



IGP Institute

IGP–KSU Practical Flour and Dough Testing

August 5–9, 2024

Course Description:

The focus of Practical Flour and Dough Testing is the hands-on application of analytical tests used to determine attributes of different flours. Participants are introduced to the analytical techniques that they may encounter when working with flour mills and bakeries. This five-day course will provide a broad understanding of standard analytical methods and procedures commonly used in flour quality testing through participant hands-on exercises. This course will teach how analyses are done as well as how to evaluate, interpret, and use the results. The course also introduces wheat classes and uses, lab milling and grinding methods, and test baking methods and applications for breads, cakes, and cookies.

Basic analytical tools used for flour analysis that will be covered in the course include moisture, protein, ash, pH, flour color, TTA, SRC, gluten washing, glutomatic, damaged starch, and rheological tests such as farinograph, dough lab, falling number, mixolab, alveograph, and RVA that measure various dough properties. Lab milling machines will include the Quadrumat junior and senior, Buhler MLU, and Chopin lab mill.



Learning Outcomes

- Discuss the standard analytical flour and dough tests used in the commercial milling and baking industry
- Discover the scientific principles of the standard analytical flour and dough tests
- Practice how the standard analytical flour and dough tests are conducted
- Analyze the data collected by standard analytical flour and dough tests
- Interpret the test results to understand relative flour quality



Who Should Attend

- Employees of flour milling companies
- Ingredient suppliers
- Equipment manufacturers
- Baking companies

See the full course agenda on the back.

KANSAS STATE
UNIVERSITY

IGP Institute
Department of Grain Science and Industry

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IGP–KSU Practical Flour and Dough Testing – Course Agenda

August 5–9, 2024

Day 1 – Monday

8:00 Depart hotel for KSU Waters Hall Annex (IGP shuttle)

Welcome and Introductions – Dogan

- IGP Overview and Offerings
- Overview of Flour and Dough Testing and Course Outline

Understanding U.S. Wheat Classes and Basic Grades – Dogan

- Define the six classes of U.S. wheat and uses

Break

Introduction to Flour Composition – Karkle

- Review the basic components of wheat flour: starch, gluten proteins, arabinoxylans.

NIR Moisture, Ash, and Protein – Karkle

- Discuss the scientific principles used in NIR measurement of moisture, ash, and protein.
- Discuss the definition and importance of moisture basis.

12:00 Lunch (Shellenberger 204)

Introduction to Lab Milling and Grinding Methods – Dogan / Blodgett

- Overview of lab milling machines and uses.
- Understanding of particle size distribution.

Quadrumat Junior – Dogan / Blodgett

- Overview of machine principles and grinding operations
- Milling wheat samples

Quadrumat Senior – Dogan / Blodgett

- Overview of machine principles and grinding operations
- Milling wheat samples

Buhler MLU – Dogan / Blodgett

- Overview of machine principles and grinding operations
- Milling wheat samples

Chopin Lab Mill – Dogan / Blodgett

- Overview of machine principles and grinding operations
- Milling wheat samples

Depart for hotel / Goolsby's (IGP shuttle)

5:00 IGP sponsored social hour and dinner (drinks and appetizers provided)

- Goolsby's, 1212 Bluemont Ave

Adjourn as needed

Day 2 – Tuesday

8:00 Depart hotel for KSU Waters Hall Annex (IGP shuttle)

pH & TTA – Karkle

- Recognize the difference between pH and TTA measurements
- Explain how to conduct pH & TTA testing

Flour Color – Karkle

- Explain which flour components contribute to color
- Discuss why measurement of flour color is important
- Describe the methods to measure flour color

Break

10:00 Oven Moisture and Ash – Pezzali

- Explain how oven moisture and ash tests are conducted.
- Measure moisture of flour

LECO Protein – Pezzali

- Discover the combustion method to measure protein.

12:00 Lunch (Shellenberger 204)

Hand Gluten Washing – Clanton

- Isolate gluten from several types of flour and use the information in conjunction with other analyses during the course to consider flour applications

Glutomatic – Clanton

- Evaluate the mechanized version of gluten washing

GlutoPeak – Dogan / Clanton

4:00 Tour of Kansas Wheat Innovation Center – Gilpin

5:00 Adjourn and depart for hotel (IGP shuttle)

Day 3 – Wednesday

8:00 Depart hotel for KSU Waters Hall Annex (IGP shuttle)

Alpha-Amylase Determination – Karkle

- Identify what alpha-amylase is and its role in baking
- Discover the scientific principles used in alpha-amylase measurement

Falling Number – Karkle

- Demonstrate and compare methods of alpha-amylase testing.
- Discover physical and chemical changes that occur when starch gelatinizes and then retrogrades.

RVA – Dogan

- Demonstrate and compare methods of alpha-amylase testing.
- Observe use of RVA to measure starch cooking and pasting behavior.

Damaged Starch – Dogan

- Identify how starch is damaged and its role in baking
- Explain the scientific principles used in damage starch measurement
- Test damaged starch and interpret test results using the SD Matic

12:00 Lunch (Shellenberger 204)

SRC Manual Method – Dogan

- Identify impact of flour components on water holding capacity
- Discover the scientific principles used in SRC measurement

Mixolab – Dogan

- Explain the measurements obtained from mixolab.
- Observe and describe how the mixolab test differs from other recording dough mixers

5:00 Adjoin and depart for hotel (IGP shuttle)

Day 4 – Thursday

8:00 Depart hotel for KSU Waters Hall Annex (IGP shuttle)

Dough Lab – Dogan

- Test flour samples, interpret the data from dough lab and discuss applications.

Farinograph – Dogan

- Test flour samples, interpret the data from farinographs and discuss applications

12:00 Lunch (Shellenberger 204)

AlveoLAB – Karkle

- Explain the scientific principles of the alveograph test
- Explore how the alveograph test is conducted

Review Testing Data from Prior Days – Karkle

5:00 Adjoin and depart for hotel (IGP shuttle)

Day 5 – Friday

8:00 Depart hotel for Shellenberger Baking Lab (IGP shuttle)

Test Baking Methods and Applications – Karkle / Clanton

- Conduct sponge and dough and straight dough bread test baking methods.

12:00 Lunch (Shellenberger 204)

Test Baking Continued - Karkle / Clanton

- Make sugar snap cookie and layer cakes with test baking methods for soft wheat flours.
- Evaluate breads, cakes, and cookies made during the test baking process.
- Perform volume, Ccell measurement, and texture on produced samples.

Course Review and Wrap-Up

– Dogan / Karkle / Clanton

Course Evaluations & Presentation of Certificates

– Dogan / Karkle / Clanton

5:00 Adjoin and depart for hotel (IGP shuttle)

Course Instructors

Dr. Elisa Karkle, Assistant Professor for Baking Science, Department of Grain Science and Industry, Kansas State University, 785-532-6194, ekarkle@ksu.edu

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