

**FS 461 - Food Chemistry Laboratory (1 credit)**  
Wednesday 2:10 to 5 pm | FSHN Room 140  
**Fall 2016 syllabus**

**INSTRUCTOR:** Dr. Thuy Nguyen  
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Office hours, Mondays 9-11 am or by appointment

**LABORATORY MANUAL:** Edwards, C.G. and Ross, C.F. 2016. *FS 461 Food Chemistry Laboratory Manual*, Washington State University, Pullman, WA. Each lab will be posted on the course Blackboard space at least 1 week ahead of the lab period.

**TEACHING ASSISTANTS:**

Elvis Baidoo  
Elvis.baidoo@wsu.edu | Office hours, Weds 9-11 am | FSHN 214

Robert Beezer  
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Jessica Murray  
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**COURSE OUTLINE:**

<u>Laboratory Periods</u>	<u>Topics</u>
August 24	Check-in, notebook format, laboratory safety, instrument orientation
August 31	Lab 1: Acids and Bases
September 7	Lab 2: Emulsions
September 14	Lab 3: Carbohydrates
September 21	Lab 4: Non-enzymatic Browning
September 28	Lab 5: Polysaccharides
October 5	Lab 6: Pectins
October 12	Lab 7: Lipids
October 19	Lab 8: Rancidity I
October 26	Lab 9: Rancidity II
November 2	Lab 10: Proteins I
November 9	Lab 11: Proteins II & Enzymes I
November 16	Lab 12: Enzymes II
November 23	THANKSGIVING HOLIDAY
November 30	Lab 13: Pigments
December 7	Cook's Illustr. Presentations, clean up, & check-out

### **GRADING: Presented as a percentage of the grade**

Laboratory notebook	50
Assignment and oral presentation	20
Laboratory technique/participation	10
Weekly Quizzes	20

Dictionaries, cell phones, computers ipods, or ANY other electronic equipment cannot be used, played, or consulted during quizzes or during laboratory.

### **GRADING SCALE:**

<u>Grade</u>	<u>% of Total Points</u>
A	>93.0
A-	90.0 - 92.9
B+	87.0 - 89.9
B	83.0 - 86.9
B-	80.0 - 82.9
C+	77.0 - 79.9
C	73.0 - 76.9
C-	70.0 - 72.9
D+	67.0 - 69.9
D	60.0 - 66.9
F	<59.9

### **Student Learning Outcomes and Assessment**

<b>At the end of this course, students should be able to:</b>	<b>Outcome will be addressed:</b>	<b>Evaluation of Outcome:</b>
Understand and demonstrate fundamentals of chemical reactions that occur during the processing and storage of foods including non-enzymatic and enzymatic browning, gelation, hydrolytic and oxidative rancidity, formation of emulsions, chemistry of enzymes and pigments.	Throughout the course	Weekly quizzes Lab notebook
Employ and integrate scientific knowledge as part of experimentation to solve technical problems encountered by the food industry.	Throughout the course	Weekly quizzes Lab notebook
Demonstrate scientific literacy and use this information in the preparation of laboratory notebooks.	Throughout the course	Assignment
Lead and motivate a small group to follow scientific procedures accurately, problem solve and complete a lab accurately in a timely fashion	3 labs for which the student is selected to be leader	Performance evaluated by TA and instructors
Ability to assess the performance of peers in different categories of performance	3 labs for which the student is selected to be leader	Rubric completed for each group member

## LABORATORY NOTEBOOK:

### A. Grading

The laboratory notebook will be submitted to the instructor three (3) times during the semester for grading. Because of this, the student will be required to keep two (2) separate notebooks to allow the instructor grading time. Students are encouraged to have the instructor look over their notebooks at any time during the semester for assistance with content and/or format.

Each laboratory exercise is worth 15 points and the table of contents (first notebook only) will be worth 5 points. A penalty of 10 points/day will be assessed for those notebooks that are turned in late (later than 5:00 pm on the due date). At various times during the semester, the notebooks will be checked just prior to laboratory to be sure all notebooks have been organized in preparation for data collection during the laboratory period.

A penalty of 2 points per /laboratory exercise will be assessed for those laboratory notebooks not organized prior to attending class. Make-up laboratories will not be available. Unexcused absences from laboratories will yield a zero (0) score for that laboratory exercise.

