

**RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY
SCHOOL OF ENVIRONMENTAL and BIOLOGICAL STUDIES**

Department of Food Science

COURSE TITLE	PRINCIPLES OF FOOD SCIENCE - lab
COURSE NUMBER	11:400:202
CREDITS	2
CLASS DETAILS	
Days/ Time(s)	Thurs 8:00AM – 12:00 PM (section 1) Fri 8:00AM – 12:00 PM (section 2)
Location	Food Science Lower Pilot Plant Rm 017
PRE- or Co-REQUISITE(S)	Principles of Food Science 11:400:201
INSTRUCTOR INFORMATION	
Name	Dr. Karen Schaich
Phone	848 932-5454
Email	schaich @sebs.rutgers.edu
Office Hours [Day(s) & Time(s)]	By arrangement – please email for appointment
Office Address	Food Science 315E
COURSE DESCRIPTION	
Introduction to food systems, fundamental principles underlying food function and stability, and analysis of food properties.	
COURSE OBJECTIVES	
<ol style="list-style-type: none"> 1. Become familiar with physical and chemical characteristics of foods, food behaviors under different conditions, and food processing operations. 2. Observe fundamental science concepts at work in food materials, learn to apply theory from lecture to real foods. 3. Use scientific method in investigating properties and changes in foods. 4. Develop a basic understanding of food composition and structure/function/behavior relationships, relating molecular properties to food characteristics, quality, and microbial utilization. 5. Develop skills in summarizing and communicating scientific research simply and succinctly. 	

PROGRAM LEARNING GOAL (S) SATISFIED BY THIS COURSE:

This course fulfills Food Science Program Learning Goal #2 competency in Food Chemistry and Analysis.

Student Learning Goals and Outcome

2.1: Understand the chemistry involved in the properties and reactions of various foods and its components.

2.2: Understand and effectively applies the principles behind analytical techniques associated with food.

2.3: Understand and effectively applies food chemistry and analysis methods.

FURTHER INFORMATION ON THE COURSE:

- Course materials: Course syllabus, lab instructions and resource materials are posted on Sakai: Princ Food Sci Lab F2018 under Lessons.
- There will be a course fee of \$35.00 (preferably cash) to cover costs of lab supplies and lab coats. Pay Dr. Schaich directly.
- Each student must print out lab instructions and bring them to lab in a notebook or binder. Loose lab sheets will not be permitted.
- You will be sent home for a notebook and lose points for class participation. Some support materials will be posted on the Sakai course site under Resources.
- Additional references books and journals with supporting information are available in Chang Library.
- Students are encouraged to read broadly about the topics covered in the lab exercises, using whatever authoritative sources will help them understand the concepts.
- Course requirements: Read lab exercise and background before each class. It is critical that you understand what is to be done so the experiments proceed without problems.
- Complete pre-lab question sheets and submit at beginning of lab.
- **YOU WILL NOT BE ADMITTED TO LAB WITHOUT COMPLETED QUESTION SHEETS!**
- Attend lab and complete lab experiments each week. Record all data where indicated in the course notes you bring to class.

- Write lab reports according to format (page 3).
- Reports are due one week after completion of lab.
- Points will be deducted for late reports at the rate of 2 points per day unless extensions are granted beforehand by the professor.
- ***This is a 2 CREDIT lab course, so be prepared to spend the full time in each lab period to allow for clean-up and discussion of results before leaving.
- You may bring a bag breakfast or snacks to eat at desks during discussions but not in the food preparation area.
- Basis of grades: Pre-lab Worksheets 35% (in lab notebook and posted on Sakai)
 Lab reports 55%
 Participation (including clean up) 10%
 2 Optional extra credit project: Write a new laboratory exercise.
- Include purpose, introduction, directions, questions to be answered in report, expected outcomes. Discuss with Dr. Schaich before submitting

- Lab make-ups: Students are expected to attend all labs. There are no make-ups for missed classes. If students know they must miss class, or if they get sick, excused absences may be granted if Dr. Schaich is notified BEFORE class. Make-ups for excused absences may be arranged at the discretion of the professor.

SAFETY

- All students are expected to wear safety glasses, lab coats, gloves and hair covering during all labs.
- Wear approved safety glasses for all labs (you will not be admitted to class without them -- you each must purchase your own from bookstore, Home Depot, etc., keep track of them, and bring them to each lab).
- Lab coats and hair covers will be provided (part of your lab fee). These are required to cover your clothes and prevent contamination of foods from outside microbes. Thus, lab coats can only be worn in class.
- Remove whenever you leave the laboratory. Gloves will be provided in class when needed.

HAND WASHING AND HAIR

- Disease is transferred rapidly by hand contact.
- Because everyone will share in tasting the foods prepared in each lab, students are required to wash their hands with soap and hot water at the dedicated handwashing station in the pilot plant before handling food.

