

Program Proposal for a Minor

1. Name of the proposed minor: Feed Technology
2. Name of the department(s) involved: Agricultural and Biosystems Engineering, Animal Science
3. Name of contact person(s): Dr. Tom Brumm
4. General description of the minor.

The Feed Technology minor is 18 credits that cover the breadth of animal nutrition, feed formulation, grain handling and storage, feed processing and technology, and feed safety and quality.

Required courses:

1. ABE 469 (Grain Processing and Handling); or TSM 322 and TSM 322L (Preservation of Grain Quality with laboratory)
 2. TSM 455X (Feed Processing and Technology)
 3. TSM 457X (Feed Safety, Ingredient Quality and Analytics)
 4. AN S 319 (Animal Nutrition)
 5. AN S 320 (Animal Feeds and Feeding)
 6. AN S 324 (Food Processing for Companion Animals)
5. Need for the proposed minor.

Iowa's economy is heavily dependent on grain and livestock production. Iowa and the Midwest are one of the densest feed production and grain processing regions in the world. Feed technology (grain handling and storage, feed formulation, feed manufacturing, biosecurity, feed safety and novel ingredients processing) is a critical component to the success of these industries. Additionally, feed manufacturing is a global business, in terms of customers, ingredients and products.

New technologies and more stringent requirements and regulations in the feed industry have increased the need for a capable and knowledgeable workforce with practical and transferrable skills. The U.S. feed industry is facing a major shortage of qualified technical talent. This minor provides students with the skills, knowledge and abilities to be successful in the feed manufacturing industry or enable them to interact with the feed industry as part of their careers in grain and livestock production.

6. Objectives of the proposed minor including the student learning outcomes and how the learning outcomes will be assessed.

Upon completion of the minor, students will:

- Understand the principles of nutrition and feed ingredients and their application to diet formulation and best feeding practices for managed animals. (AN S 319, 320, 324)
- Be able to identify, explain and select methods of laboratory analyses of feeds and feed nutrients. (AN S 320, AN S 324, TSM 457)
- Understand the knowledge, techniques, skills, and tools related to grain quality, handling and drying. (TSM 322/322L or ABE 469)
- Be able to identify, analyze and solve grain quality, drying, and handling problems. (TSM 322/322L or ABE 469)
- Be able to appropriately balance rations for livestock, poultry and companion animals within the limits of preparation, transport, storage, feeding, and economic feasibility. (AN S 320, AN S 324 and TSM 455)
- Understand the basic processes used to convert raw materials (ingredients) into finished animal and companion animal feeds. (TSM 455 and AN S 324)
- Understand the principles of design and operation of contemporary feed manufacturing equipment, including equipment maintenance and trouble-shooting. (TSM 455)
- Be able to relate the effect of feed manufacturing processes and feed ingredients to animal performance and health and feed safety. (TSM 455, TSM 457, and AN S 324)
- Understand feed mill operations management as it pertains to feed quality and safety, worker safety, and profitability. (TSM 455)
- Be able to identify chemical, biological, and physical hazards in grain and feed and their associated risks, along with practical ways to monitor, manage, and mitigate hazards in grain handling and feed manufacturing facilities. (TSM 457)
- Understand the role and scope of regulatory and quality management systems for feed and grain safety. (TSM 457 and AN S 324)
- Be familiar with the importance, scope, and trends of the global animal feed industry. (AN S 320, AN S 324, TSM 455, TSM 457)

Learning outcomes will be assessed in the individual courses through assignments and examinations.

7. Relationship of the minor to other programs at Iowa State University.

Animal Science has classes in animal nutrition and feeding but does not emphasize feed technology and processing. Agricultural and Biosystems Engineering has classes in grain handling, feed processing, and feed quality and safety, but no classes in animal nutrition and feeding. There is no academic program at Iowa State that covers the breadth of feed technology – from animal nutrition and feed formulation to feed manufacturing and feed quality.

Additionally, Iowa State is building a Feed Mill and Grain Science Complex, breaking ground in 2019. This complex will provide hands-on experiences for students taking the courses within the minor. Real-world experiences in grain operations, feed manufacturing and food/feed safety will be an integral part of the minor.

