

Lab Time: Mon 2:10 - 5:00 Location: FSHN G20 (WSU Pullman)

Instructor: Frank Younce, PE, CFS  
 Office: FSHN G20E (Pilot Plant)  
 Phone: 509.335.7603  
 Email: [younce@wsu.edu](mailto:younce@wsu.edu)  
 Office hours: by appointment and open door

TA:  
 Office:  
 Email:

**Course Description:** FS 302 [M] Food Processing Lab 1 credit, Fall, Application of specialized techniques, concepts and practices of food processing. Cooperative course taught jointly by WSU and UI. [M] Writing in the Major. Required: \$35/credit lab fee. Prerequisites: WSU students: FS 303 or c//; FS 110 or 220; MATH 140 or 171; STAT 212, UI students: FS 303 or c//; FS 110 or 220; MATH 160 or 170; STAT 250.

**Course Overview:** The purpose of FS 302 is to enhance the learning experience of the students enrolled in FS 303 Food Processing lecture through practical lab activities and industry tours. We will explore many of the common and novel unit operations utilized in food manufacturing industry which are effective and profitable for processing food to enhance its safety, shelf-life, variety and nutrition.

### Learning Outcomes (for IFT Food Science Degree Core Competencies)

The student will:

1. Measure and evaluate physical properties of foods, such as rheological and thermal properties which are used in the design of food processes.
2. Select processing equipment for common unit operations for processing a product according to the equipment's functional principles and key variables necessary for control and safety.
3. Measure and analyze the operating conditions of systems such as thermal processing equipment which make a food product microbiologically safe for consumption.
4. Measure and interpret packaging material performance in a shelf life test.

### Required Texts (same as FS 303 lecture)

1. Fellows, P. J., 2009, Food Processing Technology, Principles and Practice, Third Edition. CRC Press, Woodhead Publishing Ltd. (ISBN 9781439808214 paperback).
2. Unit Operations in Food Processing by Earle and Earle. Online book available free on the web at (<http://www.nzifst.org.nz/unitoperations/>), 2003. (first published 1966)
3. Course handouts

### Recommended Texts (optional, but good for your personal library)

4. Robertson, Gordon L., 2006, Food Packaging, Principles and Practice, 2<sup>nd</sup> edition CRC Press.
5. Singh R. P. and D. R. Heldman. 2008. Introduction to Food Engineering 5<sup>th</sup> ed. Academic Press. (this is the required text for FS 432/433 Spring 2015)
6. Heldman, D.R. and R.W. Hartel. 1997. Principles of Food Processing. Chapman & Hall
7. Wheeler, Donald. J. and David S. Chambers, 1992, "Understanding Statistical Process Control", 2nd ed. SPC Press Knoxville, TN

### Course Grading

Lab Reports	50%	The class is intended to be graded on a straight scale: 100-93 = A, 92.9-90 = A-, 89.9-87 = B+, 86.9-83 = B, 82.9-80 = B-, 79.9-77 = C+, 76.9-73 = C, 72.9-70 = C-, 69.9-67 = D+, 66.9-60 = D, 59.9 or less = F It is acceptable and desirable for the entire class to receive As, if you earn them.
Tour Reports	15%	
Process Line Proposal	25%	
Process Line Presentation	5%	
Attendance / Participation	5%	

### Late Assignment Policy

Assignments lose 20% of total possible score for each university business day late (5:00 pm cutoff). So if you turn in a report (which was due 9/11) on 9/14, three business days late, it will be docked 60% of its total possible score (i.e. a three day late report that is scored a 93% will only get a 33% grade after being docked 60%). Assignments received five or more business days late will be recorded as a zero. No reports will be accepted after 5:00 pm Friday December 8, 2017. They will be recorded as a zero.

**Attendance**

Team work and open discussions are encouraged during the laboratories. Attendance and participation is expected and will contribute to final grade. A sign in sheet will be provided for the tutorial sessions, demonstrations and tours not requiring a report. Please provide the instructor with advance notice of planned absences (such as a required field trip for another class) so arrangements can be made to complete the lab so you can write the report.

**Learning Goals and Assessment**

At the end of this course, students should be able to:		Course topics (&dates) that advance these learning goals:	This objective will be assessed
LG1	Use Critical and Creative thinking to integrate and synthesize knowledge from multiple sources. And to combine and synthesize existing ideas, images, or expertise in original ways.	Field trip (9/15), project proposal assignment (9/29)	Tour Reports, Process Line Proposal (paper and presentation)
LG2	Use Quantitative Reasoning to convert relevant information into various mathematical forms. And to understand and apply quantitative principles and methods in the analysis of data.	Tutorial on spreadsheet techniques for data analysis and simulation (9/29). Weekly lab activities for measuring: food physical properties, particle size, sterilization, drying, packaging performance (permeation)	Lab Reports
LG4	Effectively identify, locate, evaluate, use responsibly and share information for the problem at hand.	Lecture on preparing a proposal (9/29).	Process Line Proposal, Lab Reports
LG5	Use communication skills to tailor message to audience, express concepts, propositions, and beliefs in coherent, concise and technically correct form, speak in front of a group.	Interactions with industry personnel on field trip (9/15), process line proposal presentations (12/1).	Process Line Proposal (written and oral presentation), Tour Reports, Lab Reports
LG7	Develop depth, breadth, and integration of learning in Food Science / Food Engineering.	Weekly lab activities and demonstrations using food processing equipment unit operations. Industry Field trip (9/15), wheat lab tour(9/22), meats lab tour (11/10).	Lab Reports, Tour Reports, in-class participation

