

**FOS 4427C: Principles of Food Processing**  
**FOS 6936: Adv Principles of Food Processing**

**Syllabus**

Lecture: M W F 9:35-10:25AM @ CSE E222  
Laboratory: F 12:50-3:50PM Food Science Pilot Plant  
Tutorial: F 12:50-3:50PM Location: NZH 0112

**Instructor:** Dr. Wade Yang      **Phone:** 352-392-1991, Ext. 507  
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Room 126  
**Office Hours:** Open door policy

**Description:** This course will introduce food processing and preservation topics as well as build on fundamentals. It covers basic principles, equipment and quality assessment for food processing and preservation operations such as mixing, separation, blanching, pasteurization, extrusion, baking, frying, chilling and packaging. Integrated laboratory sessions will provide students with hands-on experiences of the food processing principles learned in the class. By conducting the term project and oral presentation, students will integrate and apply the food processing concepts, principles and skills to solve the real-world problems.

**Textbook:** The electronic version of the following textbook is available in library free of charge.

Fellows, P.J. 2009. Food Processing Technology: Principles and Practice. 3<sup>rd</sup> edition. Woodhead Publishing Ltd.

Supplemental notes and handouts will be distributed to class via e-learning and/or email.

**Course Outcome:** Students will be able to describe the fundamentals of food processing and preservation, and will be able to explain, analyze and evaluate scenarios related to various unit operations in food processing. The students will also be capable of using research literature on the subjects and analyzing situations in which the food processing principles may be utilized.

**Learning Activities:** These include classroom lecture, homework or practice problems, group discussion, guest lecture on selective topics, field trip, laboratory exercise or demonstration, tutorial, term paper and oral presentation.

**Assessment Tools:** Written exam, home work, and performance in term project and oral presentation will be used to assess students' learning outcomes. In addition, observations during classroom discussion and reflections on field trips will also be conducted to determine the learning outcomes.

**Exams:** Three 2-hour exams (Exam I, Exam II and Exam III) will be given.

**Grading Policy:**

Homework	20%	A: 90 – 100
Lab report	15%	A-: 87-89.99
Term Project	10%	B+: 85 – 86.99
Participation/Conduct	5%	B: 80 - 84.99
		C+: 75 - 79.99

Exam I	15%	C: 70 - 74.99
Exam II	15%	D+: 65 - 69.99
Exam III	20%	D: 60 - 64.99
		E: Below 60
Total	100%	

**Note:** All exams are open book, open notes. Absence from any exam without prior notice/excuse will result in a zero score.

**Homework/Lab Report:** Homework and lab report are typically due one week from the date they are distributed. A 15% penalty will be assessed for late assignments or reports turned in within a week after the due date. No homework or lab report will be accepted after two weeks past the due date. Homework and lab report should be started early so that any questions may be asked well in advance of the due date. It is the student's responsibility to ask any questions about the assignment or lab report before the last minute.

**Term Paper and Oral Presentation:** All students in this course are required to conduct a term project covering a topic related to the class content. Graduate students need to write a term paper in addition to making a Powerpoint presentation at the end of the class, while undergraduate students only need to make a Powerpoint presentation. Evaluation on oral presentations will be conducted by the entire class on a scale of 100. The term paper will be evaluated by the instructor only at the end of the class on the same grading scale.

#### **Other Course Information:**

**Participation:** Students will be assessed a grade based on their attendance, preparedness and conduct for discussion, attentiveness, and class participation. E-mail, call or visit the instructor immediately concerning absences. Absences over 60% of class time will result in a forfeiture of the participation grade.

**Students with Disabilities Act:** The Dean of Students Office coordinates the needed accommodations of students with disabilities. This includes the registration of disabilities, academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services, and mediating faculty-student disability related issues. Dean of Students Office, 202 Peabody Hall, 392-7066. [www.dso.ufl.edu](http://www.dso.ufl.edu). Students with disabilities can take exams earlier, under special supervision. Every effort will be made to accommodate these students.

**Academic Honesty:** The University of Florida requires all members of its community to be honest in all endeavors. Cheating, plagiarism, and other acts diminish the process of learning. When students enroll at UF they commit themselves to honesty and integrity. Students are fully expected to adhere to the academic honesty guidelines they signed when they were admitted to UF. As a result of completing the registration form at the University of Florida, every student has signed the following statement:

*"I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University."* Furthermore, on work submitted for credit by UF students, 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 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.

**Campus Helping Resources:** Students experiencing crisis or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. Both the Counseling Center and Student Mental Health provide confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career and academic goals, which interfere with their academic performance. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health is located on the second floor of the Student Health Services in the Infirmary.