8. Relationship of the minor to the strategic plans of the university, of the college, and of department or program.

ISU Strategic Plan 2017-2022.

- Goal 1: Ensure access to the ISU Experience – including an exceptional education offering practical, global, and leadership experiences that shape the well-rounded citizens and informed critical thinkers needed in the 21st century; Subgoal 1.3 - provide learning opportunities to prepare students for lives and careers in a dynamic, global community. Students earning the minor will be well prepared for careers in the feed or related industries.
- Goal 3: Improve the quality of life for all Iowans through services and programs dedicated to economic development and the promotion of healthy communities, people, and environments; Subgoal 3.1 Increase the number of Iowa public, private, and non-profit sectors that receive direct assistance or benefit from engaging with the university's programs, services, and initiatives. Many students earning the minor will be employed in and will assist the Iowa feed industry.

College of Agriculture and Life Sciences Strategic Plan 2017-2022

- Goal: deliver high-quality, highly experiential educational programs, providing opportunities for students to grow in cultural competency, global awareness, and the ability to communicate within and across disciplines. The classes in this minor will utilize the ISU Feed Mill and Grain Sciences Complex for numerous experiential learning opportunities. The minor is interdisciplinary, encouraging communication within and across disciplines. Learning about the global nature of the feed industry is an important component of the classes within the minor.

Agricultural and Biosystems Engineering Strategic Plan 2011-2016

- Our programs educate hands-on problem solvers who can blend theory and practice. The minor meets this value statement.
- Our programs are rigorous. The classes in the minor have an appropriate degree of rigor.
- Students are supported in their educational and career goals. The minor enables students to be well prepared for careers in the grain and feed industry.

Animal Science Strategic Plan

- The Animal Science Department educates and develops students with life skills and knowledge to engage and serve the public and people who produce animals and animal products. This minor is compatible with this statement.
- The Animal Science Department supports the education of students through discovery, development, and dissemination of knowledge related to basic animal biology, applied animal science, and animal products, in order to promote economically viable, socially acceptable, and environmentally sustainable systems. This minor will aid students in discovering and faculty and graduates in disseminating knowledge related to the production and care of managed animals in economically viable, socially acceptable and sustainable, environmentally sustainable manner.

9. Comparison of the proposed minor with similar programs at other universities, including the Regent's universities.

There are no similar programs at four-year institutions in Iowa. Kansas State University (KSU) has undergraduate and graduate degrees in Feed Science. KSU previously offered an undergraduate minor in Feed Science but no longer does. North Carolina State has a graduate certificate in Feed Science.

10. Program requirements and procedures, including:

- a. Prerequisites for prospective students;
There are no pre-requisites other than the pre-requisites for the individual classes.
- b. Application and selection process;
Students must be enrolled as an undergraduate student in any college or major at Iowa State University. There are no selection criteria other than this. Students apply for the minor through academic advisors in Animal Science or Agricultural and Biosystems Engineering
- c. Language requirements;
There are no language requirements.
- d. Courses and seminars presently available for credit toward the program;
All courses proposed for the minor are already available. Specifically, they are:
 7. ABE 469 (Grain Processing and Handling); or TSM 322 and TSM 322L (Preservation of Grain Quality with laboratory)
 8. TSM 455X (Feed Processing and Technology)
 9. TSM 457X (Feed Safety, Ingredient Quality and Analytics)
 10. AN S 319 (Animal Nutrition)
 11. AN S 320 (Animal Feeds and Feeding)
 12. AN S 324 (Food Processing for Companion Animals)
- e. Proposed new courses or modifications of existing courses;
No new courses are proposed. Currently, two of the courses are experimental. After they are taught the required number of times, they will become part of the course catalog.
- f. Advising of students;
Students will be advised by either ABE or Animal Science advisors. Each department will designate an academic advisor for this minor.
- g. Implications for related areas within the university.
Iowa State is building a Feed Mill and Grain Science Complex. This complex will provide hands-on experiences for students taking the courses within the minor. This undergraduate minor is an important part of the overall education/research/outreach mission of the Complex.

