

Lab Syllabus: FDSC 4304L/5304L

Food Chemistry Lab

Fall 2017

Instructor(s):

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Course Co-requisites Food Chemistry lecture (FDSC 4304/FDSC 5304)

Course Description

Laboratory activities are designed to supplement and expand the student's understanding of the lecture material and are designed to provide students with practical, hands-on analytical laboratory skills. You are required to keep a lab notebook; the notebook must be permanently bound. Essay books or standard lab notebooks are acceptable. Formal lab reports will be required following completion of laboratory activities. All reports must be word processed or typed and all graphs and plots must be prepared using a spreadsheet program such as Excel. Reports are submitted via Blackboard. Even though you work as a group to collect the data, the individual lab reports are to be your own work.

Objectives

You have probably taken several lab courses already at university. The laboratory is somewhere some of you will spend the bulk of your future careers while others will never return to a laboratory following graduation. Whatever your goals, this course will offer you opportunities to improve your applied science skills and will also be a useful reinforcement for other FDSC courses.

First of all, food chemistry experiments very often do not work out as planned. In your inorganic chemistry labs the chemicals were pure, the conditions were controlled and you could reasonably be expected to get a "right" answer. In food chemistry we often have poorly characterized starting materials, food ingredients, and many reactions occurring in parallel under non-ideal conditions. Unsurprisingly, the data we get is often messy and hard to interpret. Wherever you go in life you will be trying to make difficult business decisions based on poor data. Developing these analytical skills in this this class will certainly benefit you as a manager in the food industry.

Come to the lab prepared – know the protocol for the experiment you will be conducting and have an idea of the results you expect. Be observant – what do your samples look like? What do they smell like? Do you think your measurement technique can give meaningful results for your sample? Be thorough – record your observations in detail. Make sure you get the data you were asked for but note other observations. Many times you'll be supplying data for your portion of the experiment to other groups in the class. Be imaginative – once you have your observations can you construct a scientific explanation including not only what you expected (and why) but also what happened (and why). Have fun – remember there isn't a final!

Course Objectives: The goal of this class is for students to make scientific measurements of some of the important chemical reactions occurring in foods.

Students successfully completing this class will be able to:

1. Recognize the important reactions in food chemistry and their consequences.
2. Be familiar with methods to measure these reactions.
3. Report their results in an appropriate format.
4. Design and conduct an experiment to understand a simple food chemistry problem.

Class Hours:

The class will meet in Room C5 between 1:30 and 4:20 either Tuesday or Thursday. Attendance is required. The class will start with a lecture/discussion before beginning the practical work.

Academic Integrity:

The measurements you make as a working scientist will be used by yourself and others to make decisions that will affect the profitability of companies and the lives of individuals. It is therefore essential that you truthfully and accurately report both what you did and what you saw and measured. The University policy on academic integrity applies in this course (<http://honesty.uark.edu/policy/index.php>). You are encouraged to work together within your research group to conduct laboratory exercises and discuss the interpretation of results but the actual presentation of the report is your individual responsibility and you are not permitted to copy each other's work.

Required Text

None. All laboratory protocols will be posted ahead of class on Blackboard.

Grading

Assignment	Total Points	Due
Prelab questions 10 labs x 20 pts	200	To be placed on Blackboard before the beginning of each lab
Lab participation 10 labs x 10 pts	100	Each lab period
Formal lab reports 9 reports x 25 pts	225	1-2 wks after lab completed. Post on Blackboard (see table for correct date)
Lab notebooks 9 labs x 5 pts	45	Each week in lab
Total	570	

Graduate student teaching

Graduate students will be required to teach one week's lab (both the Tuesday and Thursday laboratory sections) and assist another graduate student in teaching another week's lab (both the Tuesday and Thursday sections). For these two weeks, the teaching and assistant graduate students will not be required to submit lab reports. The grades for these two lab reports will be an assessment of your teaching, preparation and conducting the lab. This may be the first time that you have taught formally. That is ok. This is meant as a

learning experience and we will be here to provide guidance.

Prelab questions

The purpose of the prelab questions is to get you to read through the lab protocol and use your own words to articulate the principles behind the lab you will perform. This means you are restating what someone else has said, and therefore you need to reference them. For your prelab question responses you are given permission to cite the protocol or lecture Powerpoints as sources. Cite the protocol as “Food Chemistry Lab. 2015. Lab # Title. University of Arkansas” or Dr. Crandall’s Powerpoints as “Crandall. 2016. Title of ppt. University of Arkansas.” Of course, you can cite Fennema’s Food Chemistry or peer-reviewed journal articles you find on line or in the library.