**Lab Schedule**

<u>Week of:</u>	<u>Topic: (assignment)</u>
Aug 21	Introduction, Pilot Plant Orientation, Lab 5a - Packaging ( <i>report due 12/8</i> ) (notify your other Monday instructors of the Sept. 11 <sup>th</sup> all day field trip)
Aug 28	Lab 1 - Food Mechanical Properties and Texture ( <i>report due 9/11</i> )
Sept 4	Labor Day Holiday ( <i>no lab</i> )
Sept 11	<b>Required - All day field trip to food processors in the Tri Cities</b> <b>Notify your professor(s) for all Monday classes you may miss.</b> ( <i>Tour Reports draft copies due 9/18, final copies due 10/2</i> )
Sept 18	Lab 2 - Sieving ( <i>report due 10/2</i> ) How to write a successful proposal document ( <i>assignment of Process Line Proposal, draft copy due 10/23, final copy due 11/17</i> )
Sept 25	Tour - USDA wheat quality lab (no report)
Oct 2	Tutorial – spreadsheet techniques and simulations of thermal processes. Bring your laptop with spreadsheet software.
Oct 9	Lab 3 - Thermal processing / canning heat penetration ( <i>report due 10/23</i> )
Oct 16	Concentration by evaporation demonstration ( <i>no report</i> )
Oct 23	Spray and drum drying demonstration ( <i>no report</i> )
Oct 30	Lab 4 - Tray and freeze drying ( <i>report due 11/13</i> )
Nov 6	Freezing of food, vacuum and pressure infusion, blanching, HHP demonstration
Nov 13	Evaluation of the frozen apple slices ( <i>no report</i> ) / Meats Lab Tour (no report) ( <i>Process Line Proposal final copy due 11/16</i> )
Nov 20-24	Fall Recess Break
Nov 27	Process Line Proposal presentations
Dec 4	Lab 5b Packaging ** ( <i>report due 12/8</i> )
Dec 11-15	Finals week (no lab)

\*\* The 12/4 Lab session is available for collecting the final data for Packaging Lab 5 but your group can meet anytime beginning the week of 11/27 to collect the data for the report.

**Required Field Trip**

An all day field trip is scheduled to three or more food processing plants in the Tri Cities area. Transportation is provided. Since this is a required all day event, students are responsible to notify professors of any classes that may be missed and make arrangement for any work needing to be made up. A class absence request form is available here: <http://schedules.wsu.edu/Home/AbsenceRequest>  
A handout detailing the itinerary and format for the required written tour reports will be provided.

**Writing Assignments**

This class carries an [M] "writing in the major" designation. Two major technical writing assignments of Tour Reports and a Process Line Proposal will be assigned. For both of these, a student will turn in a draft which the instructor will mark for improvement and return to the student. Then the student will make revisions and turn in a final copy. In addition for the Process Line Proposal the student will make a short oral presentation to the class which is graded separately. For each of these assignments a handout with additional details on scope, content and format will be provided.

**Tour Reports** - A separate report is required for each processing plant visited on the all day field trip. Each of these reports are normally 2-3 pages single spaced not including the flowchart. Students are strongly encouraged to ask questions and take notes in order to write quality reports.

**Tour Report Content** - (Additional details will be provided on the field trip itinerary handout.)

1. Your name, date of report and name of company.
2. Information and background on the company.
3. Product descriptions and target market.
4. A description of the processing lines and all unit operations observed.
5. A flow chart of the process line detailing operations from raw materials to finished product.
6. Quality control practices and HACCP program.
7. Food safety/sanitation practices and worker safety.
8. A list of any library or online references used.

**Process Line Proposal** – You have an idea for a new retail food product and your boss has charged you with developing your idea into a proposal to upper management for a new (or modified) manufacturing line to produce your product. This paper includes a summary page followed by 6 or more pages of single spaced text not including the flowchart, lists, tables or figures.

**Process Line Proposal Content** - (Additional details will be provided on the process line handout.)

1. A summary page with a concise description of the new product and manufacturing line, a list of major options for implementation, a budget summary and your recommendation for action.
2. The background scenario and business justification for the investment.
3. A detailed description of the unit operations and equipment needed to manufacture the product.
4. A process flowchart
5. A discussion of major equipment and/or production scale options for production of the product.
6. A capital and operating budget discussion and table
7. A recommended timeline for implementation
8. References

The background scenario for the business opportunity can be entirely fictional but not science fiction. The process line must be realistic, detailed, technically correct and feasible. A list of food products will be provided for you to select from to develop your process line proposal. Alternately, you may suggest a food product of personal interest. Discuss your idea and its scope with the instructor for approval.

