

Course Syllabus
FS 432: Food Engineering
 Spring 2017

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Class Hours: MWF 9:30-10:20 AM
Classroom: Administration 317
Office hours: Facebook and by appointment
FS 433 Lab Instructor: Frank Younce
Lab Hours: R or F 2:10-5:00 PM
Classroom: FSHN 103/155
 (WSU Campus)

Course Prerequisites: WSU: FS 303; PHYSICS 101; UI: FS 302, FS 303, PHYS 111

Course Description:

Engineering is generally associated with math, and lots of it. But the core of engineering is really problem-solving. Math is simply a tool that engineers use to solve problems. Since this is a food engineering course, we'll be focusing on solving engineering problems associated with food. These problems are generally those that come from producing food on an industrial scale and include moving food from one place to another, mixing foods together, heating and cooling food, and drying food properly, as well as designing all of the equipment to do these things. Often, there is no one right answer to an engineering problem, just better or worse approaches. Thus, critical thinking and problem-solving skills are key to success in engineering problem-solving. Throughout the course we'll use a specific problem-solving method that helps you work through the problem-solving process and reach viable solutions.

Student Learning Goals Table

At the end of this course, students should be able to:		Course topics that advance these learning goals:	This objective will be assessed primarily by:
UI LO1: Learn and Integrate	Develop depth and breadth of food engineering knowledge, and integrate material taught in other food science courses to benefit themselves, their employers, and the community	All course topics involve integration of previously learned material (food processes, food chemistry, etc.). The information given in the beginning of the course is a foundation for the information taught later in the course.	All graded assessments
UI LO2: Think and Create	Develop real-life engineering problems and evaluate the accuracy of the solutions developed Solve quantitative problems by applying concepts taught in class and making appropriate assumptions	All course topics involve the engineering problem solving process, which requires critical thinking skills to analyze problems and develop solutions.	In-class activities, case studies, homework assignments, quizzes, exams
UI LO3: Communicate	Explain basic engineering principles are used in various food processing operations; defend selected solution to an engineering problem	All course topics	Case studies, homework assignments, exams, exam corrections

Required Textbook:

Introduction to Food Engineering, 5th ed. RP Singh and DR Heldman (2013). ISBN 0123985307

The textbook is available at the University of Idaho bookstore or online.

Textbook corrections are available at: http://rpaulsingh.com/textbook/errata_ife.html

Website: <https://bblearn.uidaho.edu>

Course Format:

This course is designed to be a blended learning/flipped course. In a flipped course, students review the lecture material BEFORE class. Lecture material may be given in the form of handouts, reading assignments, video clips, lecture notes, or other media, and is available on the course website. Class time is used for content application. Example class activities include discussion of lecture material, problem-solving, group activities, and interactive demonstrations. If needed, a short lecture will be given at the beginning of the class to clarify key concepts.

Being in a flipped course does not mean that you have to learn all of the material on your own! Reviewing the material before class frees up class time that would normally be spent on lecture for activities that promote a deeper understanding and better retention of the material. There will be plenty of opportunities to ask questions and practice the material under instructor guidance. There will also be a short lecture at the beginning of each class covering the key points of each lecture.

To encourage good team dynamics, class activities will often involve group work. If these activities are graded, a grade may be determined based on group results, individual results, or a combination of the two.

Facebook Group: Food Engineering

Food Engineering has a closed Facebook group and only students enrolled in the course may participate. The Facebook group was made for the sole purpose of helping the instructor and students connect on a platform that is relevant to current times. This is an open forum for all students to discuss topics and to ask the instructor questions. The instructor will use the group to post reminders of major course events (for example, assignments, quizzes, exams). You will be removed from the group after final course grades have been posted.

Participation is highly recommended, but not required; declining to participate will not impact your course grade in any way. The group will not appear in Facebook search results until there are at least 10 members. To locate the group please go to the following URL:

<https://www.facebook.com/groups/257159901319381/>

You must request to join this group. If you request to join the group using a name other than the name that appears on the course roster you will not be added to the group until you communicate this difference with the instructor. You may create a second Facebook account to participate in the group if you do not want to use your primary account. Please be kind and respectful when posting. All posts deemed offensive will be promptly removed. Bad language will not be tolerated.

Assignment Submission:

All assignments must be submitted through Blackboard. *Please do not turn in hard copies or email assignments to the instructor; you will receive an email stating that your submission will not count unless it is uploaded on Blackboard.* Upload links will be given for each assignment. An explanation of how to use the links is available on the course main page. More detailed instructions are provided in the Blackboard Help files.

You are expected to submit assignments on time. Valid University of Idaho excused absences (e.g. severe illness) are acceptable reasons to submit an assignment late without penalty, provided the appropriate documentation is submitted to the instructor. Poor/no internet connections and busy schedules are not valid excuses for late submission. BbLearn outages are also not valid excuses, as the dates for these outages are posted ahead of time. Please plan accordingly when completing your assignments.