Prelab question files are on Blackboard for downloading before coming to lab. Upload your prelab questions in a Microsoft Word format to the proper file folder on Blackboard, use a bold font for the question and your answer indented under the question not in bold. Your references should be at the end of the document with in-line citations. ~~Save your file with the file name given and attached~~ “_Your First Name Last Name” to the end. They are **due by 1:30 pm on the day of the lab**. 10 points will be deducted from your total prelab points for being late on the day they are due (as defined as being submitted between 1:30 pm and 6 pm on the day they are due). You will receive a 0 for your prelab questions if they are not submitted by 6 pm on the day they are due.

Grading rubric for laboratory reports

Item	Points awarded	Explanation
Late submission	-10	(between 2pm and 6 pm on the day it is due)
Formatting	0 points awarded for your whole prelab	submitted after 6 pm.
	2	Answers are formatted correctly; file is named correctly;
	1	file name incorrectly named or answers not formatted correctly
	0	Improper formatting
References	5	Answers properly cited; Reference information complete and follows JFS format.
	3	Missing pieces of reference information; improper format
	2	Missing references
	0	Not present
English	3	Sentences properly constructed; correct use of grammar; Language flows and is sensible;
	2	Minor grammatical errors
	1	Major grammatical errors: run-on sentences, poorly chosen wording
	0	So poorly constructed that I can’t understand what you were trying to say.
Content	10	Answers are complete and correct; all of the questions are answered;

8	incomplete answers but all answered to some extent and mostly correct;
6	some missing answers; some incorrect answers
3	Missing answers and mostly or all incorrect answers
0	No answers

Lab Participation Points, a possible of 10 points can be earned each week

<u>Items</u>	<u>Points</u>	<u>Explanation</u>
Set-up	2	Student prepared, organized
	1	Student needs improvement, not organized
	0	Obviously unprepared, unfamiliar with lab
Equipment use	2	Student prepared, handles equipment properly
	1	Needs improvement in handling equipment
	0	Obviously unprepared, misuse/abuse of equipment
Safety	2	Practices good safety habits; conscious of others
	1	Poor safety habits; needs improvement
	0	Unsafe practices; also puts others at risk
Clean-up	2	Areas well cleaned; cleans general use areas
	1	Some areas overlooked or not properly cleaned
	0	Areas left unclean and unorganized
Attendance	2	Student present from beginning to end
	1	Extremely late; left lab too early
	0	Unexplained absence with no make-up - Note: This will usually result in a zero for the lab report as well.
Group Data (-5)		Most laboratories require each group to submit data for the entire class to use. This is usually collected before you leave the lab. You are responsible for submitting your group's data with any necessary identifying information. You have three choices, 1) write the data neatly on the chalk board for others to copy (if other groups are finished with lab before you are, then you will be required to use one of the next two options), 2) upload a picture of the data in your lab notebook to the discussion board on Blackboard (before midnight on the day of your lab), or 3) enter the data into excel and upload the excel spreadsheet to Blackboard (before midnight on the day of your lab). Failure to submit all your data by the deadline will result in 5 pts being deducted from <u>each group member's laboratory participation score</u> .

Laboratory Notebooks

Notebooks must be some type of bound book, i.e., laboratory notebook, computation book, spiral bound notebook, etc. It does not have to be expensive but should contain at least 150 pages. Individual labs and experiments will be hand written in the notebook. Changes in procedures, notes, all data accumulated and other information should also be included. Show all your work. Suggestions about how to enter data may be given from time to time (check lab handouts). Notebooks will be checked at the beginning of each class period by the instructor or TA. They will review, sign and date the work. **It is the student's responsibility to make certain their work has been signed by the current week's instructor.** The purpose of requiring notebooks is to acquaint students with GOOD LABORATORY PRACTICES they will encounter in their field of study.

Proper data accumulation, organization and review are necessary to validate information and form a basis for decisions made in the food industry and health professions.

Lab Notebook Format

- A personal information page (or cover sheet) must contain 1) your name, 2) laboratory day, 3) group number, and 4) the names of all laboratory partners.
- A table of contents listing each lab, entered as you perform them.
- Individual labs should be labeled by lab number and title.
- Individual experiments within each lab are to be identified.
- Each experiment should be outlined. It is left up to the individual how they wish to do this (outline form, flow chart or numbered steps are all acceptable). However, it should be written so that others can also follow your method. Leave some space in the notebook so that changes in the procedure can be noted here.
- Results are to be written as tables of data, visual or sensory observations, or other forms appropriate for the procedure.
- Additional information sheets can be taped, stapled or glued inside the notebook.