### B. Due Dates

<u>Notebook #</u>	<u>Points</u>	<u>Laboratory Experiments</u>	<u>Due Date</u>
1	65	Table of contents, Acids/bases, Emulsions, Carbohydrates, Non-enzymatic browning	September 28
2	75	Polysaccharides, Pectins, Lipids, Rancidity I, Rancidity II	November 2
3	60	Proteins I, Proteins II, Enzymes, Pigments	December 12

**LAB BOOK FORMAT: This is the format to follow in your lab notebook for each lab**

A. Title of the lab

B. Objective – what is the purpose of the lab?

C. Materials and methods – For this section you may print out and paste the methods from the lab manual. However, make notes as to any changes that you or the instructor makes during the pre-lab.

D. Results – this will be in the form of tables and observations. The instructor will let you know about additional analysis of the raw data or the figures that will need to be generated. If so, these figures will be included in this section.

E. Discussion – Discussion of your results, with the results placed in context of other literature. Include citations of at least 2 reference articles in this section to support your results. Do not cite FSHN 460 Lecture Notes, the instructor, or your laboratory partner as references.

**PREPARATION FOR EACH LAB PERIOD**

Prepare your lab book by 1) reading the lab ahead of time, 2) recording the title, objective and the methods in the lab book. Any changes in the lab procedures made by the instructor can be recorded during the pre-lab discussion. 3) In the results section to facilitate data collection, generate appropriate tables so you can effectively capture results.

The instructor will be checking that you have done this prior to the labs.

**WEEKLY QUIZZES**

You are not submitting a formal lab report each week but your understanding of the previous lab's materials will be evaluated in weekly quizzes. These quizzes will assess how well you can apply the knowledge that you gained from the previous week. You will be allowed to consult your lab notebook but the quiz will be completed independently. If you have an unexcused absence from lab class, you will receive a zero on that week's quiz.

**ASSIGNMENT: *Cook's Illustrated***

You are the scientific consultant for "Cook's Illustrated." One feature of this magazine is "Readers' Questions." In this feature, readers submit questions regarding the chemistry of food. For your assignment, you will be assigned one of these questions to answer. You will need to answer the question using scientific literature and communicate in a way that is appropriate in responding to someone with little to moderate food science background. You will also need to describe an experiment that you would run to confirm the answer to this question.

You **MUST** cite an article from a peer-reviewed journal in this response. If you do not, you will receive a **zero** on the assignment. The response is to be no longer than **2 pages double-spaced**. I will mark this response and from it, I will develop a second follow-up question. You will then answer this question using the same format.

Assignment-Question 1 (20 points): Due October 5 at 5:00 (hard copy to instructor)  
Assignment-Question 2 (20 points): Due November 16 at 5:00 (hard copy to instructor)

You will lose 5 pts for each day the assignment is late.

Oral presentation (4 points): In a 5-minute presentation, students will state their *Cook's Illustrated* questions and provide in-depth answers that clearly demonstrate their knowledge of food chemistry.

### **LAB TECHNIQUE/PARTICIPATION**

In our first lab meeting, you will be randomly assigned into a group of 3. This is your lab group for the course. For each weekly lab, I will assign a group leader. As the leader, you will be responsible for leading your group through the activity for that week. You will be assessed on your ability to lead, as well as your success in having your group complete the activity on time. To capture this information, you will need to check in with your assigned instructor once you have completed the lab.

Also as the leader, you will evaluate the performance of the other two members in your group. You will use the evaluation form provided. This evaluation is confidential.

#### **Student Policies:**

Students are encouraged to consult the WSU Student Handbook for information related to student policies and procedures (<http://handbook.wsu.edu/what-is-the-student-handbook/>)

#### Students with Disabilities

(WSU students) Students with Disabilities: Reasonable accommodations are available for students with documented disabilities or chronic medical conditions. If you have a disability and need accommodations to fully participate in this class, please visit the Access Center website to follow published procedures to request accommodations: <http://www.accesscenter.wsu.edu>. Students may also either call or visit the Access Center in person to schedule an appointment with an Access Advisor. Location: Washington Building 217; Phone: 509-335-3417. All disability related accommodations **MUST** be approved through the Access Center. Students with approved accommodations are strongly encouraged to visit with instructors early in the semester during office hours to discuss logistics.

(UI students) Disability Support Services Reasonable Accommodations Statement: Reasonable accommodations are available for students who have documented temporary or permanent disabilities. Please notify your instructor(s) during the first week of class regarding accommodation(s) needed for the course. All accommodations

must be approved through Disability Support Services located in the Idaho Commons Building, Room 306; phone 885-6307; email at [dss@uidaho.edu](mailto:dss@uidaho.edu); website at [www.access.uidaho.edu](http://www.access.uidaho.edu) or [www.webs.uidaho.edu/taap](http://www.webs.uidaho.edu/taap).

