

# Cover Sheet: Request 14174

## FOS 4XXXC Introduction to Unit Operations in Food Processing

### Info

Process	Course New Ugrad/Pro
Status	Pending at PV - University Curriculum Committee (UCC)
Submitter	Andrew MacIntosh andrewmacintosh@ufl.edu
Created	8/29/2019 10:47:17 AM
Updated	9/20/2019 5:01:41 PM
Description of request	Create new course: FOS XXXXC Introduction to Unit Operations in Food Processing

### Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Food Science and Human Nutrition 514915000	Susan Percival		8/29/2019
FOSXXXXCIntroductiontoUnitOperationsinFoodProcessing.pdf					8/29/2019
ConsultforFOScoursebyABE8-28-2019.pdf					8/29/2019
College	Approved	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Approved at the CALS CC on 9/20/19.	9/20/2019
No document changes					
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			9/20/2019
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

# Course|New for request 14174

## Info

**Request:** FOS 4XXXC Introduction to Unit Operations in Food Processing

**Description of request:** Create new course: FOS XXXXC Introduction to Unit Operations in Food Processing

**Submitter:** Andrew MacIntosh andrewmacintosh@ufl.edu

**Created:** 8/29/2019 9:58:32 AM

**Form version:** 1

## Responses

**Recommended Prefix** FOS

**Course Level** 4

**Course Number** XXX

**Category of Instruction** Advanced

**Lab Code** C

**Course Title** Introduction to Unit Operations in Food Processing

**Transcript Title** Intro Food Processing

**Degree Type** Baccalaureate

**Delivery Method(s)** On-Campus

**Co-Listing** No

**Effective Term** Fall

**Effective Year** 2020

**Rotating Topic?** No

**Repeatable Credit?** No

**Amount of Credit** 4

**S/U Only?** No

**Contact Type** Regularly Scheduled

**Weekly Contact Hours** 6

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

**Prerequisites** MAC 2311, PHY 2053

**Co-requisites** N/A

**Rationale and Placement in Curriculum** An introductory food processing class was traditionally offered as AOM 4062 food engineering, and is a required course in the food science track. With a key instructor's retirement, AOM 4062 is no longer offered. This class (FOS 4XXXC Introduction to Unit Operations in Food Processing) will replace AOM 4062 for food scientists. As this is a senior year course, food science would like to include laboratories, and adjust curriculum from AOM 4062 to better integrate with other final year courses, and meet IFT accreditation requirements.

**Course Objectives** 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 theory during laboratories.
3. Students will apply food processing theory to scenarios and quantify parameters.
4. Students will analyze food processing problems and determine optimal solutions.

**Course Textbook(s) and/or Other Assigned Reading** Required Textbook:

Singh, R.P. and D.R. Heldman. 2013. Introduction to Food Engineering. 4th 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 3 413-422 Food Microbiology (Death)
- Week 4 51-55 & 257-266 Thermal Properties of Food & Conduction
- Week 5 232-236 Thermocouples
- Week 6 29-46 Mass Balance 187-200 Steam,
- Week 7 266-274 & 285-286 Convection, Nu and Frying
- Week 8 Exam I (Laboratory Period - Oct 10th) no reading
- Week 9 248-252 Heat Exchanger 270, 285-306 SSHT
- Week 10 84-88 Reynolds number
- Week 11 65-73 Pumps 721-735 Extrusion
- Week 12 337-350 USSHT
- Week 13 422 – 433 Lethality Rate
- Week 14 269-270 Radiation HT 371 – 379 Microwave
- Week 15 Irradiation - Handout
- Week 16 Exam II (As Assigned) no reading assigned

**Weekly Schedule of Topics**

Week	Topics	Laboratory
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Week	Topics	Laboratory
1	Introduction, Units/Eng. Toolbox	Lab walk-around, safety discussion (PPE),
2	Properties of food, Report Writing	Lab Food properties
3	History, Microbial Death tutorial	Food properties
4	Microbial Death Examples, Energy Sources, Thermal Conduction	Lab Steam Flaking
5	Conduction Examples, Temperature Measure, Phase Change	tutorial Steam Flaking
6	Steam, Energy/Mass Balance, Steam Examples	lab Steam
7	Convective Heat Transfer, Frying	tutorial Steam
8	Exam Prep/Presentations	EXAM I (no lab)
9	SSHT, Heat Exchangers, HE examples	lab SSHT
10	Fluid Flow Reynolds, HE D & Z Calculations, Rheology	tutorial SSHT
11	Pumps, Extruder, Examples	lab Extruder
12	Blanching, USSHT, USSHT Examples	tutorial 5 Extruder
13	LR Canning, LR Examples	lab USSHT
14	Sous-vide, Radiation HT, Examples	tutorial USSHT
15	Irradiation (no lab)	
16	Exam Prep/ Presentations	EXAM II (no lab)