Note that submitting an assignment online is just like turning in a hard copy to the instructor. Once you click "submit", your assignment has been turned in. If you forget to upload a file or upload the wrong file, please contact the instructor BEFORE the assignment is due to have your submission reset. You will have three "do-over" opportunities per semester, i.e., the instructor will reset a total of three submissions so you can upload the correct files. Once you use up your "do-overs", you will not be able change your submitted files.

When you submit assignments, please make sure every file you submit has your name and a clear title stating what the homework is. For example, "HJoyner Homework 1" and "JoynerFluidFlowCalcs" are good titles; "HW6", "homework", and "Workbook1" are not good titles. You are asked to name your files in this manner so that the instructor can easily tell who submitted what file and the contents of the file. If you do not title your files appropriately, a 5% penalty will be given.

There are several ways to turn a physical copy of an assignment into an electronic copy. Instructions for doing so are posted on the course website. Please note that if you do not consolidate your files as much as possible (for example, uploading 8 scanned pages as 8 jpgs instead of putting the images into a single pdf or Word file), a 5% penalty will be given. Also, please make sure any scanned or imported images are clearly legible. If the instructor cannot read your work, you will not receive credit for it.

Grade Determination:

Assessment	Total Possible Points	Points to Letter Grade
Three Midterms (100 points each)	300	A= 900 - 1000 pts
Comprehensive Final (optional)	200	B= 800 - 899 pts
Participation/Homework/Concept Checks	400	C= 700 - 799 pts
Problem-Solving Quizzes	100	D= 600 - 699 pts
		F= <600 pts
Total Points:	1000	
(extra credit earns additional points)		

Quizzes:

Quizzes are at the end of each problem-solving module on the course website and will be open note/book. You have three attempts to complete each quiz; only the highest grade will be counted.

Grade Determination (continued):

Homework:

The required homework format and a grading rubric will be posted on Blackboard. Homework problems will be completed during class. Problems to be completed in class will be assigned before class for you to attempt. Attempted problems must be submitted before class begins (i.e. 9:30 AM on the day the problem is covered in class). These problems will be graded based on attempt/no attempt. Failure to submit work (whether it is correct or not) will result in a 20% deduction from the final problem score. Your problem attempts (which will be marked with a stamp), must be submitted with your homework assignment.

Homework and problem attempt due dates will be posted on Blackboard.

Concept Checks:

Concept checks will be given in class every 2-3 weeks. Concept checks will be a problem related to the course content during the previous lectures and may be cumulative. They are closed resource (equations and constants will be provided as needed). Concept checks will be taken twice; the first attempt will be individual and the second will be in a small group. The grade will be a combination of the individual and group attempts. Further details will be provided in a separate handout.

Participation:

Class participation comprises the following:

Attendance:

Attendance is essential to your success in this class and you are expected to attend all classes. Excused absences include university-sanctioned events, illness, and family emergencies. You should become engaged in interactive learning processes, participate in class discussions, and ask questions when a topic or concept is unclear. Appropriate professional behavior demonstrating respect for the students and instructor is expected.

Stick questions:

Stick questions will be asked to encourage student participation, feedback, and critical thinking. Each student will have their name written on a Popsicle stick at the beginning of the semester. Sticks will be chosen at random for answering questions, explaining concepts, reporting on group discussions, etc. Student responses will be tracked on the sticks via a marking system.

Phone clicker questions:

Students will be required to answer questions asked via PollEverywhere, an online polling service that allows participants to answer questions by texting to a shortcode. This service is free to students and does not require a smartphone to use. Students will be required to certify their phones at the beginning of the semester so that they can receive credit for their answers. Phones can be registered and certified at <http://www.poll Everywhere.com/register?p=2ftem-1i2w>. If any difficulties in using the polling system arise, the instructor should be notified immediately.

NOTE: The maximum number of points given for homework, class participation, and concept checks combined is 400. Out of these points, participation is worth 100 points. However, the total number of available points for class participation is greater than 100. This is to encourage students to answer questions and offer opinions without fear of negatively affecting their final grade.

Grade Determination (continued):

Midterm Corrections for Credit:

Partial credit on the initial scoring of midterms will NOT be given. You will be able to regain points missed on the midterms by resubmitting corrected solutions by the due date posted on Blackboard. Credit awarded for correct resubmissions will be 50% of the points originally assigned to the problem for conceptual errors and 75% of the points originally assigned to the problem for mathematical errors. To obtain maximum points for a missed problem, you must identify and classify all error(s) (e.g. conceptual, mathematical). You must also fully rework/rewrite each missed problem with the correct solution clearly identified. This opportunity to make up points will not be offered for other assignments.

