

**FS 462 FOOD ANALYSIS  
Spring 2015**

**Instructor:** Denise Smith  
Professor, School of Food Science  
202 FSHN, WSU  
509-335-2101, [denise.smith@wsu.edu](mailto:denise.smith@wsu.edu)

**Office Hours:** Tuesday 9:30 - 10:30 a.m. and by appointment.

**Laboratory Instructor:** Michael Costello  
Instruction and Classroom Support Technician  
230 FSHN, WSU  
509-432-9369, [michael\\_costello@wsu.edu](mailto:michael_costello@wsu.edu)

**Office Hours:** Monday and Wednesday afternoons and by appointment

**Teaching Assistant:** Lina Sheng, Graduate Student  
216 FSHN, WSU  
509-336-9057, [lina.sheng@email.wsu.edu](mailto:lina.sheng@email.wsu.edu)

**Office Hours:** By appointment

**Pre-requisites:**

WSU CHEM 345, UI CHEM 275/276 or UI CHEM 277/278; FS 302; FS 303; senior standing; FS 460 and FS 461 recommended

**Lecture:** Tuesday/Thursday 8:10-9:00 a.m., Clark 147

**Laboratory:** Thursday 9:10-noon, FSHN 140

**Required Textbook:**

S. S. Nielsen, Food Analysis, 4<sup>th</sup> Edition, Springer, New York, 2010  
Laboratory Manual - Provided at first class meeting

Other materials will be distributed in class, by e-mail or posted on BBL. We will occasionally use an instrumental analysis website ChromAcademy - <http://www.chromacademy.com/>. As a student you can register and use ChromAcademy for free.

**Other Required Supplies for Laboratories:**

Safety Goggles  
Lab Coat  
Laboratory Notebook with Duplicate Sheets

**Attendance:**

Attendance is essential to your success in this class. Announcements regarding assignments, exams and other important changes/events will be made in class. Excused absences include university-sanctioned events, illness and family emergencies as per WSU policy. It is the student's responsibility to acquire lecture notes, assignments and handouts from missed classes.

**Course Overview:**

We will study the development and application of analytical procedures used to characterize foods and their constituents. Results of these analytical procedures are used to provide information about a wide variety of different characteristics of foods, including their composition, structure, chemical properties, and overall quality. Such information is critical to the rational understanding of the factors that determine the properties of foods, as well as to our ability to economically produce foods that are consistently safe, nutritious and desirable and for consumers to make informed choices about their diet. The objective of this course is to review the basic principles of the analytical procedures commonly used to analyze foods and to discuss their application to specific food components. Laboratory experiments are designed to introduce students to a variety of techniques used in food analytical labs. Students will be expected to understand basic laboratory principles and applications of several common techniques. Specific methods change rather quickly, but the fundamental skills and principles change slowly.

**Course Grading:**

ACTIVITY	POINTS
Mid-term exam I	100
Mid-term exam II	100
Final exam (comprehensive)	100
Lab quizzes	30
Lab reports and worksheets	90
Lab attendance and participation	30
<b>TOTAL POINTS</b>	<b>450</b>

Exams are closed book and will include material from lectures, laboratories and assigned reading. You may prepare and bring one 3” x 5” index card with hand-written formulas and definitions. The final exam is comprehensive.

Quizzes, both announced and unannounced, will be given throughout the semester during several laboratory periods. No make-up quizzes will be available. No make-up laboratories will be available due to the difficulty in using borrowed lab equipment for more than one week. The lowest lab assignment grade and quiz grade will be dropped when calculating your final grade.

Detailed instructions for laboratory reports and worksheets will be presented during the first laboratory class. Grades for lab reports and worksheets handed in after the required deadlines will be reduced by 10% per day.

**Grading Scale:**

Grade	Total Points (%)
A	>92
A-	89-92
B+	86-88.9
B	82-85.9
B-	79-81.9

C+	76-78.9
C	72-75.9
C-	69-71.9
D+	66-68.9
D	60-65.9
F	<60

## Course Outline – Spring Semester 2015

Week	Date	Lecture Topic	Reading Assignment	Laboratory Topic
1	1/13	Introduction		Laboratory orientation; Safety procedures
	1/15	Methods selection	1	
2	1/20	Quality Assurance in Commercial Analytical Laboratories– <i>Dr. Steve McGeehan, Director, ASL</i>		Precision and Accuracy Lab
	1/22	Food regulations and food analysis	2	
3	1/27	Analyzing and presenting results	4	Proximate Analysis I
	1/29	Proximate analysis - Moisture	6	
4	2/3	Proximate analysis - Protein	9	Tour of USDA Western Wheat Quality Lab, Cereal Analysis
	2/5	Wheat Quality Analysis – <i>Dr. Craig Morris, Director, USDA/ARS Western Wheat Quality Lab</i>		
5	2/10	Proximate analysis - Lipid	8	Proximate Analysis II
	2/12	Proximate analysis – Ash, Fiber	7, 10 (p. 165-171)	
6	2/17	Spectroscopy	21, 22	Proximate Analysis III
	2/19	Spectroscopy		
7	2/24	Mineral analysis	12, 24	Tour of Analytical Science Lab, UI, Moscow; ICP Mineral Analysis
	2/26	Review for Exam 1		
8	3/3	<b>EXAM 1</b>		Salt Determination Lab
	3/5	Vitamin analysis – <i>Dr. Giuliana Noratto, Assistant Professor, SFS</i>	11	
9	3/10	Buffers and solutions	Handout	Buffers Lab
	3/12	Buffers and solutions		
10	3/17	SPRING BREAK		
	3/19	SPRING BREAK		
11	3/24	Enzyme assays	16	Spectroscopy Lab
	3/26	Principles of chromatography	27	
12	3/31	Principles of chromatography		Enzymes as analytical tools: Alkaline phosphatase and starch content
	4/2	Liquid chromatography	28	
13	4/7	Gas chromatography	29	Column Chromatography Lab and prepare for GC-MS Lab
	4/9	Mass spectrometry, <i>Dr. Andrzej Paszcynski, Professor, SFS</i>	26	
14	4/14	Mass spectrometry, <i>Dr. Paszcynski</i>		GC-MS Lab, UI Food Research Center
	4/16	Review for Exam 2		
15	4/21	<b>EXAM 2</b>		The Corporate Quality Control Laboratory - <i>Mike Martin, Manager, Quality, Conagra Lamb Weston</i>
	4/23	Role of the corporate quality control laboratory		
16	4/28	Immunoassays	17	Laboratory check out
	4/30	Review Session		
17	5/6	<b>FINAL EXAM</b>		