### Academic Regulations & Student Affairs Policy Regarding Absences

It is the policy of the WSU Office of Student Affairs to assist students during crisis situations where they are unable to notify their instructors prior to a hurried emergency departure. The Office of Student Affairs will send professors an “Emergency Notification” in those instances where the student will be away for more than two days. The Office of Student Affairs will not issue notifications retroactively or for “one-day emergencies.” Attendance will only impact earned grade if student does not participate in lecture.

### Academic Dishonesty/Etiquette/Safety:

Academic integrity will be strongly enforced in this course. Cases of academic dishonesty shall be processed in accordance with academic integrity policies as stated in the *Washington State University Student Handbook, Faculty Manual* (WSU students) or the *University of Idaho Faculty Staff Handbook* (UI students).

### **Safety:**

Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the “**Alert, Assess, Act**” protocol for all types of emergencies and the “**Run, Hide, Fight**” response for an active shooter incident. Remain **ALERT** (through direct observation or emergency notification), **ASSESS** your specific situation, and **ACT** in the most appropriate way to assure your own safety (and the safety of others if you are able). Please sign up for emergency alerts on your account at [MyWSU](http://MyWSU). For more information on this subject, campus safety, and related topics, please view the [FBI's Run, Hide, Fight video](#) and visit the [WSU safety portal](#).

Washington State University is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan (<http://safetyplan.wsu.edu>). It is highly recommended that you visit this web site as well as the University emergency management web site (<http://oem.wsu.edu/emergencies>) to become familiar with the information provided. Other safety information can be accessed through the WSU ALERT site (<http://alert.wsu.edu>).

### **Plagiarism:**

**WSU's Academic Integrity Statement\*** "As an institution of higher education, Washington State University is committed to principles of truth and academic honesty. All members of the University community share the responsibility for maintaining and supporting these principles. When a student enrolls in Washington State University, the student assumes an obligation to pursue academic endeavors in a manner consistent with the standards of academic integrity adopted by the University. To maintain the

academic integrity of the community, the University cannot tolerate acts of academic dishonesty including any forms of cheating, plagiarism, or fabrication. Washington State University reserves the right and the power to discipline or to exclude students who engage in academic dishonesty." \*

Academic Integrity Statement and link to WSU's policy:

[www.conduct.wsu.edu/default.asp?PageID=343](http://www.conduct.wsu.edu/default.asp?PageID=343)

[www.wsulibs.wsu.edu/plagiarism/main.html](http://www.wsulibs.wsu.edu/plagiarism/main.html)

Plagiarism is defined by Webster's Dictionary as, "*to steal and pass off the ideas or words of another as one's own.*" There are two general forms of plagiarism:

- (a) Unintentional: the use of other writers' words, phrases, sentences, paragraphs as though they were your own *without understanding* the need to cite the original source. Unintentional plagiarism normally occurs when the individual does not understand the conventions of scientific writing and the need to cite sources of information.
- (b) Intentional: the use of another writers' work and claiming it as your own. Intentional plagiarism includes *knowingly copying* or incorporating sections of books, articles, or other sources into your work without citation.

To evade plagiarism, you must acknowledge the source of information. In scientific writing, this can be performed in the text of your work through the use of surnames of authors and the year of publication (e.g., Edwards et al., 2003) or by using numbers enclosed by parentheses which correspond to specific citations in the reference section. In addition to employing citations in the text, plagiarism can be avoided by applying special techniques when writing about information obtained from a source:

- (a) Paraphrase: rewording information in which you accurately present the main ideas from the source but do so using your own organization, words, and sentence structures.
- (b) Summary: a concise statement of the main idea from a section within a source.
- (c) Direct quotation: use of quotes surrounding the passage written by another author.

In general, paraphrasing (a) and the use of summary statements (b) are very common techniques used in scientific writing. Use of quotations (c) in scientific writing is rare and should be avoided.

Plagiarism is dishonest and is **not** tolerated. If caught using all or portions of a current or former classmate's writing or other sources of information (e.g., purchase a paper), a grade of "zero" will be given for the exercise. Additional penalties for plagiarism are possible as outlined in the *Washington State University Student Handbook*.