Late Submission and Make-up Policy:

Late assignments will be accepted at a cost of 20% off the grade per each late day.

Therefore, if the assignment is one (1) day late, the highest attainable grade will be 80%.

Assignments missed due to a valid University excuse will not be considered late.

Make-up of missed exams is contingent on making arrangements prior to the exam. You must notify the instructor at least 24 hours before the exam of the circumstances that will result in a missed exam. The make-up exam will be oral, essay, or a combination and must be completed within one week of the scheduled exam time.

Pre-Class Assignments:

You are expected to review the lecture material prior to the class period in which it is to be discussed. This practice will allow us to expand on and clarify the topics in class.

Unannounced quizzes may be given if it becomes apparent that students are not reviewing material before class. Working ahead is encouraged.

Calculator and Laptop:

A scientific calculator capable of natural logarithms is required for the homework, quizzes and exams. You need to bring this calculator to each class (and lab).

Many of the assignments done in class use resources that are available on the internet (e.g. items on BBLearn). You should bring a laptop, tablet, or other device that can connect to the UI wireless network to each class. While this is not a course requirement, having a device that can access the internet will be helpful as you work on in-class assignments.

Course Content and Fundamental Course Concept and Questions

This course focuses on using engineering concepts to produce food on an industrial scale that tastes good and is safe to eat. Not all processes scale well, and there are many things that become important at a large scale that didn't matter on a small scale. As you work through the engineering concepts, you should notice that they have several key similarities, which relates to the fundamental course concept.

Fundamental course concepts are the main themes underlying the course. All of the material can be related back to this concept. Fundamental course questions are related to the fundamental concept. Learning the information provided in the course should provide the needed information to answer these questions.

The fundamental course concept in this course is *at steady-state, in=out*. In other words, what goes in must come out. Otherwise, the tank overflows or empties, the temperature starts increasing or decreasing, etc. This concept leads us to a fundamental question, which help us understand how this concept is a theme in this course.

Course Content and Fundamental Course Concept and Questions (continued)

The fundamental question in this course is *how can we manipulate our inputs to get a desired output?* This question will be answered for many different applications by the material covered in the course. The fundamental concept and questions appear in the Course Outline on the next page so you can keep the question and concept in mind as you work through the course content.

Course Outline (may be adjusted to include/exclude topics as time allows):

Week	Date	Topic	Reading
1	Jan 11, 13	Introduction, Dimensions, Properties	Chapter 1
2	Jan 18, 20	Thermodynamics: mass balances Thermodynamics: energy and energy balances;	Chapter 1
3	Jan 23, 25, 27	Thermodynamics: energy and energy balances; Fluid Flow: flow profiles	Chapter 2, posted reading
4	Jan 30, Feb 1, 3	Fluid Flow: flow measurement, Reynold's number, Bernoulli equation, energy balances for fluid transport systems	Chapter 2, posted reading
5	Feb 6, 8, 10	Fluid Flow: energy balances for fluid transport systems, pump energy calculation Midterm Exam #1	Chapter 3; (cumulative*);
6	Feb 15, 17, 19	Fluid Flow: Pump selection Energy: steam generation, steam tables	Chapter 3
7	Feb 22, 24	Energy: steam and energy balances Heat Transfer: heat exchangers, thermal properties, steady-state heat transfer (conduction)	Chapter 3
8	Feb 27, Mar 1, 3	Heat Transfer: steady-state heat transfer (convection, radiation)	Chapter 4
9	Mar 6, 8, 10	Heat Transfer: steady-state heat transfer (multi-mode) Midterm Exam #2	Chapter 4; (cumulative*)
10	Mar 20, 22, 24	Heat Transfer: steady-state heat transfer (design of heat exchangers) Heat Transfer: unsteady-state	Chapter 4
11	Mar 27, 29, 31	Heat Transfer unsteady-state Refrigeration: components, pressure-enthalpy charts, equations, single-stage	Chapter 4,6
12	Apr 3, 5, 7	Refrigeration: multistage Psychrometrics: properties of chart components	Chapter 6
13	Apr 10, 12, 14	Psychrometrics: properties of chart components, chart use and applications Mass transfer: simple diffusion	Chapter 9, 10
14	Apr 17, 19, 21	Mass Transfer: steady- and unsteady-state transfer Drying	Chapter 8, 10
15	Apr 23, 26, 28	Drying Midterm Exam #3	Chapter 10 (cumulative*)
16	May 1, 3, 5	Engineering and You	
		Comprehensive Final Exam (Optional) Thursday May 11, 7:30-9:30 AM	(cumulative*)

*Exams may include some additional topics from lecture, handouts and/or reading material that may not be covered in the book.

