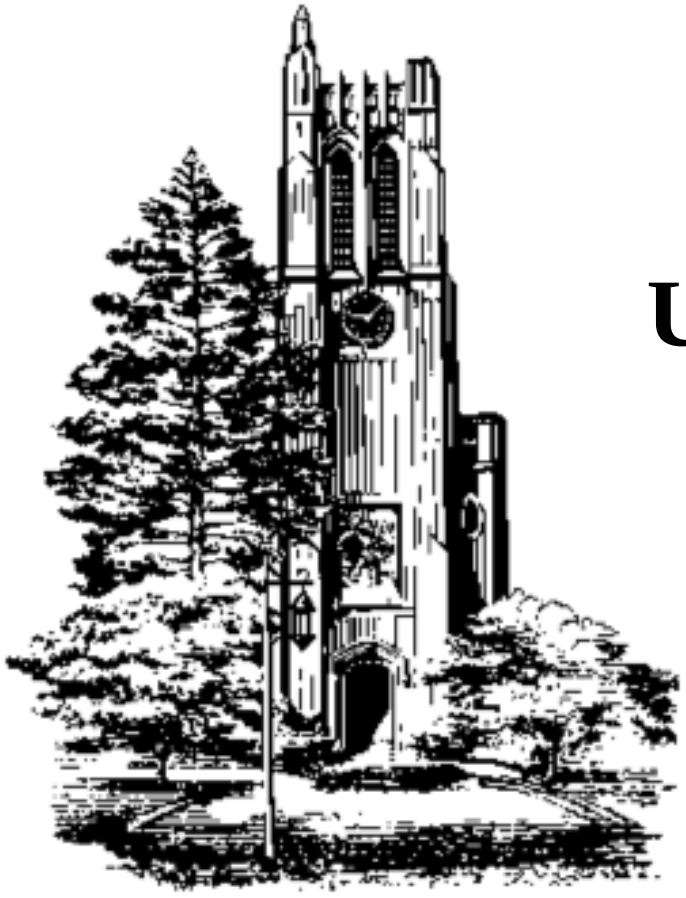
MICHIGAN STATE UNIVERSITY

Department of Animal Science



Undergraduate Handbook

2009-2010

INDEX

WELCOME

Welcome to the Animal Science Department at Michigan State University. We are looking forward to working with you over the next 4 years to help you build an exciting program that gives you plenty of opportunities and a chance to achieve your dreams. Our department has internationally renowned faculty who devote their careers to teaching, research, extension and public outreach related to animals. We have wonderful advisors which will help you make decisions that are tailored to your needs and interests. There are four concentrations in Animal Science that you can choose from. For example, you have the opportunity to tailor your program by choosing the animal industries, animal biology/pre-vet, companion and exotic animal biology or production animal scholars concentration for your B.S. in Animal Science. For those of you enrolled in Agricultural Technology, options include beef, dairy, horse or swine management.

In our B.S. program, you will receive a strong science background along with lots of opportunities to work with animals. In our Agricultural Technology program, you will focus primarily on developing strong management skills. This will enable you to go in to the work force, to graduate school or veterinary school with a strong background as well as practical experience. You will gain these experiences through learning in the classroom, working on our campus beef cattle, dairy cattle, horse, mink, poultry, and sheep farms as well as enjoying extra-curricular activities such as the Block and Bridle Club, the Animal Welfare team, the livestock judging teams or you can join any of the hundreds of clubs available to MSU students. You can also participate in international experiences, internships or work in a research lab to further your career goals. We have researchers working in reproductive and developmental biology, animal health and welfare, nutrient management, genomics, bioinformatics, and bone and joint health in beef cattle, swine, poultry and dairy animals. We are excited that you chose the Department of Animal Science at MSU as your "home" for the next 4 years. Please take advantage of opportunities to learn both inside and outside the classroom and we will do our best to make your experience at MSU memorable and the best ever!

Feel free to contact me if you need anything or have any questions:

Dr. Karen Plaut, Chairperson, Department of Animal Science
1290 Anthony Hall, kplaut@msu.edu

WHAT IS ANIMAL SCIENCE

Throughout history, domestic livestock (cattle, sheep, goats, swine, poultry, and horses) have provided humans with a major source of food, fiber, pleasure, and companionship. Over the last century, advances in animal feeding, breeding, reproduction, and management techniques occurred simultaneously with improvement in other agricultural practices.

The rate of technological innovations in animal agriculture has accelerated in the last 20 years. Computers are revolutionizing animal production, research, and marketing capabilities. Alternate feed sources have been identified; estrus synchronizing agents have been discovered; embryo transfer techniques have been developed, and new growth promoting compounds are being tested. Molecular geneticists are beginning to unravel the complexities of mammalian genes and the field of biotechnology has been born. Immunology and studies of animal behavior offer new insight into ways of enhancing animal welfare.

Animal Science is an exciting field that has application to all animals and provides opportunities from production through agribusiness and processing as well as in research and as a solid basis for

application to veterinary or other professional schools. We hope that the program in Animal Science at Michigan State University will fulfill your needs and expectations.

MSU Home page: http://www.msu.edu
Animal Science home page: http://www.ans.msu.edu/

THE ANIMAL SCIENCE UNDERGRADUATE PROGRAM

The undergraduate program in animal science, which leads to the Bachelor of Science degree, is designed to prepare students for a variety of career opportunities. Scientific principles of biology and animal agriculture developed from various animal models are an important component of the animal sciences program. Another important component is the application of animal management procedures in agricultural operations.

The animal science major provides students much flexibility in meeting their program requirements. Students can benefit most from this flexibility with careful guidance from their academic advisors and career mentors as they plan programs of study consistent with their interests and goals. To gain the most from one's advisor, we encourage each student to see their advisor or mentor once per semester to discuss course selection, career objectives, and any other items of concern to them as a student.

All students in animal science must complete required core courses involving the disciplines of breeding and genetics, nutrition, physiology, and management. These principles are taught utilizing beef and dairy cattle, horses, poultry, sheep, and swine. Students must also complete one of the four concentrations in Animal Science.

ANIMAL SCIENCE ON THE WORLD WIDE WEB

Animal Science has a home page on the world wide web. It can be accessed from any computer lab or from your own computer with a modem. The access through MSU home page is at: http://www.msu.edu. There are other resources on the MSU home page, www.msu.edu, click on Info for Students, this will take you to Academic Programs, Descriptions of Courses, and Schedule of Courses. All of the information will be helpful in planning your academic program.

SPECIAL SERVICE REQUESTS

Persons with disabilities may request accommodations for Animal Science classes by calling John Shelle (355-8391) or Kim Dobson (353-9227) **at least 10 days** before the start of each semester to ensure sufficient time to make arrangements. Requests received after this date will be met when possible.

CAREER OPPORTUNITIES IN ANIMAL SCIENCE AND RELATED INDUSTRIES

The United States Department of Agriculture reported that more than 48,000 jobs will be created annually for college graduates with expertise in agriculture and related industries. The livestock industry and related fields are a major component of the United States economy and career opportunities are excellent for students trained in animal science.

ANIMAL PRODUCTION/MANAGEMENT

Livestock producers are concerned with production of cattle, sheep, goats, horses, swine, and poultry. These individuals and the people they employ are the cornerstone of the animal industry. They must be superb business people and be knowledgeable in animal products, nutrition, genetics, behavior, and physiology. In addition, they must know how to manage livestock , have marketing expertise and understand the relationships between the environment, communities and agriculture.

FOOD PROCESSING

The food processing industry is a major employer of animal science graduates. This segment of the industry not only is concerned with marketing meat, milk, and eggs in the usual sense, it is also involved in fabrication of new products, production of specialty food items, and development of products that will appeal to a health-conscious public. This progressive component of animal agriculture hires animal science graduates as livestock buyers, quality control specialists, plant managers, and sales personnel.

ANIMAL FEED/HEALTH INDUSTRY

Pharmaceutical organizations, livestock product companies, and feed companies are constantly seeking bright, energetic young people to enter research groups, sales forces, and consulting agencies dealing with both commercial livestock production and companion animals. Animal science students may also become veterinarians and be involved in primary health care.

COMMUNICATION AND SERVICE ORGANIZATIONS

Breed associations, livestock commodity groups, artificial insemination services, and government agencies employ animal science students as representatives of their organizations. Likewise, livestock publications, newspapers, television stations, advertising agencies, and public relations firms need talented people who can communicate about agriculture. Other service organizations such as banks, insurance companies, real estate agencies, and power companies also employ agricultural representatives.

RESEARCH

Research designed to improve efficiency and quality of domestic animals and to solve livestock-related problems is conducted by a number of agencies including the U.S. Department of Agriculture (USDA), universities, and private companies. Individuals with bachelors and masters can work in laboratory research or continue on for their doctoral degree so that they can run a research program.

With recent advances in computer science and biotechnology, persons trained in these areas will become even more competitive.

EDUCATION AND EXTENSION

A student majoring in animal science may qualify to teach vocational agriculture in high school under a program of study cooperatively developed by the Department of Community, Agriculture, Recreation and Resource Studies. Animal science majors may also find employment with the Cooperative Extension Service working as a county agent. People with advanced degrees in animal science are needed to teach in colleges and universities. All of these teaching fields will require animal science graduates to meet the needs of the future.

Animal agriculture is a huge component in the American economy. It not only involves livestock production, but also encompasses marketing, public affairs, transportation, processing, research, companion animal management, and a myriad of allied specialties. Animal science is a challenging field with many employment opportunities.

ACADEMIC ADVISING AND REGISTRATION

Each student is responsible for knowing the university, college, and department requirements as stated in the MSU Academic Programs. Students must complete the graduation requirements which were in effect at the time the student entered the ANS major unless he/she elects to complete a curriculum adopted by the ANS department at a later time.

Each freshman or transfer student will be assigned an academic adviser in ANS after a preliminary interview with Dr. John Shelle, the ANS Undergraduate Coordinator in Room 1250 Anthony Hall. In addition to an academic advisor, students are encouraged to select another ANS faculty member as a career mentor. This person can provide guidance on career paths and internships.

All ANS students are encouraged to see their advisor at least once per semester to review their academic progress toward graduation and professional goals. Your advisor must also certify your completion of all requirements for graduation.