Lab notebook rubric

Lab notebook rubric

Points awarded	Comments
5	Legible; methods complete, noting any changes made; observations of experiments clear; Raw data present in organized format; Table of contents up-to-date; Lab mates noted for recognition in report; date present;
4	Raw data present but not organized in an easily identifiable way; methods incomplete;
3	Partially missing methods or changes not noted; Table of contents missing information; no observations
2	Date missing; raw data so disorganized so as to be difficult to identify
1	Methods missing; Raw data not present;
0	Did not come to lab;

Lab Reports

All lab reports must be turned in on Blackboard by 5:00 PM on the date due in Microsoft Word (.docx or equivalent) format. Late work will be docked 10 points for each day it is late. A day is defined as a 24 hour period, starting at the time the assignment is due. These are not business days, weekends count. If work is more than a week late (a week being defined as 7 days), it will not be accepted and you will receive a zero on that assignment. You may NOT use the protocol or Powerpoints as one of your three references (although you need to cite the protocol since that is where you received your methods). You may use Fennema's Food Chemistry as one of your references. You can use some of the same references which you used in your lab prelab questions. You may use the material posted on Blackboard as extra reading material as a reference.

Lab report rubric (25 points per report)

- I. Title page containing: your name, date, title of the lab(s), your lab partners' names (1 pt)
- II. Abstract (Executive summary of results) (4 pt)
- III. Introduction (brief) (4 pt)
- IV. Materials and Methods (3 pt)
- V. Results, discussion (including figures and tables) (8 pts)
- VI. Conclusion (2 pt)
- VII. 3 References (3 pt)

Section	Points	Explanation
Title	1	All information present
	0	Missing information
Abstract	4	Brief introductory information; pertinent results mentioned; relevance of data noted;
	3	Word count too small or too high; improper English
	2	Missing some information
	1	Missing most information
M&M	0	Not present
	3	Cited M&M source; complete methods without being wordy or irrelevant
	2	Minor omissions; Too wordy or irrelevant information; minor mistakes
	1	Source not cited; Large omissions; large mistakes
Results, discussion	0	Not present
	8	Figures and tables properly labeled; Results presented in text properly; Raw data not presented unless that is all that is available; Discussion interprets results (does not simply repeat them) and provides them in a context of other research; proper use of significant digits
	6	Raw data presented when analyzed data should have been; discussion restating results; grammatical errors which do not significantly prevent understanding
	4	Improperly formatted figures and tables; improperly labeled figures and tables; some missing results; grammatical errors which distort the data or meaning of the data
	2	Some figures or tables not present; figures or tables so improperly labeled or formatted such that they are basically not present; most of the results missing; references in list not actually cited in the text;
Conclusion	0	Not present
	2	Recaps the experiment to lead into drawing implications; presents the relevance of the data to the field of food science; Claims do not reach beyond the data presented
	1	Claims reach beyond the data presented; does not raise implications for the industry; grammatical errors

References	0	Not present
	3	At least 3 references in addition to reference to the protocol for you M&M; Reference information complete and follows JFS format.
	2	Missing pieces of reference information; improper format
	1	Missing references
	0	Not present

Proposed lab schedule Fall 2017

Exp. #	Date	Title	Report due
1	Aug 29 or Aug 31	Physical Properties of Foods: Water activity, Specific Gravity, Viscosity and Refractive Index	Sept 12 or 14
2	Sept 5 or 7	Dispersions of matter: solutions, emulsions, and foams	Sept 19 or 21
	Sept 12 or 14	No labs this week	
3	Sept 19 or 21	Ice crystal formation	Sept 26 or 28
4	Sept 26 or 28	Carbohydrates: reducing sugars, starch morphology, and gelatinization	Oct 3 or 5
5	Oct 3 or 5	Lipid characteristics	Oct 17 or 19
	Oct 17 or 19	No labs this week-Fall break	
6	Oct 24 or 26	Proteins: qualitative and quantitative analysis	Oct 31 or Nov 2
7	Oct 31 or Nov 2	Proteins: Maillard browning, effect of heat	Nov 7 or 9
8	Nov 7 or 9	Enzymatic browning	Nov 14 or 16
9	Nov 14 or Nov 16	Food flavors and precursors	Nov 28 or Nov 30
	Nov 21 or 23	Thanksgiving; no lab	
10	Nov 28 or Nov 30	Integrative activity: Pizza part one	
11	Dec 5 or 7	Integrative activity: Pizza part two	