

ANIMAL SCIENCES, B.S.

OVERVIEW

Studying the biology of domesticated animals helps us better understand their health. The major addresses important issues related to animal health and welfare, biomedical advancements, food safety, precision livestock farming, and land and water stewardship.

Students in the animal sciences major learn about cattle, swine, sheep, horses, poultry, and goats, as well as companion animals. They also examine recent discoveries connecting human and animal health.

The Department of Animal and Dairy Sciences is home to the undergraduate program in animal sciences. It produces skilled leaders in animal agriculture and sustainable food systems while embracing innovation and technology. A 10:1 student-faculty ratio and small classes allow for meaningful connections among students and instructors.

Students can take courses on an assortment of topics including animal breeding, veterinary genetics, animal health and welfare, animal nutrition, and companion animals including dogs and cats, and more. The major offers a science-focused path for students interested in veterinary medicine, animal science, medicine, or other graduate programs. Students can also focus on the business of animal sciences with classes in economics, accounting, marketing, farm management, and other courses.

Learn through hands-on, real world experiences

The program emphasizes hands-on learning, and students choose from more than a dozen lab courses covering animal handling, reproductive biology, veterinary genetics, meat processing, animal welfare, and more. Field courses look at international agriculture and sustainability. The department encourages animal sciences majors to get involved with internships and research with faculty and staff.

Build community and networks

Animal sciences majors find a welcoming community where professors know their students and can provide guidance based on their specific goals. Outside of the classroom, students can join several student organizations including the Pre Vet Club (<https://win.wisc.edu/organization/prevetassociation/>), Badger Meat Science Club (<https://win.wisc.edu/organization/badgermeatscienceclub/>), Saddle and Sirloin Club (<https://win.wisc.edu/organization/saddleandsirloin/>), and Poultry Club (<https://www.facebook.com/PoultryClubUWMadison/>). Competitions, such as animal welfare assessment and meat judging offer students unique networking experiences in the industry.

Customize a path of study

The variety of classes in the department, including paths that emphasize science or business, allows animal sciences students to customize their coursework to fit their career goals. Students can elect to complete Honors in Animal Sciences.

Make a strong start

The department offers an introductory seminar course that helps students maximize their education, develop professional skills, and make informed decisions about their classes, internships, and career opportunities.

Gain global perspective

Students are encouraged to study abroad; the department offers globally focused courses that look at livestock production, health, animal agriculture, and sustainable development. Students can explore studying abroad as an Animal Sciences major utilizing the Animal Sciences Major Advising Page. Students work with their advisor and the CALS study abroad office to identify appropriate programs.

HOW TO GET IN

To declare this major, students must be admitted to UW–Madison and the College of Agricultural and Life Sciences (CALs). For information about becoming a CALs first-year or transfer student, see Entering the College (<http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#enteringthecollegertext>).

Students who attend Student Orientation, Advising, and Registration (SOAR) with the College of Agricultural and Life Sciences have the option to declare this major at SOAR. Students may otherwise declare after they have begun their undergraduate studies. For more information, contact the advisor listed in the Contact Box for the major.

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (<http://guide.wisc.edu/undergraduate/#requirementsforundergraduatetext>) section of the *Guide*.

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|-------------------|--|
| General Education | <ul style="list-style-type: none"> • Breadth–Humanities/Literature/Arts: 6 credits • Breadth–Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits • Breadth–Social Studies: 3 credits • Communication Part A & Part B * • Ethnic Studies * • Quantitative Reasoning Part A & Part B * |
|-------------------|--|

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF AGRICULTURAL AND LIFE SCIENCES REQUIREMENTS

In addition to the University General Education Requirements, all undergraduate students in CALS must satisfy a set of college and

major requirements. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies, Science, and Capstone), but courses counted toward university requirements may also be used to satisfy a college and/or a major requirement; similarly, courses counted toward college requirements may also be used to satisfy a university and/or a major requirement.

COLLEGE REQUIREMENTS FOR ALL CALS B.S. DEGREE PROGRAMS

Code	Title	Credits
Quality of Work: Students must maintain a minimum cumulative grade point average of 2.000 to remain in good standing and be eligible for graduation.		
Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.		
	First Year Seminar (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSThirdYearSeminarCourses)	1
	International Studies (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSIInternationalStudiesCourses)	3
	Physical Science Fundamentals	4-5
CHEM 103	General Chemistry I	
or CHEM 108	Chemistry in Our World	
or CHEM 109	Advanced General Chemistry	
	Biological Science	5
	Additional Science (Biological, Physical, or Natural)	3
	Science Breadth (Biological, Physical, Natural, or Social)	3
CALS Capstone Learning Experience: included in the requirements for each CALS major (see "Major Requirements") (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSCapstoneRequirement)		

MAJOR REQUIREMENTS

Courses may not double count within the major (unless specifically noted otherwise), but courses counted toward the major requirements may also be used to satisfy a university requirement and/or a college requirement. A minimum of 15 credits must be completed in the major that are not used elsewhere.

