

FOOD CHEMISTRY  
400:411 (4 Credits)  
COURSE OUTLINE  
Fall 2017

**Faculty:**

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[Http://foodsci.rutgers.edu/carman/index.html](http://foodsci.rutgers.edu/carman/index.html)

Ms. Ting Zheng  
Food Science Building, Rm 222  
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***Class Location and Time: IFNH-205, Tuesday, Thursday 2:15***

***Course Description:***

The course applies basic scientific principles to food systems and practical applications. Chemical/biochemical reactions of carbohydrates, lipids, proteins, and other constituents in fresh and processed foods are discussed with respect to food quality. Reaction conditions and processes that affect color, flavor, texture, nutrition, and safety of food are emphasized. Students are given a role in the learning experience through research by student groups and class presentations and discussions related to real world problems associated with both the private and public sectors of the world. Students take an active role in development and learning of course content.

Student groups are given experiments that reinforce class discussions that are conveniently performed in the laboratory. These include activation and control of enzymatic reactions in fruits and vegetables; consequences of water migration on food quality; gelatinization-retrogradation in starch-based foods (e.g., pudding, bread, and rice); initiation and control of non-enzymatic browning (e.g., pretzels, meat); and food emulsions (e.g., salad dressings, commutated meats products).

***Learning Outcomes:***

Students are expected to understand and be able to control the major chemical/biochemical (enzymatic) reactions that influence food quality with emphasis on home and food industry applications. To understand how the properties of different food components and interactions among these components modulate the specific quality attributes of food systems, and to understand the principles that underlies the biochemical/enzymatic techniques used in food analysis.

***Learning Assessments:***

Course content is assessed through written examinations (October 5, November 7, and December 7), the depth and quality of formal class presentations, and class participation. Emphasis is placed on problem solving related to real life situations. Lecture/discussion will count for 75% of the final grade. Laboratory reports will count for 25 % of the final grade. Class participation will be factored into the final grade.

***Prerequisites:***

Principles of Food Science and Organic Chemistry

## Food Chemistry (course outline)

### **Reference book and readings:**

Fennema's Food Chemistry, fourth edition, edited by S. Damodaran, K.L. Parkin, and O. R. Fennema, 2007, published by CRC Press may be used as a reference, but not required. Students are responsible for reading articles that may be found online as directed on the Sakai web site for the course.

### **Class/Laboratory Outline:**

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<b>Topic</b>
<ul style="list-style-type: none"><li>• Cellular basis of foods (animal, plant, and microbial sources)</li><li>• Enzymes: basic principles and roles in food production, processing, and quality attributes (concepts emphasized in a laboratory experiment)</li><li>• Postharvest physiology of fruits and vegetables (concepts emphasized in a laboratory experiment)</li><li>• Water activity and water migration; basis for controlling biochemical reactions (concepts emphasized in a laboratory experiment)</li><li>• Protein: biochemical influences on controlling structure, color, flavor, and texture (concepts emphasized in a laboratory experiment)</li><li>• Carbohydrates: biochemical influences on controlling structure, color, flavor, and texture (concepts emphasized in a laboratory experiment)</li><li>• Lipids: biochemical influences on food structure, color, flavor, and texture (concepts emphasized in a laboratory experiment)</li><li>• Browning reactions: biochemical influences on color , flavor, and texture (concepts emphasized in a laboratory experiment)</li><li>• Color: biochemical influence on development and loss of pigments</li><li>• Flavor: biochemical influences on desirable and undesirable</li></ul>

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## **Food Chemistry (course outline)**

### ***Laboratory:***

The Food Chemistry laboratory will meet in FS room 303 on Thursdays (section 1) or Fridays (section 2) . Lab day assignments will be made during the first week of class.

### **Laboratory reports:**

Each person is responsible for their own report. It must be submitted to Ms. Ting Zheng by email (tz150@scarletmail.Rutgers.edu) before 12 pm on the following week after each laboratory exercise. A reply email will be sent upon receipt of the report. A late report will receive a compromised grade, and if a report is not submitted it will be graded as zero.

The report should be typed (double-space) and prepared in a professional manner following the format used for publication in the Journal of Food Science.

*Abstract:* Provide a summary of the lab experiment, purpose, and results (1/4 page).

*Introduction:* Provide a brief background of the topic that leads to a stated hypothesis and objective of the lab. Make sure you cite the literature when making statements about the topic. Explain how the concept explored in the experiment(s) applies to a practical application. Use commercial food products when applicable (3/4 to 1 page).

*Materials and Methods:* Describe the procedure followed for each experiment, indicating the materials used in each step. Briefly explain any analytical methods in a way that the experiment could be replicated. Do not copy/paste from the laboratory handout. It is not necessary to make a list of the materials used (1-2 pages).

*Results:* When describing the results, give a one sentence preamble as to why you did the experiment, how you did the experiment, and what you found. Do this for each experiment. If you performed an experiment where you examined the effects of something on a food quality, include the results in a table, bar chart, or line drawing as appropriate. Include pictures if they add to the explanation (2-3 pages).

*Discussion:* In the first paragraph, repeat the rationale for doing the experiment. Summarize the results, and then discuss why you think they happened. You should consult the literature to back your discussion. Present your conclusions in the last paragraph. The conclusions should respond to the objectives and should not refer to literature (1 page).

*References:* Provide a list of citations that were used in the main body of the report. Use the format for citing papers according to the Journal of Food Science.

*Length:* The length of the laboratory report should be no more than 6 typed pages (double space) excluding figures, tables, and references.

*Grade rubric (20 points total):* Abstract (2), Introduction (4), Methods (4), Results (4), Discussion (4), References (2).

## 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.