It is critical to keep your advisor and mentor informed about your actions and plans. Let him/her know if you are available for specialized independent educational and work experiences. Frequent short meetings are better than one long meeting. Remember, one of the most important people in your MSU undergraduate program of study is your advisor. Effective communication with your instructors and advisor will significantly influence your program of study, progress, and career after graduation.

GRADUATION REQUIREMENTS FOR A BACHELOR'S DEGREE*

To be recommended for a bachelor's degree, a student must complete all of the following:

- Complete one year's work, normally the year of graduation, earning at least 30 credits in courses given by Michigan State University. A senior who has earned sufficient credits from this university and met the minimum requirements as stated below, through prior arrangement with the assistant dean of the college and the registrar, may be permitted to transfer not to exceed 10 of the last 30 credits from an accredited 4-year college or university.

- Earn at least 27 credits on the East Lansing campus after reaching junior standing.

- Complete at least 20 credits at Michigan State University while enrolled in the major in the college in which the degree is to be earned.

- Remove any deficiencies identified by MSU placement test scores, as described in the Academic Placement Tests and Remedial-Development-Preparatory courses sections of the MSU Academic Programs Announcement.

- Complete the University requirement of 30 credits in courses approved for integrative studies or in approved substitutes, as described in the Integrative Studies section of the MSU Academic Programs Announcement.

- Complete satisfactorily an approved program of study in a college.

- Complete a minimum of 120 credits (123 credits if Math 1825 is taken) with at least a 2.00 grade point average.

- MSU Academic Programs Book

SEQUENCE FOR REGISTRATION

1. Review program progress; prepare tentative schedule; review questions and options.
2. Schedule advisor appointment. If you do not know your advisor, check with Kim Dobson in room 1250 Anthony. She has a master list.
3. Prepare tentative schedule with several alternatives to discuss with your advisor during scheduled appointment.
4. Meet with your advisor.
5. Enroll via computer enrollment.
6. When computer enrollment is complete, you are registered.
7. The Registrar's Office will mail you a completed schedule and fee statement.

COURSES AT OTHER INSTITUTIONS

To determine if courses taken or to be taken at other institutions transfer as course credits to MSU.

Step 1. On the internet go to: http://transfer.msu.edu/Institution.asp

Step 2. Select the college or university.

Step 3. Select an appropriate course category.

Step 4. Determine if the course has an equivalent course at MSU.

MSU students enrolling in a course at another institution should complete a guest status form to ensure that the credits will transfer to MSU. These forms are available in the CANR Academic and Student Affairs office in 121 Agriculture Hall.

ANIMAL SCIENCE UNDERGRADUATE PROGRAM
E-MAIL ADDRESSES & TELEPHONE NUMBERS

UNDERGRADUATE STUDENT OFFICE (1250 Anthony Hall)			
John Shelle	Undergraduate Program Coordinator	shelle@msu.edu	355-8391
Kim Dobson	Secretary	dobsonk@msu.edu	353-9227
Dennis Banks	Internship Coordinator	banks@msu.edu	355-4704
ADVISORS FOR BACCALAUREATE PROGRAM			
Richard Balander	Poultry, Pre Vet 1250 Anthony	balander@msu.edu	432-1395
Dennis Banks	Livestock 1250 Anthony	banks@msu.edu	355-4704
Roy Fogwell	Prod Anml Sch 1250 Anthony	fogwell@msu.edu	432-1385
Gretchen Hill	Swine 2290 Anthony	hillgre@msu.edu	355-9676
Elizabeth Karcher	Dairy 1287 Anthony	ekarcher@msu.edu	353-8518
Brian Nielsen	Horse 1287 Anthony	bdn@msu.edu	432-1378
Michael Orth	Poultry 2209 Anthony	orthm@msu.edu	432-1816
John Shelle	Horse 1250 Anthony	shelle@msu.edu	355-8391
Karen Waite	Horse 1287 Anthony	kwaite@msu.edu	353-1748
Miriam Weber Nielsen	Dairy 1250 Anthony	msw@msu.edu	432-5443
ADVISORS FOR AGRICULTURAL TECHNOLOGY			
Ashley Bushman	Beef 1250 Anthony	bushmana@msu.edu	432-1389
Joe Domecq	Dairy 1250 Anthony	domecqjo@msu.edu	353-7855
Camie Heleski	Horse 1250 Anthony	heleski@msu.edu	355-8427
Ashley Bushman	Swine 1250 Anthony	bushmana@msu.edu	432-1389
STUDENT CLUBS AND FARM UNITS			
Block & Bridle Club	1275 Anthony		353-5182
Dairy Club	1272 Anthony		355-3699
Rodeo Club	1264 Anthony		432-6760
Horsemen's Association	1265 Anthony		432-2425
Equestrian Team			
Polo Team			
Dressage Team			
Beef Cattle Research Center	Ken Metz, Mgr	metz@msu.edu	353-2245
Dairy Cattle Research & Teaching Ctr	Bob Kreft, Mgr	kreft@msu.edu	355-7473
Purebred Beef Barn	Cody Sankey,Mgr	sankeyc@msu.edu	355-7452
Swine Teaching & Research	Al Snedegar, Mgr	Snedega1@msu.edu	355-7485
Horse Teaching & Research	Paula Hitzler, Mgr	phitzler@msu.edu	355-7484
Poultry Teaching & Resch.	Angela Napolitano, Mgr	Napolit3@msu.edu	355-0360
Sheep Teaching & Resch.	Al Culham, Mgr	culhama@msu.edu	355-7477
The Pavilion	Scott Rancour, Mgr	Rancour2@msu.edu	432-5566

FINANCIAL AID AND SCHOLARSHIPS

The Office of Financial Aid, located in Room 259 Student Services (353-5940), distributes more than 60 million dollars in financial assistance to over 50% of the MSU student population. A number of scholarship, loan, grant, and work study packages are available for students who inquire.

Listed below are scholarships for which ANS students may be eligible. Some applications are available in the ANS Undergraduate Student Affairs Office in Room 1250 Anthony Hall. Others are available at the address or web site provided. Students will be notified via email when available scholarships come into the Department Undergraduate Office. **Additional scholarships may be available through the College of Agriculture and Natural Resources Academic and Student Affairs Office in 121 Ag Hall (355-0236).**

A. Scholarships for 4-Year Students in Animal Science

Richard and Dana Balander Avian Scholarship
This scholarship will award up to $1500 dollars to honor and encourage students pursuing a poultry or avian species related career. Academic performance, leadership attributes, career ambitions and financial need will be considered by the selection committee. Undergraduate students will receive primary consideration, but graduate students are also encouraged to apply. Applications are available in spring semester in 1250 Anthony Hall. Deadline is May 15 for completed applications.

Howard E. Cowles Dairy Prize
Awarded annually to juniors born in Michigan and who are majoring in Animal Science with an interest in dairy. Students must also exhibit interest and participation in extracurricular dairy activities. Recipients are selected by the faculty of Animal Science from students who meet criteria for eligibility.

Michigan Dairy Memorial Scholarships
Tuition scholarships of $1,500/year for freshmen or $3,500/year to full tuition and fees for sophomores, juniors and seniors are available to students preparing for careers in the dairy industry. Applications are available in 1250 Anthony Hall. Deadline for completed applications is September 27 for freshmen and February 28 for sophomores, juniors and seniors.

Jack and Betty Barnes International Michigan Dairy Memorial Scholarship
A tuition scholarship of $1,000 is available to students meeting eligibility criteria for Michigan Dairy Memorial Scholarships and who desire an international experience to enhance their education. Applications are available in 1250 Anthony Hall. Deadline for completed applications is April 1.

Michigan Livestock Industry Scholarships
Awards of $2,000/year are available to students preparing for careers in the livestock industry. Applications are available in 1250 Anthony Hall. Deadline is February 1 for completed applications.

Michigan Pork Producers Association Scholarship
Scholarships of $1000, $500, $250 are awarded annually to undergraduates with an interest in the swine industry. Applications are available from Michigan Pork Producers Association. Deadline is January 15 for completed applications.

Ralph Hudson Scholarship
A $250 cash award is given to the Outstanding Block and Bridle Club member selected by the faculty of Animal Science.

Reginald A. Emmert Scholarship
Awards for $1,000 per year are available to full time ANS undergraduates with an emphasis in livestock production. Applications are available in 1250 Anthony Hall.

Harry Moxley Scholarship
A $250 cash award is given to the outstanding junior in Animal Science with a livestock emphasis. The recipient is selected by the faculty of Animal Science.

B. Scholarships for Students Enrolled In The Institute of Agricultural Technology

Michigan Milk Producers Association Scholarship
Eight awards are presented annually to Ag Tech Dairy Management students interested in pursuing careers in dairy farming. Recipients must be MMPA members, or children or employees of members. Applications are available in 1250F Anthony Hall. Deadline for completed applications is September 15.

Michigan Dairy Memorial Scholarship Foundation, Inc, Scholarships
Tuition scholarships of $1,500/year are available to Ag Tech students preparing for careers in dairy science, processing, and/or manufacturing. Applications are available in 1250 Anthony Hall. Deadline is September 30 for completed applications. Applications are available in 1250 Anthony Hall.

C. Additional regional or national scholarships

The Chicago Mercantile Exchange (CME) Pork Industry Scholarship
Four $2,500 scholarships will be awarded to students who intend to pursue a career in the pork industry - talented and thoughtful students who may emerge as industry leaders someday.

One of the top four winners will receive an all expense paid trip to the Pork Industry Forum.

1. Be an undergraduate student in a two-year swine program or a four-year college of agriculture;
2. Write a brief letter indicating what role you see yourself playing in the pork industry after graduation;
3. Submit an essay of 750 words or less describing an issue you see confronting the pork industry today or in the future - and offer your solutions;
4. Obtain two letters of reference from current or former professors or industry professionals;
5. Prepare a cover sheet with your:
    A - name
    B - complete mailing address and telephone number
    C - school name
    D - year in school
    E - permanent mailing address and telephone number
    F - social security number

Submit all the above items in a single envelope to:
National Pork Producers Council
PO Box 10383
Des Moines, Iowa 50306

The National Pork Producers Council (NPPC) will administer the program, read the essays, and select the winners. Essays will be judged on the basis of clarity or expression, persuasiveness,

originality, and relevance of topic. Winners will be announced at the Pork Industry Forum, in February. Application deadline December.

