

### **Course Description**

Analysis and design of food processing operations including thermal pasteurization and sterilization, freezing, extrusion, texturization, and mechanical separation. Pre: 3504, 3524. (3H,3C).

### **Course Overview**

Students will learn about principles and design issues about food processing operations including thermal pasteurization and sterilization, refrigeration, freezing, microwave cooking, frying, and extrusion. Theories on some of the new food processing technologies like ohmic heating, high pressure processing, pulsed electric field processing will be included. Students will learn how various unit operations come together in making various food products from their raw stage to a final stage on consumer's dinner table.

### **Learning Objectives**

Upon successful completion of this course, students shall be able to:

- identify the underlying principles of food preservation
- identify the underlying principles of thermal processing
- design heat exchangers for thermal processing of liquid foods
- identify the underlying principles of refrigeration and freezing
- design various refrigeration and freezing systems
- identify the underlying principles of irradiation processing (MW, RF, Gamma)
- apply dehydration principles in deep fat frying, baking/broiling operations
- apply mass transfer principles in moist cooking, salting and marination operations
- design the extrusion cooking processes
- design of packaging systems for food products

- be familiar with the principles in emerging technologies in food processing
- perform simulation on various food processing operations
- obtain basic understanding of contemporary and ethical issues in food processing and preservation

### **Course Policy**

It is important that you attend all the classes, working out all home works, assignments, and taking all exams. For any graded work, specifically the assignments, an 80% policy will be enforced. To get grade in that category you must have completed and submitted 80% of the given work. For e.g., if you have been given 10 assignments during the course, you should have submitted 8 assignments to get grade assigned for the assignment category. Use of electronics (laptop, IPad, cell phone, etc.) and other distracting programs like face book, email is strictly prohibited in the class unless the students are otherwise notified. Most of the assignments will be assigned on Fridays and collected week later. Late submission will not be accepted. You will be given two tests and one comprehensive final exam.

### **Grading Policy**

Assignments 10%  
Tests (2 @ 15% each) 30%  
Project 25%  
Final Exam 25%  
Attendance 10%

### **Disability Statement**

Reasonable accommodations are available for students who have a disability. Students should contact the Services for Students with Disabilities (SSD), 150 Henderson Hall, 231-3788 (V), 231-1740 (TTY); Susan P. Angle, [spangle@vt.edu](mailto:spangle@vt.edu), [www.ssd.vt.edu](http://www.ssd.vt.edu). "Students with disabilities are responsible for

self-identification. To be eligible for services, documentation of the disability from a qualified professional must be presented to SSD upon request. Academic adjustments may include, but are not limited to: priority registration, auxiliary aids, program and course adjustment, exam modifications, oral or sign language interpreters, cassette taping of text/materials, note-takers/readers, or assistive technology."

### **Honor Code Statement**

The Honor Code will be strictly enforced in this course. All assignments submitted shall be considered graded work, unless otherwise noted. All aspects of your coursework are covered by the Honor System. Any suspected violations of the Honor Code will be promptly reported to the Honor System (see <http://www.honorsystem.vt.edu/>). The following is the Honor Code written verbatim from the VT Honor System Constitution:

The Honor Code is the University policy that expressly forbids the following academic violations:

1. Cheating -- Cheating includes the actual giving or receiving of any unauthorized aid or assistance or the actual giving or receiving of any unfair advantage on any form of academic work, or attempts thereof.
2. Plagiarism -- Plagiarism includes the copying of the language, structure, ideas and/or thoughts of another and passing off same as one's own, original work, or attempts thereof.
3. Falsification -- Falsification includes the statement of any untruth, either verbally or in writing, with respect to any circumstances relevant to one's academic work, or attempts thereof. Such acts include, but are not limited to, the forgery of official signatures, tampering with official records, fraudulently adding or deleting information on academic documents such as add/drop requests, or fraudulently changing an examination or

other academic work after the testing period or due date of the assignment.

While group work on homework assignments is encouraged to facilitate cooperative learning, each student is expected to complete each assignment him/herself and to turn in his/her own work. Copying of another student's work (currently or previously enrolled students) is not allowed. Copying (either direct cut and paste or slight rewording) of written material, such as from the Internet or another student's work, is not allowed. All exams should be solely and completely the work of the individual student. Violations of the Honor Code will be turned over to the Honor Court.

### **Tentative Lecture Schedule**

<b>Week</b>	<b>Tue</b>	<b>Thu</b>	<b>Assignment</b>
1 (08/22)	General introduction	Food preservation principles	Food preservation (Chat 1)
2 (08/29)	Thermal processing	Thermal processing	Thermal process c (A2)
3 (09/05)	Sterilization	Pasteurization	Pasteurization(A3)
4 (09/12)	Blanching/ Unsteady heat transfer	Frying Baking/Roasting Broiling/Grilling	Unsteady state he. (A4)
5 (09/19)	Microwave processing/ Exam Review	<b>Exam 1</b>	
6 (09/26)	Refrigeration	Refrigeration	Refrigeration (A5)
7 (10/03)	Freezing	Freezing	Freezing (A6)

8 (10/10)	Food Packaging	Food Packaging	Food Packaging (A7)
9 (10/17)	Food Packaging	<b>Exam 2</b>	
10 (10/24)	Food Extrusion	Food Extrusion	Food Extrusion (A8)
12 (10/31)	Food Extrusion	Food Ethics	Food Ethics (A9)
13 (11/07)	Mathematical modeling	Mathematical Modeling	
14 (11/14)	Mathematical Modeling	Mathematical Modeling	Modeling (A10)
15 (11/21)	<b>Thanks Giving Break</b>		
16 (11/28)	New technologies	New Technologies	
17 (12/05)	Project presentations	Project presentations	