

# FOS 4410C/6936 Introduction to Unit Operations in Food Processing (4 credits) (Intro Food Processing) Syllabus

Lecture: MWF Period 8 3:00 - 3:50 PM - PUGH 120  
Laboratory A: R 5, 6, 7 (11:45 - 2:45pm) Food Science Pilot Plant/ Arch 120  
Laboratory B: R 8, 9, 10 (1:55 - 4:55pm) Food Science Pilot Plant/ Arch 120

**Instructor:** Dr. Andrew MacIntosh **Phone:** (352) 294-3594  
**Office:** AFPP (Bldg. 120) **E-mail:** [andrewmacintosh@ufl.edu](mailto:andrewmacintosh@ufl.edu)  
Room 126 (formal communication only please)

**Office Hours:** Friday 2:00 - 3:00 (before class) These may be adjusted during the first week of class as to not conflict with the FS student schedule.

**TA's:** Jonathan Lee: [leejonathan@ufl.edu](mailto:leejonathan@ufl.edu)  
TBD

### TA Office Hours:

Wednesday: 4:00 – 5:00pm (Jon) may be adjusted during the first week of class as to not conflict with the FS student schedule.

**Course Description:** This class introduces the fundamentals of food processing and is designed as a core course for non-engineering students. Primary concepts are applied in context of the field of food science, and include: Engineering Units, Food Properties, Conduction, Convection, Phase Changes, Microbial Death, Heat Exchangers, Steady-State-Heat-Transfer, Unsteady-State-Heat-Transfer, Extrusion, Radiation and HPP.

### Required Textbook:

Singh, R.P. and D.R. Heldman. 2013. Introduction to Food Engineering. 4<sup>th</sup> edition. Academic Press.

Note: Supplemental notes and handouts will be distributed to class via Canvas and/or email.

### Readings from text:

Week 1	1-19 Intro and Units
Week 2	19-29 Food Properties
Week 3	29-46 Mass Balance 51-55
Week 4	257-266 Thermal Properties of Food & Conduction
Week 5	266-274 & 285-286 Convection, Nu and Frying
Week 6	187-200 Steam 232-236 Thermocouples
Week 7	269-270 Radiation HT 371 – 379 Microwave
Week 8	Exam I (Laboratory Period)
Week 8	721-735 Extrusion
Week 9	84-88 Reynolds Number
Week 10	413-422 Food Microbiology (Death)
Week 11	248-252 Heat Exchanger 270, 285-306 SSHT 65-73 Pumps
Week 12	337-350 USSHT
Week 13	422 – 433 Lethality Rate
Week 14	Irradiation – Lecture Notes
Week 15	Exam II (As Assigned)

**Course Outcome:**

1. Students will be able to apply the concepts of food engineering to food processing systems to compare methods and evaluate safety.
2. Students will test food processing theories during laboratories.
3. Students will apply food processing theories to scenarios and quantify parameters.
4. Students will analyze food processing problems and determine optimal solutions.

**Learning Activities:** These include classroom lectures, laboratory sessions and reports (with application based problems), group discussions, guest lectures on select topics (as available) and a **term project with presentation**.

**Assessment Tools:** Written exam(s), laboratory reports, and performance in term project/presentation will be used to assess students' learning outcomes. In addition, observations during classroom discussion and reflections during laboratory sessions will also be conducted to determine success of the learning outcomes.

**Grading Policy:**

Lab reports x 6 (6 % each)	36%	A: 90 – 100
Tutorial x 6 (3% each)	18%	A-: 87-89.99
Exam I (20%)	20%	B+: 85 – 86.99
Exam II (20%)	20%	B: 80 - 84.99
Project (6%)	6%	C+: 75 - 79.99
Total	100%	C: 70 - 74.99
		D+: 65 - 69.99
		D: 60 - 64.99
		E: Below 60

- For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**Exams:** A midterm and final exam will be given. **Note:** All exams are open book, open notes, open computer.

**Reports:** Laboratory and Tutorials reports are due within 1 week (Due before noon, but will be accepted without penalty until EOD – I will NOT take questions concerning the previous weeks work during the following lab/tutorial). A 20% penalty will be assigned for late assignments or reports turned in within 3 days after the EOD on due date. No reports will be accepted after 3 days past the due date. Reports should be started early so that any questions may be asked well in advance of the due date (ideally during office hours). It is the student's responsibility to ask any questions about the report before the last minute.

**Project:** The project has the same value as a laboratory report, and the same amount of effort is expected. The idea to expand upon an aspect of the course, from material, to laboratories and present your work. Thus, the particulars of the project change each year. Details will be given the first weeks of class.