CAREER PLANNING AND PLACEMENT INFORMATION

Ms. Jill Cords, Career Services and Placement Coordinator, College of Agriculture and Natural Resources, 121 Agriculture Hall or Michigan State University Placement Services, 113 Student Services Building, offer excellent programs to assist graduating seniors and employers in finding each other. Every senior should register with the College or Placement Services Office and become familiar with these programs in the 2nd semester of their junior year. It is too late if you wait until the 1st or 2nd semester of your senior year because by then you have already missed some of the opportunities. Most interviews take place a semester before graduation.

The ANS department supplements the university and college placement activities in several ways:

(1) Students are notified via email as employers contact the Department with job opportunities. Many students find full-time employment with organizations that have employed former students.
(2) The Department Undergraduate Student Affairs Office, 1250 Anthony Hall, houses a file on internships for your use in planning your search for internships.
(3) Representatives from government or industry present seminars to interested students regarding employment opportunities.
(4) Academic advisors and mentors are available to discuss career planning and job opportunities at all times.

Many public agencies use Civil Service examination procedures. You should enroll for those tests when they are scheduled for an opening of interest to you. There is often a long lag between the test date and the posting of scores - start early.

Don't wait for someone to call with the job offer. Contact those agencies of most interest to you, give them a resume of your education and work experience, and let them know of your interests and availability. Jobs come to those who are both well prepared and willing to seek the opportunity. During your first year you should develop a resume and update that resume every year. The resume will be helpful when applying for part-time jobs and will be a useful when you graduate.

Remember, one of the ways to find a job is to **ASK**. Jobs do not come to you.

Part-Time Jobs While in College and Summer Employment

The above resources should be contacted with respect to summer and part-time employment. However, the general policy is to centralize these opportunities at the Student Employment Office in the Student Services Building.

STUDENT EMPLOYMENT

The Department of Animal Science provides additional learning opportunities in several ways. ANS students supplement their educational programs with part-time departmental employment. Students work in offices and research labs on campus. These types of employment provide valuable training and technical skills which enhance student learning while providing much needed financial support.

Working in the ANS research labs is an interesting and challenging job for the science-oriented student. Each lab offers a unique experience. Some of the areas in which animal science research is being conducted are ruminant or monogastric nutrition; physiology; endocrinology; toxicology;

animal behaviour; and molecular biology. There is something of interest for most students desiring more information regarding animal research or laboratory science.

The departmental livestock farms also present a unique learning situation for the ANS students. Students provide most of the labor force involved in the daily care and maintenance of MSU livestock. This type of hands-on learning has proven to be an invaluable experience for students interested in production animal agriculture.

Beef Cattle
There are 2 ANS beef facilities that employ students.

The Beef Cattle Research Center (BCRC) is an automated feedlot with a capacity of approximately 700 head. Students gain experience in the feed and care of the beef market animal and first hand knowledge of large scale animal research.

The Purebred Beef Cattle Teaching Center gives students a perspective of a different segment of the beef cattle industry. Approximately 50 Angus and 50 Polled Hereford cows are used to demonstrate cow/calf management, pasture management, livestock marketing, fitting and showing, artificial insemination, embryo transfer, and beef cattle breeding at this unit.

Dairy Cattle
The dairy industry is the leading animal industry in Michigan and offers tremendous employment opportunities for the Animal Science graduate. The Dairy Cattle Teaching and Research Center plays an important role in training dairy students both in the classroom and by employing students on the farm. This facility houses approximately 380 head and milks about 175 head of Holsteins. Students become involved in all facets of dairy cattle management as well as research trials that are a major part of the responsibility of this unit.

Horses
The Horse Teaching and Research Center functions primarily to provide hands-on classroom experience for students interested in horses. This facility houses approximately 90 head of Arabian horses and stands stallions for breeding. Student employees are responsible for care of horses and facilities and become directly involved in foaling, breeding, and management. Young horses are trained and shown by student employees during the spring and summer. The horse center provides students the opportunity to learn by doing in applying classroom knowledge to on farm situations.

Poultry and Mink
A 9,000 bird laying house and mink ranch, and numerous poultry research projects on one facility afford students an unparalleled animal experience. The mechanization and integration of the poultry industry demands well trained and knowledgeable personnel. The poultry unit provides an introduction to this industry as well as giving students the opportunity to learn new skills in nutrition and management by working with poultry and small carnivores. Animal research to investigate the effects of toxic chemical in the environment is currently being explored at this facility, are exciting fields in animal science.

Sheep
The Sheep Teaching and Research Center houses outstanding flocks of Suffolk, and commercial sheep. Student employees work in all aspects of sheep management with 150 sheep. Shearing, fitting and showing, footcare, lambing, breeding, castrating, and docking are all part of the learning opportunities at the sheep unit.

Swine
The Swine Teaching and Research Center farrows approximately 300 sows and finishes about 2,000 market hogs/year. Many of these animals are part of teaching exercises and ongoing research studies. The swine farm gives students a wide range of experiences and offers a wealth of information and learning about nutrition, genetics, and modern swine farm management.

Meats Laboratory
The MSU Meat Laboratory in Anthony Hall which was completed in fall, 1998, is the most modern meat processing facility on any U.S. college campus. It is designed for processing cattle, poultry, sheep and swine into meat and processed meat products. It contains facilities for slaughtering, chilling, cutting and further processing. The sausage kitchen is equipped with all major processing equipment scaled down for laboratory-sized meat formulations plus refrigerated curing rooms and a smokehouse.

The meat industry offers a multitude of opportunities for the interested Animal Science graduate. Employment in the Meats Laboratory allows students to gain valuable knowledge that cannot be obtained elsewhere. Students interested in careers in meat science find this experience to be irreplaceable.

Livestock Judging Pavilion - The Pavilion for Agriculture and Livestock Education
This facility has a large arena, auditorium, exhibition area and four classrooms. Many animal laboratories conducted on campus are held at “The Pavilion”. Students working there assist with the set-up and delivery of many of these laboratories. The Michigan animal industry also makes use of this facility for livestock shows, sales, and displays. Working at “The Pavilion” provides a chance to become acquainted with many different faculty members and industry persons and gain knowledge about a variety of animals.

WHERE TO GET MORE INFORMATION

Laboratory			
Cellular Reprogramming	B290 Anthony	Dr. J. Cibelli	432-7065
Molecular Genetics	B220 Anthony	Dr. C. Ernst	353-5378
Molecular Virology	B215 Anthony	Dr. P. Coussens	353-7291
Physiology	B255 Anthony	Dr. G. Smith	432-1456
Horse Research	2235 Anthony	Dr. B. Nielsen	353-4866
Non-Ruminant Nutrition	2220 Anthony	Dr. N. Trottier	353-4867
Microbiology	2220 Anthony	Dr. M. Yokoyama	353-4867
Forage Nutrition	2245 Anthony	Dr. M. Allen	432-1457
Ruminant Nutrition	2250 Anthony	Dr. S. Rust	355-3802
Ruminant Metabolism	2270 Anthony	Dr. M. Vanderhaar/ Dr. M. Weber Nielsen	432-1454
Toxicology	3223 Anthony	Dr. S. Bursian	432-1382
Turkey Nutrition Metabolism	2223 Anthony	Dr. M. Orth/ Dr. D. Karcher	353-9826
Animal Behavior	2265 Anthony	Dr. J. Swanson/ Dr. J. Siegford	432-4134
Livestock			
Beef Cattle & Research Center	Bennett Rd.	Mr. Ken Metz	353-2245
Dairy Teaching & Research Center	College Rd.	Mr. Bob Kreft	355-7473
Horse Teaching & Research Ctr.	Collins Rd.	Mrs. Paula Hitzler	355-7484
Poultry & Mink Research Center	Jolly Rd.	Mr. Angelo Natpolitano	355-0360
Purebred Beef Barn	Bennett Rd.	Mr. Cody Sankey	355-7452
Sheep Teaching & Research Ctr.	Hagadorn Rd.	Mr. Al Culham	355-7477
Swine Teaching & Research Ctr.	Forest Rd.	Mr. Al Snedegar	355-7485
The Pavilion	Farm Lane	Mr. Scott Rancour	432-5566
Meats Laboratory	1358 Anthony	Mr. Tom Forton	355-8452

STUDENT CLUBS AND ORGANIZATIONS

Five campus-wide student clubs, which are open to all MSU students, are affiliated with the Department of Animal Science. These are: Block and Bridle, Dairy Science, Poultry Science, Rodeo Club and the Horseman's Association. Each organization offers students the opportunity to cultivate their leadership and communication abilities with students having similar interests and concerns. Animal Science faculty serve as the club advisors and are supportive of all club functions and events. The department recommends that students join one or more of these organizations. Further information can be obtained in the Undergraduate Student Affairs Office, 1250 Anthony Hall (353-9227).

Academic Quadrathalon

In addition to student clubs, the ANS department sponsors an academic competition for students. Academic Quadrathalon consists of a written exam, oral presentation, laboratory practicum, and quiz bowl.

The 4 year member teams may compete for state honors with the first place team representing MSU at the regional American Society of Animal Science meetings during winter term. Academic Quadrathalon is a great opportunity to test knowledge in all areas of Animal Science. It is an excellent learning experience for all who participate.

Block and Bridle Club

Block and Bridle sponsors many events which provide learning opportunities for students through meaningful, hands-on participation. The Little International brings students from all majors together to compete for the coveted Jack MacAllen Award given to the best overall livestock showperson. University animals are prepared by each participant with the novice receiving help and guidance from the more experienced club members in a spirit of fellowship and competition.

Another purpose of the Block and Bridle Club is to promote and maintain student contact with the Michigan Livestock Industry. Each year the club sponsors the Block and Bridle Recognition Banquet which honors Animal Science students and alumni. However, its' main theme is the recognition of an Honored Guest who has made a significant contribution to the Michigan livestock industry.

The Block and Bridle Club students volunteer time to work with livestock industry leaders at the Michigan Winter Classic Show, Shepherds Weekend, St. Vincent Home visit, cans for food bank, and other related events. Each spring the club organizes and manages the Junior Steer and Heifer Show at the MCA Beef Expo which attracts youth exhibitors from the tri-state area along with the Northern Exposure Lamb Show.