Code	Title	Credits
Mathematics and Statistics		
Select one of the following (or may be satisfied by placement exam): ¹		5-6
MATH 112 & MATH 113	Algebra and Trigonometry	
MATH 114	Algebra and Trigonometry	
Select one of the following:		3-4
STAT 301	Introduction to Statistical Methods	
STAT 371	Introductory Applied Statistics for the Life Sciences	

Chemistry

Select one of the following:		5-10
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	

CHEM 109	Advanced General Chemistry	
Biology		
Select one of the following:		13
Option 1:		
BIOLOGY/ BOTANY/ ZOOLOGY 151	Introductory Biology	
ZOOLOGY/ BIOLOGY/ BOTANY 152	Introductory Biology	
Option 2:		
ZOOLOGY/ BIOLOGY 101	Animal Biology	
ZOOLOGY/ BIOLOGY 102	Animal Biology Laboratory	
BOTANY/ BIOLOGY 130	General Botany	
Option 3:		
BIOCORE 381	Evolution, Ecology, and Genetics	
BIOCORE 382	Evolution, Ecology, and Genetics Laboratory	
BIOCORE 383	Cellular Biology	
BIOCORE 384	Cellular Biology Laboratory	
Genetics		
GENETICS 466	Principles of Genetics	3
Animal Sciences Core²		
AN SCI/DY SCI 101	Introduction to Animal Sciences	3
AN SCI/DY SCI 102	Introduction to Animal Sciences Laboratory	1
AN SCI/FOOD SCI 305	Introduction to Meat Science and Technology	4
AN SCI/DY SCI/ NUTR SCI 311	Comparative Animal Nutrition	3
AN SCI/DY SCI 320	Animal Health and Disease	3
AN SCI/DY SCI 361	Introduction to Animal and Veterinary Genetics	2
AN SCI/DY SCI 362	Veterinary Genetics	2
or AN SCI/ DY SCI 363	Principles of Animal Breeding	
AN SCI/DY SCI 373	Animal Physiology	3
or AN SCI/ DY SCI 434	Reproductive Physiology	
Animal Science Depth		
Select 12 credits from animal science depth courses ²		12
Emphasis		
Select an emphasis		24-25
Capstone		
AN SCI 435	Animal Sciences Proseminar	2
Total Credits		88-96

¹

Science Emphasis students may choose to complete MATH 171 Calculus with Algebra and Trigonometry I and MATH 217 Calculus with Algebra and Trigonometry II in place of MATH 114 Algebra and Trigonometry and MATH 221 Calculus and Analytic Geometry I.

2

A course cannot be used for credit in both the Core and Depth within major sections.

DEPTH COURSES

Code	Title	Credits
Select 12 credits from the following:		
AN SCI/ FOOD SCI 321	Food Laws and Regulations	1
AN SCI 336	Animal Growth and Development	3
AN SCI/DY SCI 362 or AN SCI/DY SCI 363	Veterinary Genetics Principles of Animal Breeding	2
AN SCI 366	Concepts in Genomics	3
AN SCI/DY SCI 370	Livestock Production and Health in Agricultural Development ¹	3
AN SCI/DY SCI 373 or AN SCI/ DY SCI 434	Animal Physiology Reproductive Physiology	3
AN SCI/DY SCI 414	Ruminant Nutrition & Metabolism	3
AN SCI 415	Application of Monogastric Nutrition Principles	2
AN SCI 431	Beef Cattle Production	3
AN SCI 432	Swine Production	3
DY SCI/ AGRONOMY 471	Food Production Systems and Sustainability	3
AN SCI/DY SCI/ FOOD SCI/ SOIL SCI 472	Animal Agriculture and Global Sustainable Development	1
AN SCI/DY SCI/ FOOD SCI/ SOIL SCI 473	International Field Study in Animal Agriculture and Sustainable Development	2
AN SCI/FOOD SCI 515	Commercial Meat Processing	2
Up to 3 credits from courses listed below can go toward the required 12 credits of depth:		
AN SCI 399	Coordinative Internship/ Cooperative Education	
AN SCI 681	Senior Honor Thesis	
AN SCI 682	Senior Honors Thesis	
AN SCI 699	Special Problems	

1

Meets CALS International Studies requirement.