11. General description of the resources currently available and future resource needs, in terms of:

- a. Faculty members;
These existing faculty members are currently teaching the courses in the minor.
 1. Dr. Kurt Rosentrater (ABE 469) or Sam Cook (TSM 322/322L)

2. Sam Cook (TSM 455)
 3. Dr. Erin Bowers (TSM 457)
 4. Dr. Ranga Appuhamy Jayasooriya and Dr. Lance Baumgard (AN S 319)
 5. Dr. Mariana Rossoni-Serao (AN S 320)
 6. Dr. Elisabeth Lonergan, Dr. Mariana Rossoni-Serao, and Dr. Kurt Rosentrater (AN S 324)
- b. Computers, laboratories, and other facilities;
Computer laboratories are available in Sukup Hall and Kildee Hall. Laboratory facilities are available in Sukup Hall, Kildee Hall and the Center for Crops Utilization Research in the Food Sciences Building.
 - c. Library facilities (journals, documents, etc.) in the proposed area;
There are dozens of journals and publications in the fields of: animal nutrition; animal feeds and feeding; grain and ingredient handling, storage and processing; and feed manufacturing.
 - d. Supplies, field work, student recruitment, etc.
No additional supplies beyond those for the existing classes will be required. Students will be recruited through advertising on campus.
12. Describe the needs for new resources and/or reallocated resources. Attach to the program proposal memos from the department chair(s), the college dean(s), and other appropriate persons, agreeing to the allocation of new resources and/or the reallocation of resources.

There is no need for additional resources and/or reallocated resources. The courses in the minor are already being offered. The minor can be offered regardless of the construction status of the ISU Feed Mill and Grain Science Complex. However, the Complex will provide hands-on experiences that will make the student learning experience in this minor exceptional.

13. Attach to the program proposal, letters of support, recommendations, and statements when appropriate, from programs and departments at ISU which are associated with the proposed program or have an interest in the proposed program.

See attached letters of support from:

- Animal Science department chair
- Agricultural and Biosystems Engineering chair
- College of Agriculture and Life Sciences Dean

14. If the new program is interdisciplinary, a governance document should be created and submitted to the Associate Provost for Academic Programs. Indicate here that it has been completed.

See attached governance document. Approval is being requested.

Approvals

ABE Technology Curriculum Committee 2/13/2018
Animal Science Curriculum Committee 2/16/2018
Animal Science Faculty 3/5/2018

Academic Program Approval Voting Record

This document is to be appended as the last page of the proposal for any new or revised academic program to record the successive votes of approval as the proposal moves through its required review and approval steps. Consult Faculty Handbook Section 10.8 or the Faculty Senate Curriculum Committee website for information regarding Committee review and voting requirements for each action.

Curricular Action: (check appropriate boxes below)

1. New Program Name Change Discontinuation Concurrent Degree for:
2. Undergraduate Major Graduate Major Undergraduate Minor Graduate Minor
 Undergraduate Certificate Graduate Certificate Other: _____
3. Name of Proposed Change: Feed Technology undergraduate minor
4. Name of Contact Person: Tom Brumm e-mail address: tbrumm@iastate.edu
5. Primary College: College of Agriculture and Life Sciences Secondary College: none
6. Involved Department(s): Agricultural and Biosystems Engineering (ABE)

Animal Science

Voting record for this curricular action:

Voting Body	Votes			Date of Vote
	For	Against	Abstain	
Dept. or Program Committee				
ABE Technology Curriculum Committee	6	0	0	February 23, 2018
ABE Faculty	16	0	0	March 9, 2018
Animal Science Curriculum Committee	5	0	0	Feb. 15, 2018
Animal Science Faculty	26	0	0	March 5, 2018
College Curriculum Committee				
CALS CC	14	0	0	March 28, 2018
College Approval Vote				
CALS	134	1	8	April 18, 2018
Faculty Senate Curriculum Committee	5	0	0	April 20, 2018
Faculty Senate Academic Affairs Council	6	0	0	September 24, 2018
Faculty Senate				