In addition to these club-sponsored activities, members participate in other college and university events such as Autumnfest, Small Animal Day, and Ag Olympics. An annual trip to the national meetings allows members to interact with students from other universities. Other events the club sponsors or helps to organize include the department Spring Picnic. The Block and Bridle Club is a worthwhile and rewarding opportunity for students which provides social, personal, and academic growth for all its members.

Dairy Science Club

The Michigan dairy industry is one of the largest in the nation, creating the need to educate and train dairy students at Michigan State. Many of the students in the Dairy Club will have active roles in the Michigan dairy industry in the near future in production and agri-business.
In addition to the social and educational activities of the MSU Dairy Club, the club has 2 primary purposes. The first is to promote the dairy industry and the second is to increase the contact

between the members of the Dairy Club and the Michigan dairy industry.

The annual Christmas Cheese Sale has been a tradition of the club for many years and is one of the activities that promotes dairy products. This business activity provides students with experience not obtainable in the classroom and, at the same time, promotes dairy products and provides visibility for MSU.

The "I Milked a Cow' booth at the 4-H Dairy Days is run by the Dairy Club. Each year thousands of children and adults try their hand at milking a cow with the able assistance of club members. This booth has become a major attraction at the State Fair and brings recognition to the Club, the dairy industry, and MSU.

The annual Recognition Banquet serves to bring students, alumni, dairy industry organizations, parents, and dairy farmers together to recognize the efforts of outstanding students, alumni, and industry leaders. This banquet provides a needed link between student and potential employer and, therefore, serves an important function for Michigan's dairy industry.

In the past year, over 20,000 consumers and 5,000 producers have been reached through the combined activities of the MSU Dairy Club. The officers, club members, and alumni can be proud of their organization and accomplishments. Our industry can be proud of these students who are the future of the Michigan Dairy Industry.

Horsemen's Association

The MSU Horsemen's Association is designed for all those interested in the horse industry. It's activities and events focus on horses in general, and in the horse industry. The Horsemen's Association objectives and purpose are educating the community and the MSU student body about horses and the horse industry; promote the horse and the horse industry; to provide educational and social opportunities for MSU students interested in horses; to provide the opportunity for members to participate in industry-wide activities; to provide enriching experiences that expand knowledge and broaden perspectives of the horse industry; to serve as a liaison between students at MSU, local horse industries, and university faculty, staff, and administration; to stimulate interest in horse related professions for future horse industry leaders. To participate on either the **"MSU Equestrian Team"**, **"MSU Dressage Team"** or the **"MSU Polo Club"** a student must be a member of the Horsemen's Association which provides financial support to both groups.

Poultry Science Club

The MSU Poultry Science Club is open to all MSU students, undergraduates, and graduates. An interest in poultry or other avian species is desirable, but not required. The Club has both social and professional attributes. Students elect to attend the annual trip to the Southeastern Poultry Convention each January in Atlanta, GA where many of the members have successfully interviewed with several dozen companies. Other activities include a summer camping and canoe trip on one of Michigan's rivers, a team in the Ag Olympics, a spring trip which has included Toronto and Eli Lilly in Indianapolis, participation in Autumnfest, and the poultry farm exhibits for Small Animals Day each May. Club goals are to promote leadership, friendship, participation in activities, and promotion of poultry and animal science.

Rodeo Club

The MSU Rodeo Club originated in 1969 and is a member of the National Intercollegiate Rodeo Association (NIRA). Its goal is to encourage further education through the promotion of collegiate rodeo competition. Prior experience is not necessary to be part of the Club. All that is needed is an interest in the sport, meeting people, and having fun.

Club activities focus on the Annual Spartan Stampede Rodeo which the Club organizes and promotes. The Spartan Stampede is one of the most successful intercollegiate rodeos in existence. It has a reputation for quality stock and management that calls cowboys and cowgirls from all parts of the U.S.

INTERCOLLEGIATE JUDGING TEAMS

The Department of Animal Science has a rich heritage of successful judging teams. Many former team members who have gone on to obtain leadership roles in the industry strongly support the judging team experience. Participation on a judging team enhances a students ability to think, reason, and communicate with others. These skills are in great demand regardless of the career choice.

Students enrolled in dairy, horse, livestock or welfare judging have the opportunity to travel and visit farms that are leading the industry. They can meet and talk to the owners and managers of some of the most successful operations in the world, These contacts help students better understand current management and marketing strategies as well as assist students in making and securing career choices.

Judging is more than visiting farms and taking a class. It is competing against schools all across the U.S. in contests held in conjunction with the major industry events. Some of these are: World Dairy Exposition, Madison, WI; North American Livestock Exposition, Louisville, KY; Quarter Horse Congress, Columbus, OH; and Arabian Nationals, Albuquerque, NM.

Students may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 300A, ANS 300B, ANS 300C and ANS 300D. Many of these courses have a re-enrollment provision so that a student might be able to compete on one or two intercollegiate judging teams.

Judging Teams

DAIRY JUDGING TEAM: Coach - Dr. Joe Domecq (353-7855)

ANS 200C Introductory Judging of Dairy Cattle
Spring Semester - 1 or 2 credits with a maximum of 3 credits
ANS 300C Advanced Dairy Cattle Judging
Fall Semester - 2 credits

HORSE JUDGING TEAM: Coach – Dr. Camie Heleski (355-8427)

ANS 200D Introductory Judging of Horses
Spring Semester - 1 or 2 credits with a maximum of 3 credits
ANS 300D Advanced Horse Judging
Fall Semester - 2 credits

LIVESTOCK JUDGING TEAM: Coach – Ms. Ashley Bushman (432-1389)

ANS 200A Introductory Judging of Livestock or Carcasses
Spring Semester of Even Years - 1 or 2 credits with a maximum of 3 credits
ANS 300A Advanced Livestock Judging
Fall Semester of Even Years - 2 credits

WELFARE JUDGING TEAM: Coach – Dr. Camie Heleski (355-8427)

ANS 300E Animal Welfare Judging
Fall Semester – 1 credit

DAIRY CHALLENGE: Coach – Dr. Miriam Weber Nielsen (432-5443)/Dr. Elizabeth Karcher (353-8518)

Spring Semester

AG TECH JUDGING TEAMS

The contact persons for the Agricultural Technology Judging Teams are:

Dairy	Dr. Joe Domecq (353-7855)
Horse	Dr. Camie Heleski (355-8327)
Livestock	Ms. Ashley Bushman (432-1389)

ACADEMIC GOVERNMENT

ANS undergraduate students participate in two standing committees within the Animal Science Department. The ANS Department Advisory Committee consists of five ANS faculty, one ANS graduate student, and 1 ANS undergraduate student. The undergraduate student also serves as the ANS representative to the CANR Student Senate. The ANS Department Advisory Committee meets once per month and serves as an open channel of communication with the ANS Department Chairperson.

The ANS Undergraduate Student Affairs and Curriculum Committee consist of four ANS faculty, one ANS graduate student, and two ANS undergraduate students. This committee meets once per month to review and evaluate courses, curricula, and degree requirements for ANS undergraduates.

ANS undergraduates elect their representatives to these committees during spring semester for the following academic year.

PROFESSIONAL INTERNSHIPS

Professional internships provide an academic opportunity to work for a period of time in an animal related field while gaining college credit toward graduation requirements. Internship programs have developed into important learning experiences that allow students to develop professional skills, apply classroom information and establish important contacts for potential careers. Annually, a large number of ANS majors complete an off campus professional internship with the added benefit of securing a maximum of 6 credits counting toward the 120 total graduation requirement. Most students complete the internship after reaching junior or senior class standing. Internship opportunities exist in all areas of animal science, including, livestock production, finance, marketing, and livestock products. Internships not only occur in Michigan, but students can choose other locations throughout the U.S. or overseas.

In order to take full advantage of the professional internship program, there are a few requirements and guidelines that are to be followed to ensure a successful and rewarding experience.

A grade of pass or fail will be assigned based upon satisfactory completion of the following requirements.

1. Interview with Dr. Dennis Banks.
2. Complete application process.
3. Receive override into ANS 493.
4. Construct a minimum 20 slide power point presentation including facilities,

responsibilities, and projects.

5. Complete student, employer and program evaluations.
6. Perform exit interview with internship coordinator. For further information, contact Dr. Dennnis Banks, 1250 Anthony Hall (355-4074) or visit the Animal Science Internship web page for exisiting internships at http://www.ans.msu.edu/academics/undergrad/internships

ANIMAL SCIENCE MAJOR REQUIREMENTS
2009-2010

UNIVERSITY REQUIREMENTS		*Semester*	*Cr*
WRA	Writing, Rhetoric & American Culture	F,S,SS	4
IAH	Integrative Studies in Arts & Humanities (IAH-A)	F,S,SS	4
IAH	Integrative Studies in Arts & Humanities (IAH-B)	F,S,SS	4
ISS	Integrative Studies in Social, Behavior & Economic Sci. (ISS-200)	F,S,SS	4
ISS	Integrative Studies in Social, Behavior & Economic Sci. (ISS-300)	F,S.SS	4
		TOTAL CREDITS 20	

COLLEGE REQUIREMENTS			
EC 201 or 202	Economics (EC 201 required for management option)	F,S,SS	3
MTH 116	College Algebra & Trigonometry	F,S,SS	5
OR	MTH 103 **and** MTH 114 or MTH 124 or MTH 132		
		TOTAL CREDITS 8	

DEPARTMENT REQUIREMENTS (All the courses listed below)			
ANS 101	Introduction to Animal Science	F,S	1
ANS 110	Introductory Animal Agriculture	F,S	4
ANS 301	Professional Development in Animal Science	F	2
ANS 313	Principles of Animal Feeding and Nutrition	F	4
ANS 314	Genetic Improvement of Farm Animals	F	4
ANS 315	Anatomy and Physiology of Farm Animals	S	4
ANS 401	Issues in Animal Agriculture	S	1
BS 111	Cells and Molecules	F,S	3
BS 111L	Cells and Molecular Biology Laboratory	F,S,SS	2
CEM 141	General Chemistry	F,S,SS	4
CEM 143	Survey of Organic Chemistry	F,S	4
OR	CEM 251 Organic Chemistry		
		TOTAL CREDITS 32-33	