**Grading Scheme A: 90 – 100**

- A-: 87-89.99
- B+: 85 – 86.99
- B: 80 - 84.99
- C+: 75 - 79.99
- C: 70 - 74.99
- D+: 65 - 69.99
- D: 60 - 64.99
- E: Below 60

Lab reports x 6 (6 % each) 36%  
Tutorial x 6 (3% each) 18%  
Exam I (20% each) 20%  
Exam II (20% each) 20%  
Project (6% each) 6%

Total 100%

**Instructor(s)** Dr. Andrew MacIntosh

**Attendance & Make-up** Yes

**Accomodations** Yes

**UF Grading Policies for assigning Grade Points** Yes

**Course Evaluation Policy** Yes

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

# FOS XXXXC Introduction to Unit Operations in Food Processing (4 credits)

## Syllabus

Lecture: M W F period 2 8:30-9:20 AM

Laboratory A: R 5,6,7 (11:45-2:45) PM Food Science Pilot Plant/WEIL 408D

Laboratory B: R 8,9,10 (3-6) PM Food Science Pilot Plant/ WEIL 408D

**Instructor:** Dr. Andrew MacIntosh **Phone:** 352-294-3594  
**Office:** AFPP (Bldg 120) **E-mail:** Andrewmacintosh@ufl.edu  
Room 126  
**Office Hours:** Wed (9:30-10:30)

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

### **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 3 413-422 Food Microbiology (Death)  
Week 4 51-55 & 257-266 Thermal Properties of Food & Conduction  
Week 5 232-236 Thermocouples  
Week 6 29-46 Mass Balance 187-200 Steam,  
Week 7 266-274 & 285-286 Convection, Nu and Frying  
Week 8 Exam I (Laboratory Period - Oct 10th)  
Week 9 248-252 Heat Exchanger 270, 285-306 SSHT  
Week 10 84-88 Reynolds number  
Week 11 65-73 Pumps 721-735 Extrusion  
Week 12 337-350 USSHT  
Week 13 422 – 433 Lethality Rate  
Week 14 269-270 Radiation HT 371 – 379 Microwave  
Week 15 Irradiation - Handout  
Week 16 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 theory during laboratories.
3. Students will apply food processing theory 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:**

		A: 90 – 100
Lab reports x 6 (6 % each)	36%	A-: 87-89.99
Tutorial x 6 (3% each)	18%	B+: 85 – 86.99
Exam I (20% each)	20%	B: 80 - 84.99
Exam II (20% each)	20%	C+: 75 - 79.99
Project (6% each)	6%	C: 70 - 74.99
Total	100%	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 before the beginning of the next laboratory or Tutorial. A 20% penalty will be assigned for late assignments or reports turned in within 3 days after the 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 improve an aspect of the course, from material, to laboratories and present your results to the class. Thus, the particulars of the project change each year. Details will be given the first week 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. If you do not attend the tutorial/laboratory, any report will not be marked.

**Attendance and Make-Up Work**

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

**Online Course Evaluation Process**

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/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/sccr/process/student-conduct-honor-code>.

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.



- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.edu](http://www.counseling.ufl.edu)*

Counseling Services Groups and Workshops Outreach and Consultation Self-Help Library  
Wellness Coaching

- U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)
- *Career Connections Center, First Floor JWRU, 392-1601, <https://career.ufl.edu/>.*

#### Student Complaints:

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>.
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>

#### ***Class Schedule Summary:***

Week	Topics	Laboratory
1	Introduction Units/Eng. Toolbox	Lab walk-around, safety discussion (PPE),
2	Properties of food Report Writing	1 Food properties
3	History Microbial Death	1 Food properties
4	Microbial Death Examples Energy Sources Thermal Conduction	2 Steam Flaking
5	Conduction Examples Temperature Measure Phase Change	2 Steam Flaking
6	Steam Energy/Mass Balance Steam Examples	3 Steam
7	Convective Heat Transfer Frying	3 Steam
8	Exam Prep/Presentations	EXAM I
9	SSHT Heat Exchangers HE examples	4 SSHT
10	Fluid Flow Reynolds HE D & Z Calculations Rheology	4 SSHT
11	Pumps Extruder	5 Extruder

	Examples	
12	Blanching USSHT USSHT Examples	5 Extruder
13	LR Canning LR Examples	6 USSHT
14	Sous-vide Radiation HT Examples	6 USSHT
15	Irradiation	
16	Exam Prep/ Presentations	EXAM II