**Participation:** Students will not be assigned a grade based on their attendance, however, preparedness for the laboratory is essential and students who have not reviewed the laboratory manual will not be permitted to participate in the laboratory (as assessed through questions at the beginning of the laboratory). If you do not attend the tutorial/laboratory, any report will not be marked, and a grade of zero assigned unless otherwise communicated by the professor.

**Online Course Evaluation Process**

“Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.”

## **Academic Honesty**

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/scsr/process/student-conduct-honor-code>.

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. Click here to read the Conduct Code. If you have any questions or concerns, please consult with the instructor or TAs in this class.

It is to be assumed all work will be completed independently unless the assignment is defined as a group project as indicated explicitly by the professor. This policy will be upheld at all times in this course.

## **Software Use:**

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

## **Services for Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

- “Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.”

## Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

### Health and Wellness

*U Matter, We Care:* If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

*Counseling and Wellness Center:* [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.

*Student Health Care Center:* Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).

*University Police Department:* [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

*UF Health Shands Emergency Room / Trauma Center:* For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#).

*GatorWell Health Promotion Services:* For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the [GatorWell website](#) or call 352-273-4450.

### Academic Resources

*E-learning technical support:* Contact the [UF Computing Help Desk](#) at 352-392-4357 or

via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu).

*Career Connections Center:* Reitz Union Suite 1300, 352-392-1601. Career assistance

and counseling services.

*Library Support:* Various ways to receive assistance with respect to using the libraries or finding resources.

*Teaching Center:* Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

*Writing Studio:* 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

*Student Complaints On-Campus:* [Visit the Student Honor Code and Student Conduct Code webpage for more information](#).

*On-Line Students Complaints:* [View the Distance Learning Student Complaint Process](#).

## Approximate Class Schedule Summary (Subject to Change):

Weekly Topic	FALL 2022	Monday	Wednesday	Thursday	Demo	Friday
Intro Units History	1	21-Aug	Intro Eng Energy?	Safety Walk		Course Questions/ History
Food Prop Report Write	2	28-Aug	Units	Food Properties p, mc, measure	UNITS WB/DB	Graph and Sucrose Brix
Thermal Prop	3	04-Sep	Phase Change/Energy Mass Balance	Food Properties	frying?	Food Properties p, aw, mc, measure X2
Roasting Steam	4	11-Sep	Thermal Properties/Energy Sour	Temp Measure Calibration	Pressure, FP,	thermocouple
HT	5	18-Sep	Frying	Roasting/ Why we cook	Coffee	taste
HT2	6	25-Sep	Convective HT	Radiation HT (microwave)	energy transfer	(microwave & Steam engine?)
Exam I	7	02-Oct	HT Examples	Steam Examples (Flash steam)	Steam	steam
Extrusion	8	09-Oct	Exam Prep	Previous Exam	Exam I	
Rheo pump hurdle	9	16-Oct	Pumps	Dev Extrusion	Pumps & Extrusion	pump demo?
Microdeath	10	23-Oct	Extrusion Part II	Hurdle (processing)	Extruder	pasta test
HE	11	30-Oct	Micro Death "Z"	Micro Death Examples	Microdeath	yeast death video?
USSHT	12	06-Nov	HE "U"	HE D and Z calculations	SSHT	patty
USSHT app	13	13-Nov	USSHT	USSHT	USSHT	shapes
	14	20-Nov	Sousvide			
Cold pasteurization	15	27-Nov	Irradiation gama	HPP	USSHT	can?

**Note: Final exam date/start-time will be set by the register, it will be 3 hours in duration.**

	!= class
	Andrew Lecture
	Lab
	Tutorial
	EXAM

**Materials and Supplies Fees:** There is a \$20 supplies fee, and a \$20 equipment fee to support the running and maintenance of the laboratory.

### Class Recordings

Our class sessions may be audio/visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate in class and/or with their camera engaged or utilize a profile image are agreeing to have their video/audio or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and/or participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared.

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student

## **Attendance**

Laboratory and tutorial attendance is mandatory, however, special accommodation can be arranged through discussion with the professor if there are extenuating circumstances. A missed laboratory session will result in a grade of zero unless the absence is excused as per university policy or prior arrangements have been made with the professor. Laboratory zoom recordings will not be posted after the session.

Lectures attendance is also mandatory at the scheduled time. My experience with this course has shown that classes with active participation in discussions and questions are far superior to pre-recorded lectures, and that students who attend all scheduled lectures (either in person OR through video conference) perform better on exams and during laboratories. I strongly encourage all students to attend every lecture (either in person OR zoom) and interact during the discussions and examples. This is a difficult course, and we move at a fast pace with each lecture building upon the last. I understand that there are sometimes extenuating circumstances, however if you miss more than 4 lectures (10% of the class) without documented and approved acceptable reasons (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>), you will be assigned a failing grade for excessive absences. I will make a recording of every lecture (when possible) for review to assist in exam preparation, and to give students the opportunity to review examples.