ONE OF THE FOLLOWING COURSES			
STT 200	Statistical Methods	F,S,SS	3
STT 201	Statistical Methods	F,S,SS	4
STT 421	Statistics I	F,S,SS	3
STT 464	Statistics for Biologists	F	3
		TOTAL CREDITS 3	

ONE OF THE FOLLOWING SPECIES MANAGEMENT COURSES			
ANS 222	Introductory Beef Management	S	3
ANS 232	Introductory Dairy Management	F	3
ANS 242	Introductory Horse Management	F	3
ANS 252	Introductory Avian Management	F odd yr.	3
ANS 262	Introductory Sheep Management	S	3
ANS 272	Introductory Swine Management	F	3
ANS 282	Companion Animal Biology & Management	F & S	3
		TOTAL CREDITS 3	

ONE OF THE FOLLOWING CONCENTRATIONS:	
Animal Industry	25-34
Animal Biology and Pre-Veterinary Medicine	39-54
Companion and Exotic Animal Biology	41-51
Production Animal Scholars	52-55
ELECTIVES	**2-29**
	TOTAL CREDITS 120

ANIMAL INDUSTRY CONCENTRATION

ANS 210	Animal Products	F	4

TOTAL CREDITS 4

ONE OF THE FOLLOWING COURSES:

CSS 110	Computer Applications in Agronomy	F	3
CSE 101	Introduction to Computing	F,S,SS	3

TOTAL CREDITS 3

ONE OF THE FOLLOWING COURSES:

ABM 100	Decision-making in the Agri-Food System	F,S	3
ABM 130	Farm Management I	F	3

TOTAL CREDITS 3

ONE OF THE FOLLOWING COURSES (in addition to the required department species management course)

ANS 222	Introductory Beef Cattle Management	S	3
ANS 232	Introductory Dairy Cattle Management	F	3
ANS 242	Introductory Horse Management	F	3
ANS 252	Introduction to Management of Avian Species	F odd yr.	3
ANS 262	Introduction to Sheep Management	S	3
ANS 272	Introduction Swine Management	F	3
ANS 282	Introductory Companion Animal Biology & Mgmt	F,S	3

TOTAL CREDITS 3

ONE OF THE FOLLOWING COURSES

ANS 422	Advanced Feedlot Management	F	3
ANS 432	Advanced Dairy Management	F	3
ANS 442	Advanced Horse Management	S	3
ANS 472	Advanced Swine Management	F	3
ANS 482	Advanced Companion Animal Management	S	3

TOTAL CREDITS 3

THREE OF THE FOLLOWING COURSES

ANS 305	Applied Animal Behavior	S	3
ANS 309	Health and Hygiene of Livestock	F	3
ANS 404	Advanced Genetics	S	2
ANS 405	Endocrinology of Reproduction	S	4
ANS 407	Food and Animal Toxicology	F	3
ANS 413	Non-Ruminant Nutrition	S	3
ANS 414	Advanced Animal Breeding	S	2
ANS 415	Growth and Musculoskeletal Biology	S	3
ANS 416	Meat Science and Muscle Biology	F	2
ANS 418	Comprehensive Nutrient Management	F	3
ANS 435	Lactation and Mammary Biology	S	4
ANS 445	Equine Exercise Physiology	S	4
ANS 455	Avian Physiology	S	4
ANS 483	Ruminant Nutrition	S	3

ONE OF THE FOLLOWING COURSES: **TOTAL CREDITS 6-12**

ANS 493	Professional Internship	F,S,SS	3
ANS 300A,B,C or D	Judging	F	6
Study Abroad			6
		TOTAL CREDITS 3-6	

ANIMAL BIOLOGY AND PRE-VETERINARY MEDICINE CONCENTRATION

ALL OF THE FOLLOWING COURSES:

ANS 210	Animal Products	F	4
ANS 425	Principles of Biotechnology	F	4
BS 110	Organisms and Populations	F,S	4
BMB 401	Biochemistry	F,S	4
CEM 161	Chemistry Laboratory I	F,S	1
CEM 252	Organic Chemistry II	F,S	3
CEM 255	Organic Chemistry Lab	F,S	2
		TOTAL CREDITS	**22**

THREE OF THE FOLLOWING COURSES:

ANS 404	Advanced Genetics of Farm Animals	S	2
ANS 405	Endocrinology of Reproduction	S	4
ANS 413	Non-Ruminant Nutrition	S	3
ANS 415	Growth and Musculoskeletal Biology	S	3
ANS 416	Meat Science and Muscle Biology	F	2
ANS 435	Lactation and Mammary Biology	S	4
ANS 483	Ruminant Nutrition	S	3
		TOTAL CREDITS	**7-11**

THREE OF THE FOLLOWING COURSES (*required for admission to MSU Veterinary Medicine)

ANS 305	Applied Animal Behavior	S	3
ANS 309	Health and Hygiene of Livestock	F	3
ANS 407	Food and Animal Toxicology	F	3
ANS 414	Advanced Animal Breeding	S	2
ANS 418	Comprehensive Nutrient Management	F	3
ANS 445	Equine Exercise Physiology	F	4
ANS 455	Avian Physiology	S	4
*MMG 301	Introductory Microbiology	F,S	3
*MMG 302	Introductory Microbiology Laboratory	S	1
*MMG 409	Eucaryotic Cell Biology	S	3
PHM 450	Introduction to Chemical Toxicity	S	3
*PHY 231	Introductory Physics I	F,S	3
*PHY 232	Introductory Physics II	F,S,SS	3
*PHY 251	Introductory Physics Laboratory I	F,S,SS	1
*PHY 252	Introductory Physics Laboratory II	F,S,SS	1
ZOL 313	Animal Behavior	F,S,SS	3
ZOL 341	Fundamental Genetics		4
		TOTAL CREDITS	**8-15**

ONE OF THE FOLLOWING COURSES:

ANS 492	Undergraduate Research	F,S,SS	3
ANS 493	Professional Internship in ANS	F,S,SS	3
Study Abroad			6
		TOTAL CREDITS	**3-6**

COMPANION AND EXOTIC ANIMAL BIOLOGY CONCENTRATION

ALL OF THE FOLLOWING COURSES:

ANS 282	Companion Animal Biology and Management	F,S	3
ANS 482	Advance Comparative Animal Management	S	3
BS 110	Organisms and Populations	F,S	4
CEM 252	Organic Chemistry II	F,S	3
CEM 255	Organic Chemistry Lab	F,S	2
ZOL 328	Comparative Anatomy and Biology of Vertebrates	S	4
			TOTAL CREDITS 17

ONE OF THE FOLLOWING COURSES:

BMB 200	Introduction to Biochemistry	F	4
BMB 401	Basic Biochemistry	F,S	4
			TOTAL CREDITS 4

TWO OF THE FOLLOWING COURSES:

ANS 305	Applied Animal Behavior	S	3
ANS 405	Endocrinology of Reproduction	F	4
ANS 413	Non-Ruminant Nutrition	S	3
ANS 435	Lactation and Mammary Biology	S	4
ANS 483	Ruminant Nutrition	S	3
			TOTAL CREDITS 6-8

FOUR OF THE FOLLOWING COURSES:

ANS 404	Advance Genetics	S	2
ANS 407	Food and Animal Toxicology	F	3
ANS 415	Growth and Musculoskeletal Biology	S	3
ANS 418	Comprehensive Nutrient Management	F	3
ANS 425	Comprehensive Nutrient Management	F	3
ANS 445	Equine Exercise Physiology	S	4
ANS 455	Avian Physiology	S	4
ZOL 313	Animal Behavior	F,S	3
ZOL 341	Fundamental Genetics	F,S,SS	4
ZOL 355	Ecology	F,S,SS	3
ZOL 369	Introduction to Zoo and Aquarium Science	S	3
			TOTAL CREDITS 11-16

ONE OF THE FOLLOWING COURSES:

ANS 492	Undergraduate Research	F,S,SS	3
ANS 493	Professional Internship in ANS	F,S,SS	3
Study Abroad			6
			TOTAL CREDITS 3-6

PRODUCTION ANIMAL SCHOLARS CONCENTRATION

ALL OF THE FOLLOWING COURSES:

ANS 210	Animal Products	S	4
BS 110	Organisms and Populations	F,S	4
BMB 401	Biochemistry	F,S	4
CEM 161	Chemistry Laboratory I	F,S	1
CEM 252	Organic Chemistry II	F,S	3
CEM 255	Organic Chemistry Lab	F,S	2
MMG 301	Introductory Microbiology	F,S	3
MMG 302	Introductory Microbiology Laboratory	S	1
MMG 409	Eucaryotic Cell Biology	S	3
PHY 231	Introductory Physics I	F,S	3
PHY 232	Introductory Physics II	F,S,SS	3
PHY 251	Introductory Physics Laboratory I	F,S,SS	1
PHY 252	Introductory Physics Laboratory II	F,S,SS	1

TOTAL CREDITS 25

ONE OF THE FOLLOWING COURSES (in addition to the required department species management course)

ANS 222	Introductory Beef Management	S	3
ANS 232	Introductory Dairy Management	F	3
ANS 252	Introductory to Management of Avian Species	F	3
ANS 262	Introductory Sheep Management	S	3
ANS 272	Introductory Swine Management	F	3

TOTAL CREDITS 3

TWO OF THE FOLLOWING COURSES:

ABM 435	Financial Management in the Agri-Food System	S	3
ABM 437	Agribusiness Strategic Management	S	3
ANS 413	Non-Ruminant Nutrition	S	3
ANS 483	Ruminant Nutrition	S	3

TOTAL CREDITS 6

ONE OF THE FOLLOWING COURSES:

ANS 305	Applied Animal Behavior	S	3
ANS 405	Endocrinology of Reproduction	F	4
ANS 415	Growth and Musculoskeletal Biology	S	3
ANS 425	Principles of Biotechnology	F	3
ANS 435	Lactation and Mammary Biology	S	4

TOTAL CREDITS 3-4

ONE OF THE FOLLOWING COURSES:

ANS 422	Advanced Beef Feedlot Management	F	3
ANS 432	Advanced Dairy Cattle Management	F	3
ANS 472	Advanced Swine Management	F	3

TOTAL CREDITS 3

ONE OF THE FOLLOWING COURSES:

ANS 404	Advanced Genetics	S	2
ANS 407	Food and Animal Toxicology	F	3
ANS 414	Advanced Animal Breeding	S	2
ANS 416	Meat Science and Muscle Biology	F	2
ANS 418	Comprehensive Nutrient Management	F	3

Production Animal Scholars continues on the next page

Production Animal Scholars Continued			
ANS 455	Avian Physiology	S	4
ZOL 313	Animal Behavior	F	3
ZOL 341	Fundamental Genetics	F,S,SS	4
ONE OF THE FOLLOWING COURSE			
ANS 390	Animal Science Practicum		2

TOTAL CREDITS 2

CANR Specialization

While completing the requirement for a degree in Animal Science the student has the opportunity to use their elective credits to complete one of the Specializations available in the College of Agriculture and Natural Resources. The following are two Specializations that are excellent choices to accompany a degree in Animal Science.

