



## **AFIA 500: Fundamentals of Feed Manufacturing**

**Course Description:** AFIA 500 is a structured self-paced 5-week professional development course. The course will outline the basic fundamentals of feed manufacturing including understanding how the U.S. feed industry evolved and its current structure as well as the different processing steps involved in manufacturing feed. The lectures for this course are available as narrated PowerPoint presentations that are available for both instant view, or for downloading if a participant has a slower Internet connection. Quizzes, discussion questions and additional course materials are available via K-State's Canvas learning system.

**Course Requirements:** This non-credit professional development course is taught as an intensive 5-week module utilizing distance learning technologies that require the following commitments from students:

1. A realization that the course material for this 5-week non-credit course module is taught during several lectures each week. For every lecture hour you will need to spend additional hours studying the materials and working through the on-line quizzes and assignments. Thus, this course will require approximately 3-5 hours of your time every week for five weeks.
2. You can work through each lecture at your own convenience and complete it by taking the self-grading on-line quiz at any time day or night. To keep you motivated, we have developed some discussion questions and assignments that are based on the weekly lecture materials and that encourage interaction with the instructor and fellow students. This course is being offered as a structured self-paced course, so materials will be available on a structured release based on the information listed below.
3. You will need self-discipline to set aside your own time to work through the narrated PowerPoint lectures, and then to go on-line to complete the associated quizzes. Do not underestimate this requirement otherwise you will quickly fall behind and not complete the course module within the 5-week period! The course requires a computer with internet access. A high-speed internet connection is ideal, but not required, as all of the lectures are downloadable, and can be downloaded to your hard-drive.

**Completion:** In order to complete the course and receive a course completion certificate from AFIA as well as a Continuing Education Unit (CEU) from Kansas State University the following needs to be completed:

1. Welcome discussion post
2. All quizzes must be completed. Three attempts are available. The highest score of the three will be posted in the grade book.
3. Assignments mentioned in the syllabus, including Feed Mill Manager Interview, Particle Size Reduction, QA Mission Statement and Mixer CV Calculations.
4. When all items are completed, the total overall grade must be 80% or higher.

**Course Transfer Policy:** Should a participant not be able to participate for the dates they registered, they can transfer their registration to the next class offering. AFIA will assess a \$200 fee in addition to the registration fee. This fee covers fixed fees from KSU and the additional time needed from the facilitator.

**Instructors:**

**Dr. Charles Stark**, Professor, Kansas State University

Dr. Stark joined the Grain Science and Industry faculty as the new Jim and Carol Brown Associate Professor in Feed Technology in early August 2013. He worked closely in the development of the O.H. Kruse Feed Technology Innovation Center. Dr. Stark is a K-State alumnus with degrees in animal science (B.S.) and grain science (M.S., Ph.D.). Before joining K-State, he was a professor at North Carolina State University from 2006 until 2013. Prior to joining NCSU he spent 12 years in the feed industry with responsibilities in feed manufacturing, quality assurance, and plant operations. He has a joint faculty appointment in the departments of Grain Science & Industry and Animal Sciences & Industry. He serves as the faculty coordinator of the O.H. Kruse Feed Technology Innovation Center and Cargill Feed Safety Research Center. He is a member of the American Society of Animal Science, Poultry Science Association and the Southern Poultry Science Society.

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**Dr. Adam Fahrenholz**, Professor, North Carolina State University

Dr. Fahrenholz earned his B.S. in Feed Science and Management and an M.S. and Ph.D. in Grain Science at Kansas State University. His areas of interest include feed processing technology as it relates to improved manufacturing efficiency and finished product quality, the impact of feed processing on animal performance, and the regulatory environment impacting the feed manufacturing and related industries. Dr. Fahrenholz joined the Prestage Department of Poultry Science at North Carolina State University in June, 2012 as a Post-Doctoral Research Scholar. His responsibilities include conducting feed manufacturing research, teaching, and providing industry outreach. He has been an invited speaker at various national meetings for organizations working directly with the feed manufacturing industry or their suppliers. He has worked directly with the feed industry in several commercial facilities, serving in either an extension capacity or as a private consultant, helping to troubleshoot problems associated with manufacturing and quality control.

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International Grains Program Institute (IGP) Distance Education, Kansas State University

## **The Course of Study**

### **Week 1**

#### **Welcome - Introductions**

*Assignments: Welcome to AFIA 500 – Introduction Discussion Question*

## **U.S. Feed Industry Overview**

This module covers the evolution of the U.S. feed industry including governmental oversight of the feed industry and current issues.

*Assignments: Quiz 1-1*

## **History of the Feed Industry**

History of the Feed Industry module covers history of how the formula feed industry began in the United States, as well as how the introduction of new ingredients changed the formula feed manufacturing. In addition, you will learn when the different types of processing equipment were introduced to the feed industry as well as how the feed regulations affected the industry.

*Assignments: Quiz 1-2; Feed Mill Manager Interview Assignment*

## **Week 2**

### **Feed Mill QA Programs**

The three topics for this module will be: Fundamentals of a good Quality Assurance program, and the importance of a QC program; Factors to consider when establishing a QA program; Fundamentals of the Feed Safety Plan hazard analysis and preventive controls.

*Assignments: Quiz 2-1, 2-2, 2-3; QA Mission Statement Assignment*

### **Particle Size Reduction**

This module covers the purpose of the grinding process and covers hammermills and roller mills. Factors affecting grinding efficiency and measuring and expressing particle size are also covered.

*Assignments: Quiz 3-1, 3-2, 3-3; Particle Size Reduction Assignment*

## **Week 3**

### **Batching**

This module covers the type of equipment used to batch ingredients, how to calculate the batch cycle time and how to determine the correct order of ingredient addition to a mixer.

*Assignments: Quiz 4-1*

### **Mixing**

This module covers the importance of feed uniformity on animal as well as the types of mixers and factors affecting mixer performance.

*Assignments: Quiz 4-2; Mixer CV Calculations Assignment*

## **Automation System**

Automation systems discusses the benefits of feed mill automation and covers the components of an automation system and the statistical process control of the batching process.

*Assignments: Quiz 4-3*

## **Week 4**

### **Steam Systems**

Steam systems module covers the boiler and steam definitions and energy balance, water treatment, boiler designs and steam harness.

*Assignments: Quiz 5-1*

### **Conditioning & Pelleting**

This module covers the benefits of pelleting, the purpose of conditioning, the principles of conditioning as well as pellet mills and pellet die specifications.

*Assignments: Quiz 6-1; Pelleting Assignment*

### **Cooling**

This module covers the general function of pellet coolers, as well as the types of pellet coolers and factors involved in the efficiency of pellet coolers.

*Assignments: Quiz 7-1*

## **Week 5**

### **Post Pellet Liquid Application**

The PPLA module covers the function of the batching & mixing process including batching system design, the types of mixers and factors effecting mixer performance, testing mixers and the importance of feed uniformity on animal performance.

*Assignments: Quiz 8-1*

### **Packaging & Loadout**

This module covers the finished product packaging, warehousing, product labeling, truck fleet management and feed recall.

*Assignments: Quiz 9-1*

### **Preventive Maintenance**

This module provides an overview of preventive maintenance, including developing a program, costs and inventory management.

*Assignments: Quiz 10-1*