400:202 PRINCIPLES OF FOOD SCIENCE LABORATORY
Fall, 2010

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Course Goals:
1. Become familiar with food characteristics, behaviors, and processing operations.
2. Observe fundamental science concepts at work in food materials, i.e. 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.

Course materials:
Bound Lab Notes will be available in the Food Science Office (107) for a course fee of $30.00.
This covers costs of copying and lab supplies.
Each student must keep all lab data in the bound course notes.

Some support materials will be posted on the Sakai course site. 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 sources will help them understand the concepts (including Internet requirements).

Course requirements:
Read the lab exercise and background before each class. From these you will learn the scientific concepts to the studied and the food context in which they will be observed. Complete the pre-lab question sheet and submit at the beginning of lab. This will show that you have the fundamental knowledge necessary to complete the lab.
YOU WILL NOT BE ADMITTED TO LAB WITHOUT COMPLETED QUESTION SHEETS!
Attend lab and complete lab experiments each week. You are encouraged to ask questions and discuss observations while experiments are in progress and during the results summary and recap.
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).
Record all data in the bound course notes supplied.
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 3 points per day unless excuses are obtained from 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, snacks, or supper to eat 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%

Optional extra credit project: Write a new laboratory exercise. Include purpose, introduction and connection to course material, directions, questions to be answered in report, expected outcomes. Discuss with Dr. Schaich before submitting.
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<th>Topic</th>
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<tr>
<td>Sept. 2</td>
<td>Introduction, Overview of course and its requirements</td>
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<td>Lab report formats</td>
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<td>Introduction to Sakai course website</td>
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<td>Sept. 9</td>
<td>Water behavior in foods -- <em>Ice crystallization and freezing damage</em></td>
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<td>Sept. 16</td>
<td>pH in Foods -- <em>Factors affecting jelly formation</em></td>
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<td>Sept. 23</td>
<td>Protein functionality -- <em>Egg white behaviors</em></td>
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<td>Sept. 30</td>
<td>Proteins -- <em>Texture and structure in bread baking</em></td>
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<td>Oct. 7</td>
<td>Carbohydrates -- <em>Crystallization and glass properties of sugars (candymaking)</em></td>
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<td>Oct. 14</td>
<td>Carbohydrates -- <em>Functional Properties</em></td>
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<td>Carrageenan -- casein interactions and the stability of chocolate milk</td>
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<td>Oct. 21</td>
<td>Lipids -- <em>Shortening and flaking properties of fats and oils (cakes and pie crust)</em></td>
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<td>Oct. 28</td>
<td>Lipids -- <em>Emulsions (mayonnaise)</em></td>
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<td>Nov. 4</td>
<td>Enzymatic and non-enzymatic browning</td>
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<td>Nov. 11</td>
<td>Functional Fermentations -- <em>Making yoghurt</em></td>
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<td>Nov. 18</td>
<td>(complete yoghurt experiment)</td>
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<td>Nov. 25</td>
<td>[Thanksgiving Week: no lab]</td>
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<td>Dec. 2</td>
<td>Processing -- <em>Effects of stabilizers, freezing temp., and mixing rate on ice cream</em></td>
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<td>Dec. 9</td>
<td>Making Christmas presents or new experience lab (no lab reports involved)*</td>
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<tr>
<td>Dec. 10</td>
<td>ALL LAB REPORTS AND EXTRA CREDIT DUE</td>
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SAFETY GLASSES AND GLOVES

All students are expected to wear safety glasses and gloves during all labs.

LAB NOTEBOOKS

All measurements, results, and calculations must be recorded in ink in the bound laboratory notebook, with appropriate notations identifying each entry. 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.

LAB REPORT FORMAT

General Information:

• Reports are due one week after completion of laboratory. Three 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.

• Write reports in past tense.

• Write in third person. Do not use personal pronouns I, We, you.

• Submit reports on standard 8.5 x 11 inch paper, typed (preferred) or written in ink.

• Students are expected to attend every lab. Make-up labs are at the discretion of the teaching assistants and are granted only for exceptional circumstances. See Dr. Schaich for make-up authorization.

Report Structure: ~3 page summary of laboratory and observations

The major purpose of the lab reports is to show that you have accomplished course goals, especially to communicate the basic chemical or microbial concepts you have learned, how you are able to connect them to behaviors and properties of actual foods, and how you can extend them beyond the foods studied in the exercises.

Include:

1. Title of laboratory

2. Student name

   research group names

   date lab was conducted

   date lab was due and date submitted

3. General description of the purpose of the lab and methods used. Note any variations from conditions prescribed in lab sheets.

4. Simple presentation of results. Transform raw data to graphical form that show relationships whenever possible.

5. Brief discussion and interpretation of results and what they show in terms of scientific principles

6. Take-home message 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.

   As noted on p. 1, 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.