Agriculture and Natural Resources Biotechnology Specialization

The Specialization in Agricultural and Natural Resources Biotechnology is available as an elective to students who are enrolled in Bachelor of Science degree programs with majors in animal science, biosystems engineering, crop and soil sciences, fisheries and wildlife, food science, forestry, and horticulture. The specialization is administered by the College of Agriculture and Natural Resources.

The specialization is designed for students who may be planning to pursue graduate study in biotechnology–related disciplines or who may be interested in careers with corporations or agencies for which a basic familiarity with biotechnology is a prerequisite. Students interested in the Agriculture and Natural Resources Biotechnology Specialization should contact Dr. Richard Brandenburg at 355-0236 or 120 Ag Hall for information on how to enroll for the specialization.

ALL OF THE FOLLOWING COURSES:

BMB 401	Basic Bioshemistry		4
HRT 486	Biotechnology in Agriculture		3

TOTAL CREDITS 3-4

ONE OF THE FOLLOWING COURSES:

ANS 314	Genetic Improvement of Domestic Animals	F	4
CSS 353	Introduction to Plant Genetics		3
ZOL 341	Fundamental Genetics		4

TOTAL CREDITS 3-4

COMPLETE ONE OF THE FOLLOWING OPTIONS:

a. ANS 404	Advanced Animal Genetics	S	2
a. ANS 425	Principles of Animal Biotechnology	S	3
b. CSS 451	Biotech. Appl. For Plant Breeding and Genetics		4

TOTAL CREDITS 4-5

Agribusiness Management Specialization

The specialization in Agribusiness Management is designed to serve students with majors in other fields who are interested in careers in agribusiness. The primary educational objective of the specialization is to provide students with a fundamental knowledge of business management in relation to agribusiness firms.

The specialization if available as an elective to all students who are enrolled in bachelor's degree programs at Michigan State University. The Specialization is administered by the Department of Agricultural, Food and Resource Economics. Students interested in the Agribusiness Specialization should contact Karen Reynolds at 355-1692 or room 1 Ag Hall for information on how to enroll for the specialization.

ONE OF THE FOLLOWING COURSES:

ABM 100	Decision Making in the Agri-Food System	F,S	3
ABM 130	Farm Management I	F	3
		TOTAL CREDITS 3	

ONE OF THE FOLLOWING COURSES:

ABM 225	Commodity Marketing I	F	3
ABM 332	Agribusiness Operations Management	F	3
ABM 430	Farm Management II	F	3
		TOTAL CREDITS 3	

TWO OF THE FOLLOWING COURSES, INCLUDING AT LEAST ONE COURSE AT THE 300 OR 400 LEVEL:

ABM 222	Agribusiness and Food Industry Sales	F,S	3
ABM 337	Agribusiness Labor and Personnel Management	F	3
ABM 400	Public Policy Issues in the Agri-Food System	S	3
ABM 422	Vertical Coordination in the Agri-Food System	S	3
ABM 425	Commodity Marketing II	F	3
ABM 427	Global Agri-food Industries and Markets	F	3
ABM 435	Financial Management in the Agri-Food System	S	3
ABM 437	Agribusiness Strategic Management	S	3
		TOTAL CREDITS 6	

THE FOLLOWING COURSE:

ACC 230	Survey of Accounting Concepts	F,S,SS	3
		TOTAL CREDITS 3	

ONE OF THE FOLLOWING COURSES:

GBL 323	Introduction to Business Law	F,S	3
HED 373	Merchandising Management Entrepreneurship	F	3
MGT 325	Management Skills and Processes	F,S	3
MSC 327	Introduction to Marketing	F,S	3
FIM 335	Food Marketing Management	S	3
		TOTAL CREDITS 3	

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES
DESCRIPTION OF COURSES
IN ANIMAL SCIENCE

101 Professional Development Animal Science. Fall and Spring 1(0-2)
Careers in animal science. Job application, portfolio development, interviewing, and resume development.

110 Introductory Animal Agriculture. Fall and Spring 4(3-2)
History of animal agriculture and its relationship to human needs, production systems, marketing, and environmental considerations. Current goals of and limitations affecting U.S. animal production.

140 Fundamentals of Horsemanship. Spring 2(0-4)
Knowledge and implementation of safe horse handling skills. Development and improvement of riding skills. Application of riding aids and working with the horse at the beginner, intermediate or advance level.

141 Draft Horse Basics. Fall and Spring 2(0-4)
Safe handling, hitching and driving of draft horses. Care and maintenance of harness and horse drawn equipment.

142 Horse Training for Competition. Summer 2(0-4)
Implementation of training techniques to prepare horses for State competitions. Exhibiting horses in competitions. Field trips required.

200A Introductory Judging Livestock or Carcasses. Spring (1-2 credits)
Evaluation of functional conformation of beef cattle, sheep, and swine and their carcasses. Preparation for intercollegiate competition. Field trips required.

200C IntroductoryJudging of Dairy Cattle. Spring (1-2 credits)
Evaluation of functional conformation of dairy cattle. Preparation for intercollegiate competition. Field trips required.

200D Introductory Judging of Horses. Spring (1-2 credits)
Evaluation of functional conformation and performance of horses. Preparation for intercollegiate competition. Field trips required.

210 Animal Products. Fall 4(3-3)
Edible animal products. Processing, preservation, storage, and distribution of dairy, meat, and egg products.

211 Evaluation of Animal and Carcass. Fall (odd-numbered years) 3(1-4)
Evaluation of breeding stock, market animals, and carcasses. Production records and soundness of breeding animals, quality grading, yield grading, and pricing market animals and carcasses.

212 Merchandising Purebred Livestock. Spring (odd-numbered years) 2(1-2)
Purebred livestock industry. Private treaty and auction sales. Advertising, animal selection, and budgeting of purebred livestock sales. Field trips required.

222 Introductory Beef Management. Spring 3(2-2)
Management practices and systems for beef herds. Feed requirements, reproduction, breeding, performance testing, housing, and diseases. Costs and returns. Field trips required.

232 Introductory Dairy Management. Fall 3(2-2)
Principles and techniques of dairy herd management including calf and heifer care plus lactating and dry cow management.

242 Introductory Horse Management. Fall 3(2-2)
Principles of horse management. Reproduction, nutrition, herd health, genetics, economics, marketing. Field trips required.

252 Introductory Avian Management. Fall(odd-numbered years) 3(2-2)
Management of commercial poultry flocks and aviaries. Feed requirements, reproduction, breeding, housing and disease.

261 Principles of Animal Environments. Spring 2(1-2)
Animal environment requirements. Heat and moisture production rates. Psychrometrics of air and building materials. Heat loss and ventilation systems. Offered first ten weeks of semester.

262 Sheep Management. Spring 3(2-2)
Principles of sheep management: genetics, reproduction, nutrition, marketing, and economics. Field trips required.

272 Introductory Swine Management. Fall 3(2-2)
Swine production principles, practices, technologies, and systems. Field trips required.

282 Companion Animal Biology and Management. Fall and Spring 3(2-2)
Principles of companion animal management. Breeds, reproduction, feeding, housing, health, and diseases.

300A Advanced Livestock Judging. Fall 2(0-6)
Evaluation of conformation and performance records of beef cattle, swine, and sheep. Represent MSU in intercollegiate competition. Field trips required.

300C Advanced Dairy Cattle Judging. Fall 2(0-6)
Evaluation of conformation of various breeds of dairy cattle. Represent MSU in intercollegiate competition. Field trips required.

300D Advanced Horse Judging. Fall 2(0-6)
Evaluation of functional characteristics of horses. Represent MSU in intercollegiate competition. Field trips required.

301 Professional Development Animal Science II. Fall 2(1-2)
Career preparation in animal science. Job interviewing skills. Oral presentation, written communication, and critical evaluation of science literature.

305 Applied Animal Behavior. Spring 3(2-2)
Techniques for assessing health and welfare of domestic animals based on their behavior.

309 Animal Health and Hygiene of Livestock. Fall 3(3-0)
Normal and abnormal physical parameters. Common diseases. Role of housing, husbandry,

sanitation, and animal treatment in health.

313 Principles of Animal Feeding and Nutrition. Fall 4(3-2)
Principles and practices of nutrition for cattle, horses, poultry, sheep, and swine. Metabolism of protein, energy, minerals, and vitamins. Diet formulation. Performance prediction. Nutritional maladies. Field trip required.

314 Genetic Improvement of Farm Animals. Fall 4(3-2)
Molecular, Mendelian, population, and quantitative genetics of domestic animals.

315 Anatomy and Physiology of Farm Animals. Spring 4(3-2)
Gross and microanatomy of farm animals. Structure directed function of tissues. Endocrine integration for homeostasis. Regulation of growth, lactation, and reproduction. Homeorhesis.

390 Animal Science Practicum. Fall and Spring, Summer 2(0-6)
Farm animal production and management. Animal care. Farm management decisions.

401 Issues in Animal Agriculture. Spring 1(2-0)
Societal issues related to local, national and international animal agriculture.

404 Advanced Genetics of Farm Animals. Spring 2(1-2).
Application of molecular genetics techniques to animal breeding. Genome maps for domestic species. Incorporation of genotype data into selection programs.

