from 1 to 6, or 3 (1 credit) to 18 (6 credits) hours of work per week. See page 23 for additional information. Submit completed contract to mschneider@vasci.umass.edu or 427Z ISB to have course added to your schedule.