EMPHASIS COURSES

SCIENCE EMPHASIS

Code	Title	Credits
MATH 221 or MATH 217	Calculus and Analytic Geometry I Calculus with Algebra and Trigonometry II	5
PHYSICS 103	General Physics	4
CHEM 343	Organic Chemistry I	3
BIOCHEM 501 or BMOLCHEM 50:	Introduction to Biochemistry	3

Select 9 credits from the following: 9

CHEM 344	Introductory Organic Chemistry Laboratory
CHEM 345	Organic Chemistry II
MICROBIO 303	Biology of Microorganisms
MICROBIO 304	Biology of Microorganisms Laboratory
M M & I 341	Immunology
M M & I/PATH- BIO 528	Immunology
PHYSICS 104	General Physics
PSYCH 449	Animal Behavior

Total Credits 24

BUSINESS EMPHASIS

Up to two courses may be applied to Certificate in Business Mgmt. for Ag. & Life Sciences.

Code	Title	Credits
A A E 215 or ECON 101	Introduction to Agricultural and Applied Economics ¹ Principles of Microeconomics	4
A A E 320	Agricultural Systems Management	3
A A E 322	Commodity Markets	4
Select one of the following: 3		
M H R 305	Human Resource Management	
GEN BUS 310	Fundamentals of Accounting and Finance for Non-Business Majors	
GEN BUS 311	Fundamentals of Management and Marketing for Non-Business Majors	

Select one of the following: 3

BIOCHEM 301	Survey of Biochemistry
CHEM 341	Elementary Organic Chemistry
BIOCHEM 501	Introduction to Biochemistry

Select 9 credits from the following: 9

A A E 419	Agricultural Finance
ACCT I S 100 or ACCT I S 300	Introductory Financial Accounting Accounting Principles
AGRONOMY/ HORT/SOIL SCI 326	Plant Nutrition Management
ECON/FINANCE 300	Introduction to Finance
M H R 300	Managing Organizations
MARKETNG 300	Marketing Management
MATH 217 or MATH 221	Calculus with Algebra and Trigonometry II Calculus and Analytic Geometry I
MICROBIO 303	Biology of Microorganisms
MICROBIO 304	Biology of Microorganisms Laboratory
PHYSICS 103	General Physics
SOIL SCI 301	General Soil Science

Total Credits 26

1

A A E 215 Introduction to Agricultural and Applied Economics not accepted as a prerequisite for some advanced Business courses.

HONORS IN THE MAJOR

Students admitted to the university and to the College of Agricultural and Life Sciences are invited to apply to be considered for admission to the CALS Honors Program.

Admission Criteria for New First-Year Students:

- Complete program application including essay questions

Admission Criteria for Transfer and Continuing UW-Madison Students:

- UW-Madison cumulative GPA of at least 3.25
- Complete program application including essay questions

HOW TO APPLY

The application is available on the CALS Honors Program website (<https://cals.wisc.edu/academics/undergraduate/current-students/honors-program/>). Applications are accepted at any time.

New first-year students with accepted applications will automatically be enrolled in Honors in Research. It is possible to switch to Honors in the Major in the student's first semester on campus after receiving approval from the advisor for that major. Transfer and continuing students may apply directly to Honors in Research or Honors in the Major (after approval from the major advisor).

REQUIREMENTS

All CALS Honors programs have the following requirements:

- Earn at least a cumulative 3.25 GPA at UW-Madison (some programs have higher requirements)
- Complete the program-specific requirements listed below
- Submit completed thesis documentation to CALS Academic Affairs

REQUIREMENTS

To earn Honors in the Major, students are required to take at least 20 honors credits. In addition, students must take AN SCI 681 Senior Honor Thesis and AN SCI 682 Senior Honors Thesis when completing their thesis project; please see the Honors in Major Checklist (<http://www.cals.wisc.edu/academics/undergraduate-programs/get-involved/honors-program/honors-in-the-major/>) for more information.