405 Endocrinology of Reproduction. Fall 4(3-2)
Endocrine regulation of reproduction. Cellular and molecular aspects of gametogenesis, folliculogenesis, sexual cycles, fertilization, sex differentiation, gestation, and parturition. Technology to regulate reproduction.

407 Food and Animal Toxicology. Fall 3(3-0)
Fate and effects of chemicals in the food chain including impact on animal production. Residues in food products. Food safety assessment. Control methods.

407L Toxicology Methods Laboratory. Fall 2(0-4)
Laboratory techniques for evaluating potential toxicity of chemicals to living systems. Field trip to industrial toxicology laboratory required.

413 Non-Ruminant Nutrition. Spring 3(3-0)
Nutrition of horses, swine, and poultry. Digestive and metabolic development and nutrient requirements. Relationships of genetics, endocrinology, immunology, and environment to nutrition.

414 Advanced Animal Breeding. Spring 2(2-0)
Application of selection principles and mating systems within and among breeds of livestock. Selection index, expected progeny differences, animal models, crossbreeding systems, multiple ovulation and embryo transfer schemes, multiple trait selection, simulated populations.

415 Growth and Musculoskeletal Biology. Spring 3(3-0)
Principles of growth in mammalian and avian species. Regulation of bone, cartilage, connective tissue, fat, and muscle metabolism. Extracellular matrix proteins and their function. Introduction to musculoskeletal diseases.

416 Meat Science and Muscle Biology. Fall 2(2-0)
Structure, composition, development, and function of muscle and its conversion to meat. Properties of fresh and processed meat. Microbiology, preservation, palatability, inspection and sanitation, nutritive value, and by-products.

417 Topics in Toxicology. Spring 1(1-0)
Selected topics including regulatory toxicology, risk assessment, environmental toxicology, food safety, and safe handling of toxic substances.

418 Comprehensive Nutrient Management Planning. Fall 3(2-2)
Comprehensive nutrient management plans (CNMP) for animal feeding operations. Trends in animal production, environmental issues, and diet formulation and their impact on manure production. Development of CNMP for a specific animal feeding operation.

422 Advanced Beef Cattle Feedlot Management. Fall 3(2-2)
Feedlot management systems and issues. Feed systems, manure management, health maintenance, and cattle marketing. Field trips required.

425 Principles of Animal Biotechnology. Fall 3(3-0)
Basic concepts of molecular biology. Application of molecular biology to improvement of domestic and companion animals is emphasized. Transgenic animal production, Pharming, molecular genetics and Marker assisted selection.

427 Environmental Toxicology and Society. Spring 3(3-0)
Impact of environmental chemicals on health and modern society. Cellular and organ functions and their interface with the environment. Limitations of scientific investigation and environmental regulations.

432 Advanced Dairy Cattle Management. Fall 3(2-2)
Management techniques for operating a dairy herd. Mastitis control, reproductive and nutritional management, records, waste management, and facilities. Field trips required.

435 Mammary Physiology. Spring 4(3-2)
Anatomy of the mammary gland and physiology of lactation in domestic and laboratory mammals. Mammary gland health and factors affecting lactation. Dairy herd milking management.

442 Advanced Horse Management. Spring 3(2-2)
Management of stables and breeding farms. Pedigree and conformational selection, reproduction, promotion, marketing, and economics. Nutrition and feeding, facilities, and herd health. Field trips required.

445 Equine Exercise Physiology. Fall 4(3-2)
Research in equine exercise science. Physical, physiologic, metabolic and mental adaptation to athletic training. Nutrition and bioenergetics of muscle metabolism. Field trip required.

455 Avian Physiology. Spring 4(3-3)
Systemic and comparative physiology of birds. Espiration, reproduction, endocrinology, digestion, urination, and the senses.

464 Statistical Methods for Biologists I. Fall 3(3-0)
Biological random variables. Estimation of population parameters. Testing hypotheses. Linear

correlation and regression (prediction). Analyses of counted and measured data to compare several biological groups (contingency tables and analysis of variance).

472 Advanced Swine Management. Fall 3(2-2)
Integrated management practices of swine enterprises. Facilities and environmental needs, genetics, nutrition, reproduction, and disease control. Economics and marketing. Field trips required.

480 Animal Systems in International Development. Spring 3(3-0)
Animal Systems in various global regions. Output, land and resource conservation, and socioeconomic factors.

482 Advanced Companion Animal Management. Spring 3(2-2)
Animal behavior, training, housing, and showing. Diseases and genetics of companion animals.

483 Ruminant Nutrition. Spring 3(3-0)
Physiology and metabolism in ruminants. Prehension, digestion, metabolism, absorption, and distribution of nutrients for productive functions. Feeding management strategies and diet formulation. Field trip may be required.

490 Independent study. Fall, Spring, and Summer (1-4 credits)
Independent study in genetics, nutrition, physiology, toxicology, meat science, or management of poultry, livestock, and horses.

492 Undergraduate Research in Animal Science. Fall, Spring, and Summer 3(0-6)
Faculty supervised research in selected areas of animal science.

493 Professional Internship in Animal Science. Fall, Spring, and Summer 3 cr.
Supervised professional experience in the animal industry.

499 Senior Thesis in Animal Science. Fall, Spring, and Summer (3-9 credits)
Individual studies in an area of choice with both oral and written final communications. Topic to be determined by student and guidance committee.

AGRICULTURAL TECHNOLOGY PROGRAMS

The Department of Animal Science and the Institute of Agricultural Technology offer students a career choice in vocational education. Program areas coordinated in ANS include dairy, beef, swine, and horse management. These programs are designed to meet the needs of students who choose to make production agriculture a career and are interested in the on farm application of knowledge. Courses are animal oriented and are taught with a "hands on" philosophy in most of the instruction. Agricultural Technology programs are 12 to 18 months in length. They involve 2-3 semesters on campus taking courses in their program area. After 1½-2 semesters of course work, students are encouraged to participate in placement training, on cooperating farms. These internships allow Ag Tech students to gain the experience they need on a working farm. Students may enroll for up to 6 credits and 6 months of placement training under the supervision of faculty from ANS.

Students enrolled in Animal Science Ag Tech programs receive all services available to students at the University, including intramural and university sports, financial aid, housing, and are encouraged to participate in student clubs within the department and college.

DAIRY PRODUCTION
INSTITUTE OF AGRICULTURAL TECHNOLOGY

Because dairy farming is the leading agricultural enterprise in Michigan, the dairy program has been developed to meet the specialized needs of the herd manager and commercial diary farm. Opportunities abound for persons with the combination of classroom training in the areas of dairy husbandry, nutrition, artificial insemination, crops, farm management, and the practical experience which may be obtained on any of the many cooperating dairy farms in Michigan and the neighboring states.

Programs of study tailored to meet the individuals' wants and needs are designed around the subject matter areas of agricultural economics, communications, crop and soil sciences, and agricultural mechanics. All students must complete an internship, which can be completed on dairy operations across the country.

Suggested Curriculum

Fall of First Year

Decision Making in the Agri-Food System	ABM 100	3 cr.
Farm Management I	ABM 130	3 cr.
Dairy Farm Management Seminar	ANS 132	1 cr.
Introduction to Dairy Production	ANS 232	3 cr.
Technical Math	AT 071	2 cr.
Agriculture Communications	AT 045	2 cr.
Microcomputers	CSS 110	2 cr.
Total Credits		**16 cr.**

Spring of First Year

Dairy Herd Reproduction	ANS 235	2 cr.
Principles of Livestock Feeding	ANS 203	2 cr.
Reproduction in Livestock	ANS 205	2 cr.
Dairy Health Management	ANS 238	3 cr.
Spanish for Agriculture	AT 291	2 cr.
Professional Internship in Ag Technology	AT 293	3 cr.
Total Credits		**14 cr.**

Fall of Second Year

Commodity Marketing I	ABM 225	3 cr.
Dairy Herd Management	ANS 230	3 cr.
Dairy Feed Management	ANS 233	3 cr.
Growth, Health and Lactation in Dairy Cattle	ANS 215	2 cr.
Forage Crops	CSS 201	3 cr.
Total Credits		**14cr.**

Electives ..... 4 cr.

Program Total ..... 48 cr.

DAIRY MANAGEMENT
INSTITUTE OF AGRICULTURAL TECHNOLOGY

Description of Dairy Related Coursework

ANS 132 Dairy Farm Management Seminar
Challenges and opportunities in the dairy industry.

ANS 200C Introduction to Dairy Cattle Judging
Evaluation of functional conformation of dairy cattle. Preparation for intercollegiate competition. Field Trips required. Requires instructor approval only.

ANS 203 Principles of Livestock Feeding
Feed nutrients, digestion and metabolism. Classification of feeds. Nutrient requirements for dairy and beef cattle, sheep, swine and horses.

ANS 205 Reproduction in Livestock
Reproductive anatomy and physiology of livestock. Fertility and infertility. Reproductive health. Goals and management for reproduction.

ANS 215 Growth, Health and Lactation in Dairy Cattle
Mammary anatomy and growth. Immunization and biosecurity. Lactation and mastitis. Transition into lactation.

ANS 230 Dairy Herd Management
Analysis of dairy farm management. Investigation and problem solving. Collecting data and formulating conclusions and recommendations. Oral presentation.

ANS 232 Introductory Dairy Cattle Management
Principles and techniques of dairy herd management including calf and heifer care plus lactating and dry cow management.

ANS 233 Dairy Feed Management
Feeding management of dairy cattle with emphasis on milking cows and replacements. Cost considerations of nutrient sources and supplies. Use of home grown feeds. By-product utilization.

ANS 235 Dairy Herd Reproduction
Application of reproductive principles to dairy production.

ANS 238 Dairy Health Management
Detection of dairy cattle disease. Infections and metabolic problems.

BEEF MANAGEMENT
INSTITUTE OF AGRICULTURAL TECHNOLOGY

This major is designed allow women and men the opportunity for specialization in the areas of beef. The program also provides the flexibility in combining 2 or more of the previously mentioned areas to develop individualized programs of study. Many livestock program graduates return to the home farm.

However, many requests are received for people who are capable, industrious, and have the practical experience and specialized training provided through this program. These requests are for positions of responsibility as herd managers, assistant herd managers, and in other livestock-related areas.