- If you remove your gloves and handle clothes, back packs, etc, or leave the pilot plant during the lab, you must wash your hands again before handling food ingredients.

CLOTHING

- Appropriate attire must be worn at all times.
- This means slacks (preferably, although knee-length skirts will be allowed) and closed-toe shoes.
- Sandals, shorts, skimpy tops, or other clothing deemed unsafe and unprofessional are not allowed.
- Students wearing such attire will be sent home to change, with deduction of participation points.

LAB NOTEBOOKS

- Print lab exercises and compile in a 3-ring binder.
- Bound notebooks with lab directions should be brought to each lab and used for all records; data should NOT be recorded on scraps of paper and then transferred to the notebook.
- Do not tear out pages.
- If errors are made, cross them out and note what the error was.
- Do not bring single pages of lab instructions to class.

LAB REPORT FORMAT

General Information:

- Reports are due one week after completion of laboratory. Two points are deducted for each day late. If you have a problem completing the lab for any reason, see Dr. Schaich. Reports will not be accepted one week past due date unless a formal extension is granted from Dr. Schaich.
- Write reports in past tense.
- Write in third person. Do not use personal pronouns I, We, you.
- Type reports in a PC Word file, single spaced, 1 inch margins.
- Submit reports on Sakai under ASSIGNMENTS

Report Structure: Approximately 5 page summary of laboratory and observations

Include:

1. Title of laboratory
2. Student name Names of all other students in research group date lab was conducted date lab was due and date submitted
3. Introduction: General description of the purpose of the lab with some background on the scientific principles involved.
4. Methods: General description of the methods used and what each is to accomplish. Step by step details of methods are not required. However, note any variations from conditions prescribed in lab write-up.

5. Results and Discussion: Present key data that illustrates principles studies in the lab. Manipulate and present data so you can write a logical discussion and present supporting evidence.

Transform raw data to a graphical form that shows the relationships you want to discuss.

Examples are shown on the next page. You may use Excel, MatLab, or any other program with which you are familiar.

If you need help with software, contact a TA or the Rutgers computer lab. Make sure you label both axes of graphs.

Describe results verbally and discuss what they mean and what they show in terms of scientific principles, whether they followed expectations, and possible reasons for discrepancies. "Other groups made mistakes" is not an acceptable explanation.

Describe the mistake and the consequences. For example: balances were not tared so weights were inaccurate. pH electrodes were not cleaned between jelly samples so calibration drifted.

Make a significant effort to sort out the data and find points to demonstrate the principles being studied.

Questions at the end of each lab section are specifically focused on important issues and principles you should recognize.

Answers to questions should be incorporated into the discussion of results.

400:202 PRINCIPLES OF FOOD SCIENCE LABORATORY Fall, 2017

LABORATORY SCHEDULE

Food Science Pilot Plant Rm. 017 8:00 AM (PROMPTLY) - 12:00

Sept 13,14 Intro to course

Effect of acid on pectin gels -- Jelly lab (prepare jelly)

Sept 20,21 Proteins - Gluten formation in bread

Analyze jelly

Sept 27,28 Egg whites protein functions -- foams and gels

(Both Jelly and Bread reports due here)

Oct 4,5 Lipid emulsions - Mayonnaise

Oct 11,12 Lipid properties -- Shortening and flaking

Oct 18,19 Sugar properties: crystallization in candy

Oct 25,26 Hydrocolloid functions -- carrageenan stabilization of cocoa solids in chocolate milk

Nov 1,2 Enzymatic and Non-enzymatic Browning

Nov 8,9 Productive fermentations -- yogurt production and properties

Nov 15,16 Yogurt evaluation

Set up Freezing and Dehydration labs

Nov 20,21 **Yogurt lab due** but no lab (Happy Thanksgiving)

Nov 29,30 Analyze Freezing and Dehydration

Dec 6,7 Making Ice cream lab – choose your flavors, no reports i

Freezing and Dehydration labs due

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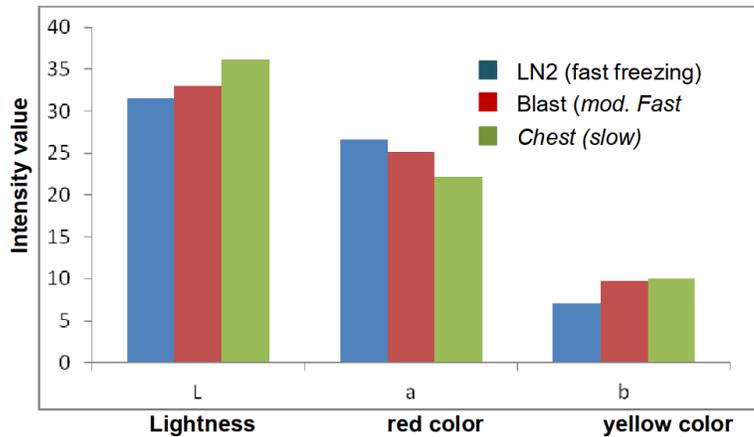
4. Methods: General description of the methods used and what each is to accomplish. Step by step details of methods are not required. However, note any variations from conditions prescribed in lab write-up.