The course and laboratory outline may change at the discretion of the instructor due to availability of guest lecturers, laboratory instrumentation or other unforeseen issues. Modifications will be communicated as far in advance as possible.

**FIELD TRIPS:**

Two trips to the University of Idaho in Moscow are required for laboratory exercises. We will form carpools as necessary.

Trip 1: Thursday February 26, 9 a.m. – noon, Tour of the Analytical Sciences Laboratory

Trip 2: Thursday April 16, 9 a.m. – noon, GC-MS Laboratory, Food Research Center

**STUDENT LEARNING OUTCOMES:**

<b>At the end of this course, the student should be able to:</b>	<b>The following topics will address this outcome:</b>	<b>This outcome will be evaluated primarily by:</b>
Explain the principles underlying common food analytical techniques	Lectures weeks 3-16	Class discussion; exams;
Describe common instrumentation used in food analysis	Lectures weeks 3-16	Class discussion; exams
Organize, analyze and interpret analytical data in a meaningful way	Lectures weeks 2-3; All laboratory sessions	Laboratory reports; quizzes, exams
Demonstrate practical proficiency when employing common laboratory techniques	All laboratory sessions	Observation of students completing laboratory assignments
Select the appropriate analytical technique when presented with a practical problem	Lectures weeks 2-16	Exams
Apply basic statistical principles in food analysis applications (sampling and analysis)	Lectures weeks 2-3; Precision and Accuracy Lab and all other laboratory assignments	Laboratory reports; quizzes, exams

**Students with Disabilities:**

**WSU.** Reasonable accommodations are available for students with a documented temporary or permanent disability. If you have a disability and need accommodations to fully participate in this class, please visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations **MUST** be approved

through the Access Center. For more information contact a Disability Specialist in Pullman or WSU Online: 509-335-3417 <http://accesscenter.wsu.edu>, [Access.Center@wsu.edu](mailto:Access.Center@wsu.edu)

### **WSU Campus Safety Statement:**

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 at <http://oem.wsu.edu/emergencies> to become familiar with the information provided.

Please access this link (<http://oem.wsu.edu/emergencies>) for WSU's latest classroom emergency and safety information. Also, be familiar with the WSU ALERT site (<http://alert.wsu.edu>).

### **Academic Honesty:**

“Academic integrity is the cornerstone of the university. You assume full responsibility for the content and integrity of the academic work you submit. You may collaborate with classmates on assignments, with the instructor's permission. However the guiding principle of academic integrity shall be that your submitted work, examinations, reports, and projects must be your own work. Any student who violates the University's standard of conduct relating to academic integrity will be referred to the Office of Student Conduct and may fail the assignment or the course. You can learn more about Academic Integrity on your campus using the URL listed in the Academic Regulations section or to <http://conduct.wsu.edu/academic-integrity-policies-and-resources>. Please use these resources to ensure that you don't inadvertently violate WSU's standard of conduct. “

### **Academic Etiquette:**

Students should become engaged in the interactive learning processes, participate in classroom discussions, and ask questions when a particular topic or point is unclear. Appropriate professional behavior demonstrating respect for fellow students and the instructors, including teaching assistants, is expected. **Please turn off or mute cell phones during class.**

### **Plagiarism:**

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 avoid 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.*, Smith 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 assignment. Additional penalties for plagiarism are possible as outlined by WSU and University of Idaho policies.

#### **Additional Resources:**

1. Handbook of Food Analytical Chemistry, Edited by Wrolstad et al. (2 volumes)  
[WSU Owen Reference TX545 .H34 2005](#)
2. Official Methods of Analysis of AOAC International  
[WSU Owen Reference S587 .A73](#)
3. Handbook of Water Analysis, Edited by Leo M. L. Nollet  
[QD142 .H36 2000 \(Electronic resource\)](#)
4. Modern Extraction Techniques: Food and Agricultural Samples  
[WSU Owen TP156.E8 M63 2006](#)
5. Laboratory Manual for the Examination of Water, Waste Water, and Soil  
[WSU Owen TD367 .R8613 1992](#)
6. Standard Methods for the Examination of Dairy Products. American Public Health Association. Washington, D.C. [WSU Owen SF253 .A55](#)
7. Approved Methods of the American Association of Cereal Chemists, Published by AACC Approved Methods Committee. St. Paul, Minn., USA  
[WSU Owen TX541 .A5 TX557 .A54 \(Electronic resource\)](#)
8. Official Methods and Recommended Practices of the American Oil Chemists' Society.  
[WSU Owen Reference TP670 .A635](#)

9. Handbook of Food Analysis. Vol. 1, Physical characterization and nutrient analysis  
[WSU Owen TX541 .H36 1996 \(Electronic resource\)](#)

10. Sampling, Thompson, Steven K. 2012 Electronic book available at both UI and WSU. [WSU Owen QA276.6 .T58 2012](#)