UNIVERSITY DEGREE REQUIREMENTS

Total Degree To receive a bachelor's degree from UW-Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency	Degree candidates are required to earn a minimum of 30 credits in residence at UW-Madison. "In residence" means on the UW-Madison campus with an undergraduate degree classification. "In residence" credit also includes UW-Madison courses offered in distance or online formats and credits earned in UW-Madison Study Abroad/Study Away programs.
Quality of Work	Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

LEARNING OUTCOMES

1. (Knowledge and comprehension) Develop the working vocabulary of an animal scientist, a working knowledge of the basic anatomy, biochemistry, physiology, and genetics of animal and meat biology, and the applied nutrition, breeding, product harvest and processing skills, necessary to manage animal production systems. Demonstrate knowledge through rigorous examination and demonstration through hands-on instructional laboratory activities.
2. (Analytical processing) Develop the ability to reduce complex datasets and scientific information into meaningful relationships and correlations, and using the scientific literature, develop hypotheses to test the cause of predicted relationships using the scientific method. Demonstrate skills through a senior capstone experience and through individualized research opportunities and instructional activities.
3. (Integration for application) Apply knowledge to develop solutions to real world problems. Identify problems yet to be investigated and in need of advanced study. Ability to integrate and apply knowledge is demonstrated through our internship programs, animal related job experiences, club activities, and problems sets that students solve in exams and laboratory settings.
4. (Critical thinking) Find their sources of information using peer reviewed research articles. Learn not only to question popular press, but understand that even in the scientific literature there are contradictory findings. Capacity to synthesize scientific literature such that they can communicate a position backed with strong scientific support. Skills are demonstrated through the reading, writing and discussion of science-based papers in key courses during their educational process and through an oral presentation in their capstone course.
5. (Effective communication) Communicate, both in writing and orally, the science behind the biology and management of domestically farmed animals. Communications provide new insights into animal production, and are explained in a manner fitting with the audience. Ability to communicate is measured by their effectiveness in presenting research posters and presentations, their analysis of the literature in papers and presentations in class and during their senior capstone course.

FOUR-YEAR PLAN

FOUR-YEAR PLAN

SAMPLE ANIMAL SCIENCES FOUR-YEAR PLAN

Freshman

Fall	Credits	Spring	Credits
AN SCI/DY SCI 101		3 CHEM 104	5
AN SCI/DY SCI 102		1 AN SCI Elective	1-3
AN SCI 135		1 Social Science (or Humanities)	3
CHEM 103		4 Ethnic Studies (or CALS International Studies)	3
MATH 113 or 114		3-5	
COMM-A		3	
		15-17	12-14

Sophomore

Fall	Credits	Spring	Credits
ZOOLOGY/BIOLOGY/ BOTANY 151		5 ZOOLOGY/BIOLOGY/ BOTANY 152	5
STAT 371		3 Emphasis Course ¹	3
Emphasis Course ¹		3-4 Humanities (or Social Science)	6
CALS International Studies (or Ethnic Studies)		3	
		14-15	14

Junior

Fall	Credits	Spring	Credits
AN SCI/DY SCI 434		3 AN SCI/DY SCI/ NUTR SCI 311	3
GENETICS 466		3 AN SCI/DY SCI 320	3
Emphasis Course		3 An Sci Depth ²	3
AN SCI Depth Course		3 AN SCI/DY SCI 361 ³	2
AN SCI/FOOD SCI 305		4 AN SCI/DY SCI 362 or 363 ³	2
		Emphasis Course	3
		16	16

Senior

Fall	Credits	Spring	Credits
AN SCI 435		2 An Sci Depth	5-6
An Sci Depth		3 Electives	3
Emphasis Course		3-4 Emphasis course	3-5
Emphasis course		3-4	
AN SCI 699		1-3	
		12-16	11-14

Total Credits 110-122

1

Choose Science or Business Emphasis; see Requirements tab for details.

2

12 credits required; see Requirements tab for options.

3

These courses are generally offered as intensive modular courses with 361 being offered first half of the semester and 362/363 offered second half of the semester.

ADVISING AND CAREERS

Advising

Each student receives one-on-one guidance from their professional advisor. Academic advisors will help students build an individualized, four-year plan. Many animal sciences majors have completed double majors with Life Sciences Communication, Genetics and Genomics, and departments outside of CALS such as Spanish, depending on the students' interests. Certificates such as CALS Business Management, Environmental Studies, Food Systems, and Global Health compliment several of our students interests and provide depth to their undergraduate program.

Career opportunities

All students have a faculty mentor to assist with their career planning.

Students graduating with a degree in animal sciences can enter a number of career fields. These include nutrition, herd management, food testing, business, marketing, technology, meat science, healthcare, research, and teaching. Graduates have also found positions within zoos. Many students go on to pursue graduate education in veterinary medicine, animal science, or human medicine.