Academic Integrity

Academic integrity will be strongly enforced in this course. Any student caught cheating on any assignment will be given an F grade for 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: <http://conduct.wsu.edu/policies/standards-of-conduct/>

Plagiarism and Academic Integrity Addendum:

University of Idaho, Student Code of Conduct Article II—Academic Honesty

1. Cheating on classroom or outside assignments, examinations, or tests is a violation of this code.
2. Plagiarism, falsification of academic records, and the acquisition or use of test materials without faculty authorization are considered forms of academic dishonesty and, as such, are violations of this code.
3. Because academic honesty and integrity are core values at a university, the faculty finds that even one incident of academic dishonesty seriously and critically endangers the essential operation of the university and may merit expulsion. [rev. 7-98]
4. The operation of UI requires the accuracy and protection of its records and documents. To use, make, forge, print, reproduce, copy, alter, remove, or destroy any record, document, or identification used or maintained by UI violates this code when done with intent to defraud or misinform.
5. All data acquired through participation in UI research programs is the property of the university and must be provided to the principal investigator. In addition, collaboration with the University Research Office for the assignment of rights, title, and interest in patentable inventions resulting from the research is also required [see 5400 A through E].
6. Entrance without proper authority into any private office or space of a member of the faculty, staff, or student body is a violation of this code.
7. It is also a violation to hack or make unauthorized use of any computer or information system maintained by the university or a member of the faculty, staff, or student body. [rev.7-05]
8. Instructors and students are responsible for maintaining academic standards and integrity in their classes. Consequences for academic dishonesty may be imposed by the course instructor. Such consequences may include but cannot exceed a grade of “F” in the course. The instructor should attempt to notify the student of the suspected academic dishonesty and give the student an opportunity to respond. The notice and the opportunity may be informal and need not be in writing. Penalties for any disciplinary infraction must be judicially imposed. [See 1640.02 C-5] [rev. 7-98]
9. Instructors may report incidents of academic dishonesty to the dean of students. Upon receiving such a report, the dean of students shall provide the student with written notice that a report has been made and an opportunity to meet with the dean to discuss the report. The dean of students shall maintain the report and any record of the meeting for a period of time deemed appropriate by the dean. The dean of students may file a complaint against the student after the meeting has taken place or the student has elected, either affirmatively or through inaction, not to meet with the dean. [add. 7-98]

For more information on academic integrity and academic dishonesty, please visit:

<http://www.uidaho.edu/DOS/academicintegrity/Student%20Resources>

University of Idaho Classroom Learning Civility Clause:

In any environment in which people gather to learn, it is essential that all members feel as free and safe as possible in their participation. To this end, it is expected that everyone in this course will be treated with mutual respect and civility, with an understanding that all of us (students, instructors, professors, guests, and teaching assistants) will be respectful and civil to one another in discussion, in action, in teaching, and in learning. Should you feel our classroom interactions do not reflect an environment of civility and respect, you are encouraged to meet with your instructor during office hours to discuss your concern. Additional resources for expression of concern or requesting support include the Dean of Students office and staff (208-885-6757), the UI Counseling & Testing Center's confidential services (208-885-6716), or the UI Office of Human Rights, Access, & Inclusion (208-885-4285).

Students With Disabilities:

WSU: Reasonable accommodations are available for students with a documented disabilities or chronic medical conditions. If you have a disability and need accommodations to fully participate in this class, please visit the Access Center website to follow published procedures to request accommodations: <http://www.accesscenter.wsu.edu>. Students may also either call or visit the Access Center in person to schedule an appointment with an Access Advisor. Location: Washington Building 217; Phone: 509-335-3417. All disability related accommodations MUST be approved through the Access Center. Students with approved accommodations are strongly encouraged to visit with instructors early in the semester during office hours to discuss logistics.

UI: Reasonable accommodations are available for students who have documented temporary or permanent disabilities. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 306 in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course. Phone: 208-885-6307; email: dss@uidaho.edu; website: www.uidaho.edu/dss.

Statement of Firearm Regulations:

The University of Idaho bans firearms from its property with only limited exceptions. One exception applies to persons who hold a valid Idaho enhanced concealed carry license, provided those firearms remain concealed at all times. It is a violation of University policy if an enhanced concealed carry license holder's firearm is displayed, other than in necessary self-defense. Please contact local law enforcement (call 911) to report firearms on University property.

Washington State University Campus Safety:

Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the "**Alert, Assess, Act**" protocol for all types of emergencies and the "[Run, Hide, Fight](#)" response for an active shooter incident. Remain **ALERT** (through direct observation or emergency notification), **ASSESS** your specific situation, and **ACT** in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at [MyWSU](#). For more information on this subject, campus safety, and related topics, please view the [FBI's Run, Hide, Fight video](#) and visit the [WSU safety portal](#).

I have read through the FS 432 Spring 2017 syllabus in its entirety and I understand the expectations and policies for this course.

Printed name

Signature Date