

## Food Processing Engineering Course Outline

FS 400:302 — Spring Semester, 2020 (4 credits)

The purpose of this course is to help the students to understand and apply the concepts and principles of food engineering. The topics to be covered are mass and energy balances, fluid mechanics, psychometrics, heat and mass transfer, dehydration, and others. The emphasis is to develop the analytical skills of the students to solve practical problems relating to food processing.

**Instructor: Professor Kit L. Yam**

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Office hours: by appointment

Teaching Assistant: Yan Zhang

Room 411, Food Science and Nutritional Sciences Building

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Office hours: Tuesday and Thursday 3 – 5 PM and by appointment

Classroom: 109 Food Science Building, M 2:15 – 3:35 PM, W 2:15 - 5:15 pm

Textbook: Introduction to Food Engineering, Singh and Heldman (fifth edition), Academia Press, 2014.

Lecture	Date	Topic
1	W 1/22	Course introduction and basic concepts (Chapter 1)
2	M 1/27	Basic concepts (Chapter 1)
3	W 1/29	Mass and energy balances (Chapter 1)
4	M 2/3	Mass and energy balances (Chapter 1)
5	W 2/5	Fluid flow in food processing (Chapter 2)
6	M 2/10	Due date of Problem Set 1
		Fluid flow in food processing (Chapter 2)
7	W 2/12	Fluid flow in food processing (Chapter 2)
		Laboratory 1 (rising film vacuum evaporation)
8	M 2/17	Fluid flow in food processing (Chapter 2)
9	W 2/19	Due date of Laboratory 1 report
		Fluid flow in food processing (Chapter 2)
10	M 2/24	Psychrometrics (Chapter 9)
		Due date of Problem Set 2
11	W 2/26	Psychrometrics (Chapter 9)
12	M 3/2	Psychrometrics (Chapter 9)
		Due date of Virtual Experiment 1
13	W 3/4	Psychrometrics (Chapter 9)
14	M 3/9	Heat transfer in food processing (Chapter 4)
		Due date of Problem Set 3
15	W 3/11	Heat transfer in food processing (Chapter 4)
	M 3/16	Spring recess
	W 3/18	Spring recess
16	M 3/23	Mid-term Exam
17	W 3/25	Heat transfer in food processing (Chapter 4)
		Due date of Virtual Experiment 2
		Laboratory 2 (convective heat transfer)
18	M 3/30	Heat transfer in food processing (Chapter 4)
		Due date of Problem Set 4

19	W 4/1	Preservation processes (Chapter 5) Due date of Laboratory 2 report
20	M 4/6	Preservation processes (Chapter 5)
21	W 4/8	Preservation processes (Chapter 5)
22	M 4/13	Preservation processes (Chapter 5)
23	W 4/15	Food packaging and shelf life (Chapter 15) Due date of Problem Set 5
24	M 4/20	Food packaging and shelf life (Chapter 15)
25	W 4/22	Dehydration (Chapter 12) Laboratory 3 (gas barrier properties)
26	M 4/27	Dehydration (Chapter 12)
27	W 4/29	Dehydration (Chapter 12)
28	M 5/4 (last day)	Dehydration (Chapter 12) Due date of Virtual Experiment 3 Due date of Problem Set 6
	F 5/10	
	W 5/13	Final exam, 12–3 pm at Room 109, Food Science and Nutritional Sciences Building

#### GRADING SYSTEM

Mid-term Exam	20%
Final examination	30%
Problem sets	20%
Laboratory reports	15%
Virtual experiments	10%
Class participation	5%
<b>Total</b>	<b>100%</b>

Students will work in teams of two people to submit their home assignments and laboratory reports. By the beginning of the third class (Wednesday, January 29), each team should email the teaching assistant a short description about how they will work effectively for the assignments and reports. In the beginning of an assignment or report, the person who submits it should list the contribution of each person (for example, 50/50 if the partners contribute equally). See the teaching assistant or instructor if you have issues with your teammate.

Home assignments will be given 2 or 3 weeks before the due dates. They may be completed by hand or computer. To earn full marks, adequate steps to reach the answer and reasonable neatness must be shown.

Laboratory reports must be completed by computer. Instructions for preparing laboratory reports will be given separately.

Class attendance is required. A student may miss up to two classes without penalty. For each additional class missed, 2% of the total scores will be deducted.

#### ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.

- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

## **STUDENT WELLNESS SERVICES**

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/ [www.rhscaps.rutgers.edu/](http://www.rhscaps.rutgers.edu/)

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / [www.vpva.rutgers.edu/](http://www.vpva.rutgers.edu/)

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation:

<https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your

request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at:

<https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.