<b>Service</b>	<b>Location</b>	<b>Phone</b>	<b>Services provided</b>
University Counseling Center	301 Peabody Hall	392-1575	Personal and career counseling <a href="http://www.counsel.ufl.edu">www.counsel.ufl.edu</a>
Student Mental Health	Student Health Care Service	392-1171	Personal counseling <a href="http://www.hsc.ufl.edu/shcc/smhs.htm">www.hsc.ufl.edu/shcc/smhs.htm</a>
Sexual Assault Recovery Services (SARS)	Student Health Care Service	392-1161	Sexual assault counseling
Career Resource Center	Reitz Union	392-1601	Career development assistance, counseling

### Class Schedule:

Week	Date	Period	Topic	Notes/Comments
1	M	1/5	3	
	W	1/7	3	Introduction; class schedule; policy
	F	1/9	3	Basic principles; properties of foods
	F	1/9	6-8	Lab 1: Lab safety, rules, lab reports
2	M	1/12		Basic principles; properties of foods
	W	1/14	3	Basic principles; properties of foods
	F	1/16	3	Raw material preparation
	F	1/16	6-8	Lab2: Density, moisture and water activity measurements
3	M	1/19	3	Holiday
	W	1/21	3	Raw material preparation
	F	1/23	3	Raw material preparation
	F	1/23	6-8	Tutorials / Problem solving
4	M	1/26	3	Size reduction
	W	1/28	3	Size reduction
	F	1/30	3	Mixing and forming
	F	1/30	6-8	Lab 3: Field Trip
5	M	2/2	3	Mixing and forming / Separation and concentration
	W	2/4	3	Separation and concentration

	F	2/6	3	Dehydration	
	F	2/6	6-8	Exam 1	NZH 0112
6	M	2/9	3	Dehydration	
	W	2/11	3	Blanching	
	F	2/13	3	Pasteurization	
	F	2/13	6-8	Lab 4: Blanching, Pasteurization & Sterilization	Food Science Pilot Plant
7	M	2/16	3	Pasteurization	
	W	2/18	3	Heat sterilization	
	F	2/20	3	Heat sterilization	
	F	2/20	6-8	Lab 5: Evaporation	Food Science Pilot Plant
8	M	2/23	3	Evaporation and distillation	
	W	2/25	3	Extrusion	
	F	2/27	3	High pressure processing	
	F	2/27	6-8	Exam 2	NZH 0112
9	M	3/2		SPRING BREAK	
	W	3/4		SPRING BREAK	
	F	3/6		SPRING BREAK	
	F	3/6		SPRING BREAK	
10	M	3/9		Baking and roasting	
	W	3/11		Baking and roasting	
	F	3/13		Food frying	
	F	3/13		Lab 6: Novel food processing technologies	Food Science Pilot Plant
11	M	3/16	3	Dielectric, ohmic and infrared heating	
	W	3/18	3	Dielectric, ohmic and infrared heating	
	F	3/20	3	Lab 7: Field trip	TBA
	F	3/20	6-8	Lab 7: Field trip	TBA
12	M	3/23	3	Refrigeration / chilling	
	W	3/25	3	Refrigeration / chilling	
	F	3/27	3	Freezing / frozen storage	
	F	3/27	6-8	Tutorial	NZH 0112
13	M	3/30	3	Freezing / frozen storage	
	W	4/1	3	Freeze drying and freeze concentration	
	F	4/3	3	Freeze drying and freeze concentration	
	F	4/3	6-8	Lab 8: Food freezing	Food Science Pilot Plant
14	M	4/6	3	Food Coating	
	W	4/8	3	Food Coating	
	F	4/10	3	Food Irradiation	
	F	4/10	6-8	Lab 10: Irradiation Facility Visit	
15	M	4/13	3	Packaging	
	W	4/15	3	Filling and sealing of containers	

	F	4/17	3	Project presentations	
	F	4/17	6-8	Project presentations	NZH 0112
16	M	4/20	3	Project presentations	
	W	4/22	3	Project presentations	
	F	4/24	3	Reading Day	
	F	4/24	6-8	Reading Day	
17	M	4/27	3	Final Exam	