## LAB NOTEBOOK EXAMPLE RUBRIC

I will complete a table like the following for each of your labs. The specific information will change but the broad categories will remain the same

Lab Title	Points	Criteria/Comments
Section I. Date/Title/Name	0.5	<ul style="list-style-type: none"> <li>On the top of the first page, the date of the exercise, title of the experiment, and your laboratory partner's name.</li> </ul>
Section II. Purpose/Objectives	0.5	<ul style="list-style-type: none"> <li>Be very brief (a sentence for each experiment).</li> <li>Can be written as one section for all experiments performed that day OR can be written as part of individual experiments.</li> </ul>
Section III. Procedures/Materials/Methods	2	<ul style="list-style-type: none"> <li>Record any corrections or changes made to the instructions in the laboratory manual by the instructor.</li> </ul>
Section IV. Data/Results/Observations	3	<ul style="list-style-type: none"> <li>Include all measurements (weights, initial and final readings, etc.).</li> <li>Tabulate and/or graph the data and show all calculations.</li> <li>Because several of the laboratory exercises will have data collected over time (i.e. a change in absorbance of a solution with time), it can be helpful to graph the data on graph paper or by using a computer program THEN put the graph into the notebook.</li> </ul>
Section V. Discussion/Conclusions	4	<ul style="list-style-type: none"> <li>Be concise and complete in discussing and explaining your results.</li> <li>As support for your results and subsequent conclusions, use references listed at the end of each exercise in the laboratory manual. Correctly cite the references in Section V (discussion &amp; conclusions) and in Section VI (references) according to the style guide of the Journal of Food Science. Please note that you can use computer information retrieval systems (AGRICOLA, etc.) available in the Owen Science Library to search for other supporting references.</li> <li>Provide all equations for chemical reactions and emphasize chemical aspects of your observations when discussing results.</li> <li>Try to explain any problems or unexpected results you observed (some speculation as to what may have happened is okay).</li> </ul>
Section VI. References	1.5	<ul style="list-style-type: none"> <li>At the end of each exercise in the laboratory manual, you will find a list of references. These references will yield additional information to help explain experimental results. Cite only those references that you actually use to support your results and conclusions.</li> <li>A minimum of 2 references (one may be a textbook) are required.</li> <li>Do not cite the instructor, lab partners, or FSHN 460 Lecture Notes.</li> </ul>
Section VII. Laboratory Manual Questions	3	
TOTAL	15	

## LAB TECHNIQUE/PARTICIPATION RUBRIC

Lab:

Group Number:

Group Leader:

Group Members:

When lab was completed:

On time?

**Group leader – performance is assessed by instructor or TA**

Criteria		Points
Interaction with group and contribution	<p>0=<b>poor</b>/disinterest, did not focus, wandered around, visited other groups, used phone frequently during lab period, no stake in time management</p> <p>1=<b>fair</b>, shows little interest, only helps when asked, used phone a few times during lab, little emphasis on time</p> <p>2=<b>good</b>, interested, enthusiastic, sometimes provided useful ideas, somewhat conscious of time, may dominate group or “hog” tasks</p> <p>3=<b>excellent</b>, good participation, respectful of others, time conscious</p> <p>4=<b>outstanding</b>, shows leadership qualities, shared participation, respectful of others, assumes responsibility, used time well in lab, focused on task</p>	
Following procedures	<p>0=<b>poor</b>, no idea what to do, lacks knowledge of lab, asks numerous questions to complete basic procedures</p> <p>1=<b>fair</b>, general knowledge of lab, asks questions that are answered in the procedure</p> <p>2=<b>good</b>, demonstrates knowledge of lab procedures, works to follow each step before moving on</p> <p>3=<b>excellent</b>, sound knowledge of lab procedure, discuss problems with peers, carefully follows each step</p> <p>4=<b>outstanding</b>, helps others with labs, follows each step and encourages group members to do the same</p>	
Lab Techniques	<p>0=<b>poor</b>, measurements/skills are incomplete, inaccurate, observations are inaccurate</p> <p>1=<b>fair</b>, some skills or techniques are somewhat inaccurate</p> <p>2=<b>good</b>, work is organized, measurements are mostly accurate</p> <p>3=<b>excellent</b>, measurements and skills are accurate, observations are thorough</p> <p>4=<b>outstanding</b>, all procedures accurate and precise, may show innovation</p>	
Clean-up	<p>0=<b>poor</b>, poor cleanup procedures</p> <p>1=<b>fair</b>, 1-2 items left at station uncleaned</p> <p>2=<b>good</b>, proper clean up procedures generally used, returned all materials</p> <p>3=<b>excellent</b>, consistently uses proper clean-up procedures, reminds others of responsibility</p> <p>4=<b>outstanding</b>, station is left neat and station, helps others clean up and directs others to do the same</p>	

Using this rubric, the leader evaluates the performance of each student in his/her group