5. Results and Discussion: Present key data that illustrates principles studies in the lab.

Manipulate and present data so you can write a logical discussion and present supporting evidence. Transform raw data to a graphical form that shows the relationships you want to discuss. Examples are shown on the next page. You may use Excel, MatLab, or any other program with which you are familiar.

If you need help with software, contact a TA or the Rutgers computer lab. **Make sure you label both axes of graphs.** Describe results verbally and discuss what they mean and what they show in terms of scientific principles, whether they followed expectations, and possible reasons for discrepancies. "Other groups made mistakes" is not an acceptable explanation. Describe the mistake and the consequences. For example: balances were not tared so weights were inaccurate. pH electrodes were not cleaned between jelly samples so calibration drifted. Make a significant effort to sort out the data and find points to demonstrate the principles being studied.

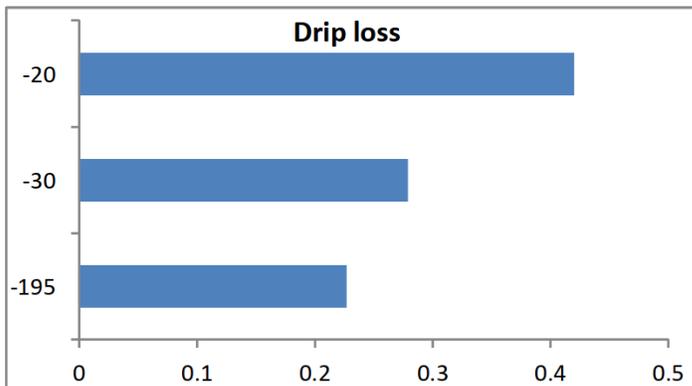
Questions at the end of each lab section are specifically focused on important issues and principles you should recognize. Answers to questions should be incorporated into the discussion of results.



Note: the independent variables here (L, a, b) are separate values not in a series, so their data must be presented in columns or other segregated forms.

Only serial data can be presented in a line graph – e.g. sugar concentration vs browning potential.

Figure 1. Effect of freezing rate on color of strawberries after thawing.



Note mistake on these graphs – axis labels are missing.

Make sure you label all graphs!

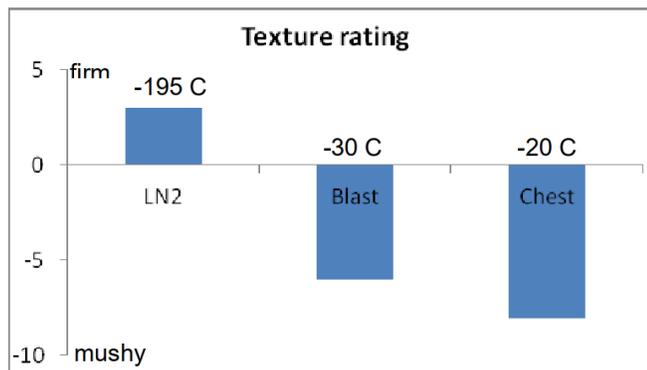


Figure 2. Effect of freezing rate on drip loss (left) and texture ratings (right) of frozen strawberries after thawing.

What can you learn from this data?

Goals of exercise were to study effects of freezing rate on ice crystal size and resulting damage to products. We cannot measure ice crystal size but we can deduce the size from extent of damage from them based on the assumption that larger ice crystals caused more damage to cells, and hence greater release of cell liquids (drip loss). In addition, acids are released and tissues become exposed to air, both of which can later pigments. Cell damage leads to collapse of tissues after the

sample is thawed. These effects can be seen in increased drip loss, color changes (red color fades – lightness (L) increases and red color (a) decreases), and texture deterioration (lower scores, increasing mushiness) in samples with slower freezing rates (chest freezer).

6. Conclusions: Briefly summarize what was learned from the experiment. “Data was chaos” is not an

acceptable summary. Relate the key points that demonstrate scientific principles and are related to the

objectives of the experiment.

7. References. List all references cited in the report. Any format may be used as long as consistency is maintained, e.g. see style guides for authors in J. Food Science, Cereal Science, J. Agric. and Food

Chemistry.

Extra credit may be earned for exceptional use of references in developing discussion and interpreting results, or adding additional perspective.

Extra points will be awarded for lab reports that go beyond listed questions and course notes to integrate

additional outside material relevant to the laboratory, including explanations or observations from “Good Eats” or

“Food Detectives” (with appropriate citations) or from journal articles or books in the library.

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/

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/

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.