

SYLLABUS

Fall 2014

FS 532 Integrated Food Manufacturing, Fall Semester, 4 credits

Class/lecture: 2 hours/week; Lab: 2 labs per week/ 2 hours each

Prerequisites: FS 432, or consent instructor

Instructors:

Richard W. Hartel (lead)
Scott Rankin

Hans Zoerb
Lei Zhao (TA)

Capsule Statement: Manufacturing processes related to converting raw materials into finished products; HACCP, sanitation and cleaning; principles of quality control; unit operations; environmental.

Objectives: As a result of participation in this course, students will

- be able to map out a food processing system, designate the critical control points, and outline how the critical control points would be monitored and validated,
- be familiar with plant and production operations common to the food processing industry, including process control diagrams, key unit operations, including water and waste treatment, and sanitation systems,
- be familiar with key equipment common to the food processing industry (pumps, valves, flowmeters, heat exchangers, etc.).

Learning Outcomes: students will be able to

#	Learning Outcomes
1	Explain the unit operations of food processing technologies (concentration, dehydration, extrusion, etc.) and various ancillary food equipment (pumps, heat exchangers, etc.), including performing engineering calculations as appropriate.
2	Apply the key elements of food quality assurance, including analyzing and, writing and implementing HACCP plans in a food processing situation (includes prerequisite programs like GMP and SSOP),
3	Set up and maintain a process control chart, design an effective sampling plan for a food processing/distribution environment, and effectively evaluate whether a process is in control
4	Identify weaknesses (and solutions) in existing SSOP plans and design defensible new plans for cleaning and sanitation protocols in food processing operation, analyze existing plans and design new plans for cleaning and sanitation protocols in food processing operations
5	Explain the effects of processing operations on shelf stability and be able to calculate shelf life of foods based on kinetics of microbial, chemical and physical changes during storage,
6	Explain the main steps in water and waste treatment as important to food processing operations
7	Apply basic concepts of reaction engineering and reaction kinetics to food processing systems

Performance Outcomes (Program Goals): students will be able to

#	Performance Outcomes
a	Interpret and report data derived from chemical experiments/analysis
b	Apply basic statistical methods to food processing operations
c	Work independently, and in groups, to complete reports, exercises and projects

Required Texts:

None. Notes, articles and other information will be shared as needed.

Course format:

Combination of lecture, labs, case studies, group projects, and individual projects.

Assessment format:

Lab reports	20%
Term paper	15%
Assignments	15%
Mid-term (10/30)	25%
Final Exam (12/15 12:25-2:25)	25%

Lab reports, assignments and the term paper are to be handed in on time. The penalty for late submission will be one full grade for every day late. To avoid confusion (and lost papers), submit each assignment to the person listed on the assignment sheet as being responsible. It is YOUR responsibility to make sure your work is in the right hands on the right day.

Course Outline:

- Process flow diagrams
 - raw materials to finished product
- Sanitary food plant design
 - raw material handling and product flow
 - equipment design
- HACCP and related programs
- Quality control
 - quality control charts
 - statistical sampling
- Shelf life
- Unit operations
 - material handling
 - thermal processing techniques (pasteurizers, retorts, aseptic processing, etc.)
 - concentration technologies (membranes, evaporation, etc.)
 - drying processes (air, spray, drum, freeze, etc.)
 - extrusion
 - extraction, particle size, mixing, distillation, fermentation, enzyme processing, etc.
- Environmental aspects of food processing
 - water, waste, sustainability, etc.