**Lab:**

**Leader:**

**Group Member:**

Criteria		Points
Interaction with group and contribution	<p>0=<b>poor</b>/disinterest, did not focus, wandered around, visited other groups, used phone frequently during lab period, no stake in time management</p> <p>1=<b>fair</b>, shows little interest, only helps when asked, used phone a few times during lab, little emphasis on time</p> <p>2=<b>good</b>, interested, enthusiastic, sometimes provided useful ideas, somewhat conscious of time, may dominate group or “hog” tasks</p> <p>3=<b>excellent</b>, good participation, respectful of others, time conscious</p> <p>4=<b>outstanding</b>, shows leadership qualities, shared participation, respectful of others, assumes responsibility, used time well in lab, focused on task</p>	
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Lab Techniques	<p>0=<b>poor</b>, measurements/skills are incomplete, inaccurate, observations are inaccurate</p> <p>1=<b>fair</b>, some skills or techniques are somewhat inaccurate</p> <p>2=<b>good</b>, work is organized, measurements are mostly accurate</p> <p>3=<b>excellent</b>, measurements and skills are accurate, observations are thorough</p> <p>4=<b>outstanding</b>, all procedures accurate and precise, may show innovation</p>	
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**FS 461 Food Chemistry Assessment: 44 points= 1<sup>st</sup> draft (20 pts.), 2<sup>nd</sup> draft (20 pts.), oral presentation (4 pts.)**

Cooks' Illustrated runs a column that answers food- and cooking-related questions sent in by home cooks. As a food scientist, you have the knowledge needed to answer these questions. Answer the question below using your knowledge of food chemistry principles. Address your response to the person asking the question. Your response should be interesting to and understandable by the general public. Please keep your response to 2 (double-spaced) pages in length.

**Grading Rubric:** (*Insert question here*)

<b>Criterion</b>	<b>No Credit (0)</b>	<b>Beginning (1)</b>	<b>Developing (2)</b>	<b>Accomplished (3)</b>	<b>Exemplary (4)</b>	<b>Score</b>
Clarity of explanation (10%)	Response has little coherence or logical thought; spelling and/or grammatical errors make response difficult to interpret	Response has major gaps in logic and few transitions; many spelling or grammatical errors are present	Response has some gaps in logic or has abrupt transitions; several spelling or grammatical errors are present	Response displays a logical flow of thought with good transitions; one or two minor spelling or grammar errors are present	Response displays a logical flow of thought with clear grasp of terminology and excellent transitions; no spelling or grammar errors are present	
Presentation of information (10%)	Information is presented in an uninteresting manner, is not informative, and/or cannot be understood without specialized food science knowledge	Information is presented mostly uninteresting and/or uninformative; information would be difficult for most of the general public to understand	Information is presented in a manner than is somewhat uninteresting and/or uninformative; information cannot be easily understood by the general public	Information is presented in an interesting and informative format, and is mostly understandable by the general public	Information is presented in an engaging format, is informative, and can easily be understood by the general public	
Depth of food chemistry knowledge (35%)	Response is overly simplistic; no evidence of food chemistry knowledge is shown	Little food chemistry knowledge was shown in the response	Some food chemistry knowledge was shown in the response, but not to the depth expected of a food science undergraduate	Food chemistry knowledge at a depth appropriate for a food science undergraduate was shown in the response	Food chemistry knowledge at a depth beyond what is expected for a food science undergraduate was shown in the response	
Food chemistry application (35%)	No evidence of food chemistry knowledge is shown in the response	Food chemistry knowledge is applied to answer the question; explanation lacks major details and/or contains major errors	Food chemistry knowledge is applied to answer the question, although the explanation may be lacking detail and/or contain minor errors	Food chemistry knowledge is correctly applied to answer the question in sufficient detail	Food chemistry knowledge is correctly applied to answer the question in sufficient detail, with additional examples or helpful analogies made to help the reader understand the explanation	
Response length (5%)	Response is a page or more over the requirements or is less than half a page	Response is half a page to $\frac{3}{4}$ of a page over the requirements or is half a page to $\frac{3}{4}$ of a page	Response is several sentences over the page requirements or feels rushed or overextended	Response meets the page requirements	Response meets the page requirements and does not feel rushed or overextended	

Oral presentation (5%)	Presentation is less than 5 minutes long. Lacking in preparation & depth.	Presentation meets 5-minute requirement, but lacks in preparation & depth.	Student presents the question, but does not clearly support the answers with food chem principles.	Student presents the question and clearly supports the answers with food chem principles.	Food chemistry knowledge communicated with depth and clarity. The presentation answers the assigned question in great detail.	
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