PEOPLE

ANIMAL AND DAIRY SCIENCES DEPARTMENT

Professors

Weigel, Kent (Chair)
 Khatib, Hasan (Associate Chair)
 Adcock, Sarah
 Arriola Apelo, Sebastian
 Cabrera, Victor
 Claus, Jim
 Crenshaw, Thomas
 Dorea, Joao
 Ferraretto, Luiz
 Fricke, Paul
 Guo, Wei
 Hernandez, Laura
 Kirkpatrick, Brian
 Laporta, Jimena
 Leone, Vanessa
 Mantovani, Hilario
 Ortega, Sofia
 Parrish, John
 Peñagaricano, Francisco
 Reed, Jess
 Richards, Mark
 Ricke, Steve
 Rosa, Guilherme
 Shanmuganayagam, Dhanansayan (Dhanu)
 Sindelar, Jeffrey
 Van Os, Jennifer
 Wattiaux, Michel
 White, Heather

Wiltbank, Milo

Instructors/Lecturers

Halbach, Theodore
 Kean, Ron
 O'Rourke, Bernadette
 Ronk, Eric

Advisor

Sandberg, Liv

Link to: <https://andysci.wisc.edu/about-us/faculty-and-staff/>

WISCONSIN EXPERIENCE**Internships**

Animal sciences majors take part in a number of internships around campus and beyond. Past students interned at veterinary clinics and hospitals, genetics companies, animal feed companies, Extension, food companies, farms, animal pharmaceutical companies, animal councils, and more.

Opportunities at Bucky's Varsity Meats, an on-campus meat-processing facility, and the Livestock Laboratory give students hands-on experience with all aspects of meat production.

Research experience

There are numerous opportunities to conduct research with faculty and staff in the department. Around 75 percent of animal sciences majors have completed independent study projects, and research stipends are available. Some students also take part in research as part of an honors thesis.

Student organizations

By joining a student organization, animal sciences majors connect with other students and build relationships with faculty and staff. Organizations available to animal sciences students include Pre Vet Club (<https://prevetassociation.weebly.com/>), Badger Meat Science Club (<https://win.wisc.edu/organization/badgermeatscienceclub/>), Saddle and Sirloin Club (<https://win.wisc.edu/organization/saddleandsirloin/>), and Poultry Club (<https://www.facebook.com/PoultryClubUWMadison/>).

There are additional opportunities for students to get involved in animal-related organizations on campus such as Hooper Riding Club (<https://www.hooferriding.org/>), Badger Dairy Club (<https://win.wisc.edu/organization/badgerdairyclub/>), Collegiate FFA (<http://collegiateffamadison.weebly.com/>), and Association of Women in Agriculture (<http://awamadison.org/>).

Competitive teams

Students can join teams and compete against other universities for events such as the Animal Welfare Assessment and the Animal Science Academic Quadrathlon competition.

Global engagement

The department encourages students to study abroad and offers globally focused courses that look at livestock production, health, animal agriculture, and sustainable development. Students can find more

information on the International Academic Programs website (<https://www.studyabroad.wisc.edu/>) and the CALS study abroad advising page (<https://cals.wisc.edu/academics/undergraduate-students/international-programs/study-abroad-advising/>).

Community engagement and volunteering

Animal sciences students engage in a number of volunteer opportunities including working at the Livestock Lab, the Poultry Research Lab, the Dairy Cattle Center, Bucky's Varsity Meats, and Animal Farm Units. Students also participate in Extension, 4-H and undergraduate student recruitment events.

On campus, the Morgridge Center for Public Service (<https://morgridge.wisc.edu/>) provides resources to help students connect with volunteer opportunities based on their interests and goals.

RESOURCES AND SCHOLARSHIPS

The animal sciences program awards \$25,000 – 35,000 in annual scholarships. Students in the College of Agricultural and Life Sciences receive more than \$1.25 million in scholarships annually. Learn more about college scholarships here. (<https://cals.wisc.edu/academics/undergraduate-students/financing-your-education/cals-scholarships/>)

The new, state-of-the-art Meat Science & Animal Biologics Discovery Building houses a fully functional meat processing facility, a retail shop called Bucky's Varsity Meats, and an advanced laboratory that offer students highly valued hands-on opportunities.

Other specialized facilities offering students hands-on experiences include:

- The Livestock Laboratory accommodates research on multiple species and includes a surgery room.
- The Poultry Research Laboratory houses chickens and other birds.
- The Dairy Cattle Center houses more than 80 dairy cows on campus in a tie-stall barn.
- A network of off-campus Agricultural Research Stations (<https://ars.wisc.edu/>) serve as living laboratories for agricultural animal research.