In this rapidly changing era, agriculture requires aggressive young people who have specialized training in modern scientific farming. The demands for success are limited only by a persons' desires or imagination.

Suggested Curriculum

Fall Semester

Farm Management I	ABM 130	3 cr.
Animal and Product Evaluation	ANS 211	3 cr.
Feedlot Clerkship	ANS 122A	2 cr.
Computer Applications	CSS 110	2 cr.
General Education1		4 cr.
Electives		3 cr.
Total Credits		**17 cr.**

Spring Semester

Cow/Calf Clerkship	ANS 122B	2 cr.
Principles of Livestock Feeding	ANS 203	2 cr.
Reproduction in Livestock	ANS 205	2 cr.
Introduction Animal Agriculture	ANS 110	4 cr.
Introduction Beef Cattle Management	ANS 222	3 cr.
Professional Internship in Ag Technology*	AT 293	6 cr.
Total Credits		**19 cr.**

Program Total 35 cr.

General Education

Agricultural Communications (FS & SS)[1]	AT 045	2 cr.
Technical Mathematics (FS)[1]	AT 071	2 cr.

Suggested Electives

Decision Making in the Agri-Food System (FS)	ABM 100	3 cr.
Introductory Judging of Livestock and Carcasses (SS)	ANS 200A	1-3 cr.
Merchandising Purebred Livestock (SS-Even Years)	ANS 212	2 cr.
Introductory Horse Management (FS)	ANS 242	3 cr.
Principles of Animal Environments (SS)	ANS 261	2 cr.
Introductory Sheep Management (SS)	ANS 262	3 cr.
Introductory Swine Management (FS)	ANS 272	3 cr.
Agricultural Finance (SS)	AT 055	2 cr.
Introduction to Crop Science (FS)	CSS 101	3 cr.
Forage Crops (FS)	CSS 201	3 cr.

* May be taken during summer term and electives put into schedule

BEEF MANAGEMENT
INSTITUTE OF AGRICULTURAL TECHNOLOGY

Description of Beef Related Coursework

ANS 110 Introduction Animal Agriculture
History of animal agriculture and its relationship to human needs, production systems, marketing, and environmental considerations. Current goals of and limitations affecting U.S. farm animal production.

ANS 122A Feedlot Clerkship
Clerkship to gain hands-on skills in the management of a working feedlot. Feeding cattle, feed storage, manure management, health programs, evaluation and selection of cattle, facilities maintenance, marketing fed cattle.

ANS 122B Beef Cow Calf Clerkship
Clerkship to gain hands-on skills in the management of a working cow-calf farm. Feeding, reproduction, genetics, and selection, facilities maintenance, exhibiting cattle for sale and daily management skills.

ANS 203 Principles of Livestock Feeding
Feed nutrients, digestion and metabolism. Classification of feeds. Nutrient requirements for dairy and beef cattle, sheep, swine and horses.

ANS 205 Reproduction in Livestock
Reproductive anatomy and physiology of livestock. Fertility and infertility. Reproductive health. Goals and management for reproduction.

ANS 211 Animal and Product Evaluation
Evaluation of breeding stock, market animals and carcasses. Production records and soundness of breeding animals. Quality grading, yield grading and pricing of market animals and carcasses.

ANS 222 Introductory Beef Cattle Management
Management practices and systems for beef herds. Feed requirements, reproduction, breeding, performance testing, housing, and diseases. Costs and returns.

HORSE MANAGEMENT
INSTITUTE OF AGRICULTURAL TECHNOLOGY

Horse Management emphasizes management and equine skills that will prepare students for positions in Michigan's growing horse industry. There are many opportunities for students in the saddle, pleasure, and racehorse industry, if they have the proper training in management and production techniques. This program offers the most current training available in these areas.

Students spend 1 semester on placement training working with professionals in the horse industry. Leaders within the horse industry have been very supportive and are ready and willing to work closely with students.

Suggested Curriculum

Fall of First Year		
Horse Behavior & Welfare	ANS 145	1 cr.
Fundamentals of Horsemanship	ANS 140	2 cr.
Introductory Horse Management	ANS 242	3 cr.
Farm Management I	ABM 130	3 cr.
Technical Math	AT 071	2 cr.
Agriculture Communications	AT 045	2 cr.
Microcomputers	CSS 110	2 cr.
Total Credits		**15 cr.**
Spring of First Year		
Introductory Judging Horses	ANS 200D	2 cr.
Fundamentals of Horse Training or	ANS 146	2 cr.
Horsemanship II Section 002	ANS 140	
Horse Management Placement Seminar	ANS 147	1 cr.
Horse Management Clerkship at MSU Farm	ANS 149	2 cr.
Principles of Livestock Feeding	ANS 203	2 cr.
Reproduction in Livestock	ANS 205	2 cr.
Electives		2-3 cr.
Total Credits		**13- 14 cr.**
Summer of First Year or Spring of Second Year		
Placement Training/Internship	AT 293	6 cr.
Fall of Second Year		
Horse Farm Management	ANS 240	3 cr.
Horse Nutrition & Feeding	ANS 243	2 cr.
Horse Exercise Physiology	ANS 245	2 cr.
Horse Selection & Judging II (other options)	ANS 300D	1-2 cr.
Agribusiness & Food Industry Sales (other options)	ABM 222	3 cr.
Forage Crops (other options)	CSS 201	3 cr.
Total Credits		**13-14 cr.**
Program Total		**48 cr.**

HORSE MANAGEMENT
INSTITUTE OF AGRICULTURAL TECHNOLOGY

Description of Horse Related Coursework

ANS 140 Fundamentals of Horsemanship
Safe horse handling skills. Riding skills. Riding aids and working with the horse at the beginner, intermediate or advanced level.

ANS 140 Horsemanship II (section 002)
Continuation of principles learned in ANS 140. Admittance by instructor approval only.

ANS 142 Horse Training for Competition (Summer)
Training techniques to prepare horses for competition. Exhibiting horses. Requires instructor approval.

ANS 145 Horse Behavior
Principles of horse behavior. Training philosophy. Horse welfare issues.

ANS 146 Fundamentals of Horse Training
Training and preparing an untrained horse for showing. Sale preparation. Admittance by instructor approval.

ANS 147 Horse Management Placement Seminar
Securing a placement training experience. Writing a resume.

ANS 149 Clerkship at MSU Horse Farm
Management of a working horse farm. Feeding, reproduction, facilities maintenance, and daily management skills.

ANS 200D Introductory Judging of Horses
Evaluation of functional conformation and performance of horses. Preparation for intercollegiate competition.

ANS 240 Horse Farm Management
Integration of principles and skills into a farm management system. Managerial qualities, goal setting, facilities management. Health programs.

ANS 242 Introductory Horse Management
Principles of horse management. Reproduction, nutrition, herd health, genetics, economics, marketing.

ANS 243 Horse Nutrition and Feeding
Nutrient requirements of the horse, selection and evaluation of feedstuffs, balancing diets by hand and by computer, pasture management.

ANS 245 Horse Exercise Physiology
Horse body systems, physiology of exercise and conditioning programs. Goals of various conditioning programs. Common ailments of sport horses.

ANS 300D Horse Judging
Evaluation of functional characteristics of horses. Represent MSU in intercollegiate competition. Field trips required.

SWINE PRODUCTION
INSTITUTE OF AGRICULTURAL TECHNOLOGY

As the world's population increases so does the demand for quality food, including pork, which is the "most consumed meat world-wide". To feed this growing number of people, we will need new scientific technologies and highly-skilled people.

The swine management program in designed to prepare people for careers in modern pork production anywhere in the world. The one-year program judiciously balances "hands-on" training with classroom instruction, in the areas of animal care, nutrition, housing maintenance, swine health, reproduction, records management environmental management and personnel management. Students also gain practical experience through a summer-long internship on a commercial swine farm in Michigan or beyond. Swine Management graduates will have numerous career opportunities including: farm owners/operator, manager or assistant manager of production (breeding herd, farrowing, nursery grower-finisher, transportation, feeds, marketing), department supervisor, local or regional company representative.

Suggested Curriculum

Fall of First Semester

Farm Management I	ABM 130	3 cr.
Live Animal and Carcass Evaluation	ANS 211	3 cr.
Swine Management	ANS 272	3 cr.
Swine Clerkship	ANS 171	2 cr.
Technical Math	AT 071	2 cr.
Agriculture Communications	AT 045	2 cr.
Microcomputers	CSS 110	2 cr.
First Aid and CPR	AT 098	1 cr.
Total Credits		**18 credits**

Spring of Second Semester

Introductory Animal Agriculture	ANS 110	4 cr.
Principles of Livestock Feeding	ANS 203	2cr.
Reproduction in Livestock	ANS 205	2 cr.
Principle of Animal Environments	ATM 261	2 cr.
Ag Facilities Maintenance	ATM 062	2 cr.
Placement Training	AT 099	3 cr.
Agriculture Communications	AT 045	2 cr.
Leadership	AT 095	2 cr.
Total Credits		**17 credits**

Program Total..... 35 credits

SWINE MANAGEMENT
INSTITUTE OF AGRICULTURAL TECHNOLOGY

Description of Beef Related Coursework

ANS 110 Introduction Animal Agriculture
History of animal agriculture and its relationship to human needs, production systems, marketing, and environmental considerations. Current goals of and limitations affecting U.S. farm animal production.

ANS 171 Swine Clerkship
Clerkship to gain hands-on experience in swine care. Nutrition. Housing maintenance. Health. Reproduction. Records management. Environmental management. Personnel management.

ANS 203 Principles of Livestock Feeding
Feed nutrients, digestion and metabolism. Classification of feeds. Nutrient requirements for dairy and beef cattle, sheep, swine and horses.

ANS 205 Reproduction in Livestock
Reproductive anatomy and physiology of livestock. Fertility and infertility. Reproductive health. Goals and management for reproduction.

ANS 211 Animal and Product Evaluation
Evaluation of breeding stock, market animals and carcasses. Production records and soundness of breeding animals. Quality grading, yield grading and pricing of market animals and carcasses.

ANS 272 Introductory Swine Management
Swine production principles, practices, technologies, and systems. Field Trips required.

ANIMAL SCIENCE FACULTY

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