

## FSHN 608 Advanced Food Science II (3 credits)

**Instructor:** Dr. Soojin Jun  
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**Meeting time:** MW 9:00 – 10:15 a.m.

**Class room:** St. John 15

**Course description:** Designed for graduate and advanced undergraduate students, who want to learn the basic engineering principles of heat and mass transfer, fluid flow applied to food processing and applications of novel food processing technologies.

**Course objectives:** Students will be able to

1. Define and explain the basic engineering concepts and unit operations used in food processing
2. Correctly analyze the mass and energy transfer phenomena that occur in the entire food processing system
3. Develop the food processing system optimized for food engineering applications
4. Understand alternative food processing techniques: high pressure processing, pulsed electric field, ohmic heating, and microwave heating
5. Develop presentation and group discussion

### References:

- R. Paul Singh, Dennis R. Heldman, 2000, Introduction of Food Engineering, 3<sup>rd</sup> edition, Academic Press Inc.
- Christie J. Geankoplis, 1978, Transport Processes and Unit Operations, Allyn and Bacon, Inc.
- Romeo T. Toledo, 1991, Fundamentals of Food Process Engineering, 2<sup>nd</sup> edition, Van Nostrand Reinhold

### Grading

Class presentation (30%), Class participation (10%), Midterm exam (Open note & handouts, 20%), and Final project (40%).

All class presentation (25 - 30 min) should be in Power Point; Handout copies of presentation; Distribute the technical paper on the topic of your presentation at least 1 week before your presentation; please set up projector for your talk.

Final project: a paper review project. Your paper shall be a review and discussion of some recent topics in food process engineering. The topics are not confined to the course syllabus. Your paper must directly discuss and reference at least three related papers published within the last six years from reputable referred technical journals or proceedings from related conferences. Note that books or chapters from books do not satisfy this requirement; however, they can be used as references. Your paper is to have a cover page stating the title of the paper, your name,

the course name, the semester, the instructor's name, and the due date. Your paper is to be 10-15 pages long, not including the cover page. You need to turn in one copy of your paper as well as copies of the primary journal/conference articles that you used.

**Course plan:**

<b>Lecture</b>	<b>Topic</b>
1	Introduction and scheduling, course description and orientation
2	Basics, unit, properties
3	Reaction kinetics
4	Reaction kinetics
5	Residence time distribution
6	Residence time distribution
7	Thermal processing: D, Z, F values
8	Thermal processing: D, Z, F values
9	Pasteurization
10	Sterilization
11	Sensor data acquisition system and measurement
12	Infrared heating
13	Microwave heating
14	Ohmic heating
15	Infrared heating (Presentation 1)
16	Microwave heating (Presentation 2)
17	Ohmic heating (Presentation 3)
18	<b>Midterm</b>
19	Pulsed electric field

20	High pressure processing
21	Food irradiation
22	Pulsed electric field (Presentation 4)
23	High pressure processing (Presentation 5)
24	Food irradiation (Presentation 6)
25	Pulsed UV light
26	Aseptic processing
27	Food freezing and evaporation
28	Biosensor
29	Pulsed UV light (Presentation 7) Aseptic processing (Presentation 8)
30	Food freezing (Presentation 9) Biosensor (Presentation 10) (Term project <b>DUE</b> )