

FS 433 Food Engineering Lab (1 credit)

Spring, 2017

Instructor: Frank Younce PE CFS, FSHN G20E (Pilot Plant) 509.335.7603, younce@wsu.edu
Office Hours: by appointment and open door
TA:
Class meets: Thursday /Friday, 2:10-5:00 pm, FSHN 104A, FSHN 103/155 or FSHN G20 Pilot Plant
Textbook: Singh, R. P. and D. R. Heldman. 2013. Introduction to Food Engineering (5th Edition), ISBN0123985307 (same as FS 432 lecture textbook)

FS 432 Instructor: Dr Helen Joyner, Ag Science 119 (UI) 208.885.9683, hjoyner@uidaho.edu
Lecture: MWF 9:30-10:20 am, Administration 227 (UI)

Prerequisites: FS 303, FS 302, PHYSICS 101 (WSU), PHYS 111 (UI)

Course Objective

To enhance the learning experience of the students taking the FS 432 Introduction to Food Engineering lecture course through laboratories, problem sessions and group discussions.

Student Learning Outcomes

- Explain basic principles of food engineering.
- Able to calculate mass and energy balances for given food processes.
- Able to size pumps and pipes for fluid food transport.
- Able to size calculate steam requirements for a thermal process.
- Able to size calculate steady state and transient heat transfer.
- Explain the basic components of refrigeration systems
- Able to calculate refrigeration capacity.
- Able to describe psychrometric processes and use a psychrometric chart.
- Able to calculate mass transfer for packaging materials.
- Able to calculate drying rates.

Laboratory/Problem Session Topics

<u>Week</u>	<u>Thursday</u>	<u>Place</u>	
1	1/12	104A	Dimensions, unit conversion, engineering measurements (<i>problem session</i>)
2	1/19	104A	Mass and energy balances (<i>process line case study session</i>)
3	1/26	104A	Fluid flow 1 (<i>problem session</i>) / Fluid density, viscosity (<i>demo</i>)
4	2/2	G20	Flow & pressure loss (<i>Lab #1</i>)
5	2/9	104A	Fluid flow 2 (<i>flow case study session</i>)
6	2/16*	UI*	Tour of UI Power Plant on Line Street Lab #1 report due
7	2/23	104A/G20	Steam tables (<i>problem session</i>) / Heat exchanger energy balance (<i>Lab #2</i>)
8	3/2	104A	Heat transfer 1 - Steady state / radiation (<i>problem session</i>) / Tour report due
9	3/9	G20H	Temperature measurement, specific heat, data acquisition, heating and cooling rates as affected by material size (<i>Lab #3</i>), Lab #2 report due
	3/13-3/17	Spring Break!	
10	3/23	104A	Heat transfer 2 – Heat exchanger design (<i>juice case study session</i>)
11	3/30	104A	Heat transfer 3 – Unsteady state (<i>problem session</i>)
12	4/6	104A/103	Refrigeration systems (Lab#4) / (<i>cooling case study session</i>) Lab #3 report due
13	4/13	104A	Relative humidity & psychrometrics (<i>problem session</i>)
14	4/20	104A	Mass transfer (<i>diffusion case study session</i>) Lab #4 report due
15	4/27	104A	Dehydration part 2 (<i>problem session</i>) (4/28 is the last day for late work)
	5/1-5/5		Final Exams Week WSU
	5/8-5/12		Final Exams Week UI

* Steam Plant Tour meet at the Line Street side entrance at UI.

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Course Policies

- The schedule for this course is subject to change due to extenuating circumstances.
- Disruptive behavior will not be tolerated and will be handled according to University Policy.

Grade Breakdown and Grade Distribution

Laboratory reports, case study reports, tour reports 90%
Attendance and active participation 10%

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

Students who actively participate in problem sessions and turn in high quality reports on time earn “A”s and “B”s. Lower grades strongly correlate with low quality reports and/or assignments that are turned in late.

Lab, Case study and Tour Reports

For case studies students will work in groups. Your group must provide a one-page executive summary of your results and include the answers to the questions in your summary. Attach diagrams and calculations as needed and make sure they are neat and legible! Only one summary per group needs to be submitted, but all group member's names must be on the summary for credit.

Each students will be required to write a report for each laboratory according the standard laboratory report style sheet. There are only four lab reports for this class but as a 400 level class they are more substantial than the FS 303 lab reports and will be graded more critically. Example reports from previous years are available for your review.

For the steam plant tour each student submits a 2 page single spaced report.

Reports are due at 5:00 PM on the day listed in the above schedule.

Reports lose 20% of total possible score for each university business day (5:00 pm cutoff). So if you turn in the Lab 1 report (due 2/16) on 2/21, three business days late, it will be docked 60% of the total possible score (i.e. a six day late lab that is scored a 93% will only get a 33% grade after being docked 60% for lateness). All reports received after 5 university business days will be recorded as a zero. No reports will be accepted after 5:00 pm Friday April 28, 2017. They will be recorded as a zero.

Attendance Policy

Team work and open discussions are encouraged during the problem sessions and laboratories. Attendance and participation is expected and will contribute to final grade. Participation includes solving the problem sets and engaging in class discussions. Negligent attendance will affect your final grade. A sign in sheet will be provided for labs, problem sessions and tours. Please provide the instructor 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 your lab report.

Instructional Methods

Some meetings may include a 20-30 overview lecture of the lab topic. Student work in groups of 2-4 on labs gathering data but each student is responsible for submitting their own lab report. The course also requires a steam plant tour for which each student turns in an individual report. Students work in small groups in on engineering calculations in the problem sessions. After some working time, students are encouraged to present their solution method “on the board” to the rest of the class. Different solution methods are discussed and critiqued. The instructor fields questions among groups and may give additional teaching individually (or to whole class) if students are having difficulty.

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Instructor Specific Expectations and Academic Etiquette

Students are required to bring the textbook and a calculator to class. Do not carry on side conversations or read during class. Please mute cellular phones during class.

Academic Dishonesty

Cases of academic dishonesty shall be processed in accordance with the Academic Integrity Policy as printed in the Washington State University Student Handbook, Faculty Manual, and as available from the Office of Student Affairs.

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.

Disability Statements:

WSU student: Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, please visit the Access Center (Washington Building 217) 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

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Idaho Commons Building, Room 306; phone 885 - 6307; email at dss@uidaho.edu; website at www.access.uidaho.edu or www.webs.uidaho.edu/taap

WSU Safety Statement

The Campus Safety Plan, which can be found at <http://safetyplan.wsu.edu>, contains a comprehensive listing of University policies, procedures, statistics, and information relating to campus safety, emergency management, and the health and welfare of the campus community. All faculty, staff, and students are encouraged to visit this web site as well as the University emergency management web site at <http://oem.wsu.edu/Emergencies> to become familiar with the campus safety and emergency information provided. Also, be familiar with the WSU ALERT site (<http://alert.wsu.edu>)

Access to the FSHN G20 Pilot Plant

You will be assigned an access code to the Pilot Plant so you can visit the instructor's office. Your code will be active during regular 8am – 5pm business hours. The lock keeps date/time records so please do not share your personal code.