**Process Line Proposal Presentation** – Your written proposal has been submitted and now you will present your recommendation for a new process line to "upper management" in the form of a 5-6 minute oral presentation. Your presentation should be concise with approximately 5-10 power point slides selling your idea. Be ready to answer 2 or 3 questions from the class and instructor. Students are encouraged to dress up for these presentations since they will be video recorded as part of the School of Food Science learning assessment program.

**Lab Reports** - Each student turns in an individual report. Students will be required to write a report for each laboratory (normally 3-4 pages single spaced excluding figures and tables). Reports are due at 5:00 PM on the day listed in the class schedule. Lab reports may be emailed to the instructor by the hard copy deadline. However, you should not consider them submitted unless you receive a confirmation email from the instructor.

**Lab Report Format** - (A handout with additional format details will be given the first day of lab.)

1. **Title:** State the title of the lab, date, your name (and other group members' names if applicable).
2. **Introduction:** Motivation and background information
3. **Experimental Equipment and Procedure:** Techniques used to perform the experiment.
4. **Results and Discussion:** Describe what the results were, why they happened. Include graphs, figures and tables (and raw data if appropriate). You will be graded on correctly labeling axes, units, legends and titles. Include any additional information asked for in the lab handout.
5. **Conclusions:** What the results should have been and why they are important. If the results were unexpected, describe why they occurred. Focus the theory behind what happened and the implications.
6. **Nomenclature Listing:** Definitions of all symbols with units (when equations are used)
7. **References:** Cite only references used in your paper. Alphabetize by last name of the first author. Follow the recommended format given on the handout.
8. **Supplementary questions:** Answer any extra questions on the lab handout. Please answer these separately from your report so they are not missed when graded.

### **Students with Disabilities**

WSU student: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.

UI students: Reasonable accommodations are available for students who have documented temporary or permanent disabilities. Please notify your instructor(s) during the first week of class regarding accommodation(s) needed for the course. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 306; phone 885 - 6307; email at [dss@uidaho.edu](mailto:dss@uidaho.edu); website at [www.access.uidaho.edu](http://www.access.uidaho.edu) or [www.webs.uidaho.edu/taap](http://www.webs.uidaho.edu/taap)

### **Academic Regulations & Student Affairs Policy Regarding Absences**

It is the policy of the Office of Student Affairs to assist students during crisis situations where they are unable to notify their instructors prior to a hurried emergency departure. The Office of Student Affairs will send professors an "Emergency Notification" in those instances where the student will be away for more than two days. The Office of Student Affairs will not issue notifications retroactively or for "one-day emergencies."

### **Academic Etiquette**

Do not carry on side conversations or read during class. Please mute cellular phones during class.

### **Academic Integrity**

You are encouraged to work with classmates on assignments. However, each student must turn in original work. No copying will be accepted. Students who violate WSU's Standards of Conduct for Students will receive an F as a final grade in this course, will not have the option to withdraw from the course and will be reported to the Office Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these definitions.

**Plagiarism**

Plagiarism is defined by Webster's Dictionary as, "to steal and pass off the ideas or words of another as one's own." There are two general forms of plagiarism:

- (a) Unintentional: the use of other writers' words, phrases, sentences, paragraphs as though they were your own *without understanding* the need to cite the original source. Unintentional plagiarism normally occurs when the individual does not understand the conventions of scientific writing and the need to cite sources of information.
- (b) Intentional: the use of other writers' work and claiming it as your own. Intentional plagiarism includes *knowingly copying* or incorporating sections of books, articles, or other sources into your work without citation.

To evade plagiarism, you must acknowledge the source of information. In scientific writing, this can be performed in the text of your work through the use of surnames of authors and the year of publication or by using numbers enclosed by parentheses which correspond to specific citations in the reference section. In addition to employing citations in the text, plagiarism can be avoided by applying special techniques when writing about information obtained from a source:

- (a) Paraphrase: rewording information in which you accurately present the main ideas from the source but do so using your own organization, words, and sentence structures.
- (b) Summary: a concise statement of the main idea from a section within a source.
- (c) Direct quotation: use of quotes surrounding the passage written by another author.

In general, paraphrasing (a) and the use of summary statements (b) are very common techniques used in scientific writing. Use of quotations (c) in scientific writing is rare and should be avoided.

Plagiarism is dishonest and is **not** tolerated. If caught using all or portions of a current or former classmate's writing or other sources of information, a grade of "zero" will be given for the exercise. Additional penalties for plagiarism are possible as outlined in the *Washington State University Student Handbook*.

**Safety**

Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.

**Pilot Plant Safety**

The first laboratory will include a Pilot Plant orientation and safety training. Handouts on *Pilot Plant Safety Policies* and *Performance Expectations for Pilot Plant Users* will be provided.

**Access to the FSHN G20 Pilot Plant**

You will be assigned Cougar Card (or keypad code) access to the Pilot Plant so you can visit the instructor's office and complete laboratories. Your door access be active during regular 8am - 5pm business hours. The lock keeps date/time records so please do not share your card or personal code.