### Class Content, Learning Objectives and Outcomes:

Module		Learning Objectives	Learning Outcomes
No.	Content		
1	Basic principles; Properties of foods	Understand basic concepts of food processing and properties of foods commonly used in processing	Students will be able to describe basic food processing concepts and food properties related to processing
2	Raw material preparation	Understand various techniques for raw material preparation including cleaning, sorting, grading and peeling.	Students will be able to describe, select and apply different preparation techniques for raw materials prior to processing
3	Size reduction	Understand the theory, equipment and operation of size reduction, as well as its effect on food quality	Students will be able to describe the principles of size reduction, determine size reduction method and select appropriate size reduction equipment
4	Mixing and forming	Understand the theory behind solid and liquid mixing, bread/pie/biscuit/confectionery molding and forming, equipment and effect on foods	Students will be able to design mixing or forming processes, choose proper equipment and understand their effect on food quality
5	Separation and concentration of foods	Understand various methods used for separation and concentration of foods, including centrifugation, filtration, expression, solvent extraction, and membrane concentration, and their effect on foods	Students will be able to describe various separation and concentration methods, equipment and effect on foods.
6	Irradiation	Understand the basic principles, equipment, applications and effects of irradiation	Students will be able to explain the principles of irradiation, and determine the proper irradiation dose and equipment for different foods
7	Novel processing technologies	Understand the basic principles of emerging processing technologies, e.g., high-pressure processing, pulsed UV lights, ultrasound processing, etc.	Students will be able to describe the principle, process and equipment of major emerging processing technologies
8	Blanching	Understand basic principles, equipment, operations and effects of food blanching	Students will be able to describe the purposes, conditions, equipment and effects for blanching vegetables and fruits

9	Pasteurization	Understand the underlying theory and equipment for pasteurization	Students will be able to describe the principles, process, equipment and effect of pasteurization of foods, e.g., milk
10	Heat sterilization	Understand in-container sterilization (retorting) and aseptic processing, as well as their effects on food quality	Students will be able to describe the processes of retorting and aseptic processing, and their effects on foods
11	Evaporation and distillation	Understand the principles and equipment for evaporation and distillation	Students will be able to describe the processes and applications of evaporation and distillation
12	Extrusion	Understand the principle, equipment, applications and effect on foods for extrusion cooking	Students will be able to describe the extrusion process, choose equipment, design applications, and understand its effect on extrudate quality
13	Dehydration	Understand drying theory, equipment, applications and effect on foods; review psychrometrics	Students will be able to calculate drying time, choose drying equipment, and understand its effect on food quality
14	Baking and roasting	Understand the principle, equipment, applications and effect of baking and roasting	Students will be able to describe the baking and roasting processes, choose equipment and understand their effects on food quality
15	Frying	Understand the principle, equipment, applications and effect of food frying	Students will be able to describe frying process, choose equipment and understand its effect on food quality
16	Chilling	Understand the principle, equipment, chill storage and effect on foods	Students will be able to describe the principle of chilling for fresh and processed foods, choose chilling equipment, and understand chill storage and effect on food quality
17	Freezing, freeze drying and freeze concentration	Understand the principle, equipment and operation of freezing, freeze drying and freeze concentration	Students will be able to describe the processes of freezing, freeze drying and freeze concentration and their applications and effects on foods
18	Packaging; modified atmosphere storage / packaging (MAS/MAP)	Understand the principle, method and equipment or material for packaging or MAS/MAP	Students will be able to describe the principles and processes of food packaging and MAS/MAP, choose appropriate packaging method and materials, and understand their effects on food quality
19	Coating or enrobing	Understand the principles, equipment and applications of coating or enrobing	Students will be able to choose appropriate types of coating materials, handle chocolate and compound coatings, determine among hard, soft and chocolate coating methods, and understand their effects on food quality

## Labs/Field Trip/Tutorials - Learning Objectives and Outcomes:

Module		Learning Objectives	Learning Outcomes
No.	Content		
1	Lab introduction/lab report guideline	Provide orientation to food processing labs, safety measures, and lab report guideline that follows a typical scientific paper format	Students will be able to describe basic components and requirements of food processing labs, safety measures, and how to write a meaningful lab report
2	Laboratories	Provide hands-on experiences to students in various aspects of food processing learned in classroom	Students will be able to describe various processing methods, understand the conditions of their operations, choose appropriate equipment, and gain basic knowledge about food processing plant material handling/distribution, environment/equipment cleaning and sanitation, and water/waste management
9	Field trip	Integrate and apply food processing principles learned in classroom to real-world problems	Students will gain first-hand experiences on the principles, material properties, food processing unit operations and applications through the field trip
10	Tutorials/problem solving	Assist students with any questions regarding class lecture, laboratory report or home work; foster an environment of group discussion and problem solving	Students will enhance knowledge retention and solve their problems by attending the tutorial sessions throughout the class