

**FS 462 FOOD ANALYSIS**  
**Spring 2017**

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**Office Hours:** Tuesday 9:00 - 10:00 a.m. or by appointment

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**Office Hours:** JL- Thursday, noon-2 p.m. or by appointment  
EP-Wednesday, 10 a.m.-noon or 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 highly recommended

**Lecture:** Tuesday/Thursday 8:10-9:00 a.m., FSHN 103/155

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

**Required Textbook:**

S. S. Nielsen, Food Analysis, 4<sup>th</sup> Edition, Springer, New York, 2010  
Other materials will be distributed in class or by e-mail.

**Other Required Supplies for Laboratories:**

Safety Goggles

Lab Coat

Laboratory Notebook with Duplicate Sheets

**Attendance:**

Attendance is essential to your success in this class. You should become engaged in the interactive learning processes, participate in classroom discussions, and ask questions when a particular topic or point is unclear. Attending all lectures, studying your notes, reading the assigned chapters, completing all assignments on time and asking questions, will help you succeed. Appropriate professional behavior demonstrating respect for fellow students and the instructors is expected.

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. Please provide a signed Class Absence Request form if you will miss a class due to an off-campus activity. It is the student's responsibility to acquire lecture notes, assignments and handouts from missed classes.

**A university approved absence must be presented to the instructor *prior* to missing an exam.** Failure to take an exam without previous permission will result in an automatic zero for the exam. Arrangements to take a make-up exam due to a university approved absence must be made prior to the scheduled exam.

**Course Grading:**

<b>ACTIVITY</b>	<b>POINTS</b>
Exam I	100
Exam II	100
Graded worksheets	50
Lab quizzes	30
Lab reports	120
<b>TOTAL POINTS</b>	<b>400</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 formulas and structures handwritten on one side of the page. Dictionaries, notes, textbooks, cell phones, and electronic equipment cannot be used, played, or consulted during examinations unless authorized by the instructor in advance.

Quizzes, both announced and unannounced, will be given throughout the semester during 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. As such, the lowest lab assignment grade and quiz grade will be dropped when calculating your final grade.

Detailed instructions for graded worksheets, laboratory reports and lab worksheets will be given. Grades for assignments handed in after the required deadlines will be reduced by 10% per day.

**Grading Scale:**

<b>Grade</b>	<b>Total Points (%)</b>
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

**FIELD TRIPS:**

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

Trip 1: March 2, 9 a.m. – noon, Tour of the Analytical Sciences Laboratory, Holm Research Center

Trip 2: April 6, 9 a.m. – noon, GC-MS Laboratory, Renfrew Hall

**Course Outline – Spring Semester 2017:**

Week	Date	Lecture Topic	Reading Assignment	Laboratory Topic
1	1/10	Introduction		Laboratory Orientation; Standard Operating Procedures (Ch 1 Lab Manual); Dilutions and Concentrations (Ch 2 New Lab Manual); Reagent and dilutions worksheet
	1/12	Standard methods	1	
2	1/17	Evaluation of analytical data	4	Precision and Accuracy Lab
	1/19	Food regulations worksheet	2	
3	1/24	Quality assurance in commercial analytical laboratories- <i>Dr. Steve McGeehan, Director, ASL</i>		Proximate Analysis I
	1/26	Proximate analysis – Moisture	6	
4	1/31	Proximate analysis – Protein	9	Proximate Analysis II
	2/2	Proximate analysis – Lipid	8	
5	2/7	Proximate analysis – Ash, Fiber	7, 10 (p 165-171)	Proximate Analysis III
	2/9	Proximate analysis calculations		
6	2/14	Mineral analysis	12	Standardization of Solutions and Volhard Salt Determination (Ch 3 New Lab Manual)
	2/16	Atomic spectroscopy	24	
7	2/21	Quality assurance in the food industry – <i>QA Manager, Guest speaker</i>		Ion Selective Electrodes, Chloride Analyzer and Quantab Chloride Titrators
	2/23	Review for exam		
8	2/28	<b>EXAM 1</b>		Analytical Sciences Lab Tour, Holm Research Center, <i>University of Idaho</i>
	3/2	Molecular spectroscopy	21, 22	
9	3/7	Molecular spectroscopy	23	Spectroscopy: Vitamin, Protein and Sugar Analysis
	3/9	Enzymes as analytical tools	16	
10	3/14	SPRING BREAK		
	3/16	SPRING BREAK		
11	3/21	Spectroscopy calculations		Enzymes as Analytical Tools: Alkaline Phosphatase and Glucose Content
	3/23	Electrophoresis	15 (p 267-271)	
12	3/28	Electrophoresis calculations		Electrophoresis of Protein Isolates and Preparation of Fatty Acids for GC-MS
	3/30	Chromatography	27	
13	4/4	Chromatography	29	Chromatography I: GC-MS of Fatty Acids, <i>Dr. Andrzej Paszczynski, Renfrew Hall, Univ. Idaho</i>
	4/6	Chromatography	28	
14	4/11	Chromatography calculations		Chromatography II: HPAE-PAD for Carbohydrates and Amino Acids, <i>Demonstration by Thermo Fisher Scientific</i>
	4/13	Chromatography - <i>Brent Boyle, Technical Sales Rep, Chromatography and Mass Spectrometry, Thermo Fisher Scientific</i>		
15	4/18	Review for exam		Laboratory Check-out
	4/20	<b>EXAM 2</b>		
16	4/25	Return exam/catch up		
	4/27	Course evaluations		

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

**Course Overview:**

We will study the development and application of analytical procedures used to characterize foods and their constituents. 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 principles of analytical procedures commonly used to analyze foods and to discuss their application to specific food components. Laboratory experiments are designed to introduce you to a variety of techniques used in food analytical labs. You 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.

**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 3-15	Class discussion, exams
Describe common instrumentation used in food analysis	Lectures weeks 3-15	Class discussion, exams
Organize, analyze and interpret analytical data in a meaningful way	Lectures weeks 2-15; All laboratory sessions	Class discussion, laboratory reports, quizzes, worksheets, 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 1-15	Quizzes, worksheets, exams
Apply basic statistical principles in food analysis applications (sampling and analysis)	Lectures weeks 2-3; All laboratory sessions	Laboratory reports, worksheets, quizzes, exams

**WSU Reasonable Accommodation Statement:** Reasonable accommodations are available for students with a documented 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: 509-335- 3417. <http://accesscenter.wsu.edu>, [Access.Center@wsu.edu](mailto:Access.Center@wsu.edu)

**WSU Academic Integrity Statement (Updated August 2016):** “Academic integrity is the cornerstone of higher education. As such, all members of the university community share responsibility for maintaining and promoting the principles of integrity in all activities, including academic integrity and honest scholarship. Academic integrity will be strongly enforced in this course. Students who violate WSU’s Academic Integrity Policy (identified in Washington Administrative Code (WAC) 504-26-010(3) and -404) will receive a failing grade on the assignment, will not have the option to withdraw from the course pending an appeal, and will be reported to the Office of Student Conduct.

Cheating includes, but is not limited to, plagiarism and unauthorized collaboration as defined in the Standards of Conduct for Students, WAC 504-26-010(3). You need to read and understand all of the definitions of cheating: <http://app.leg.wa.gov/WAC/default.aspx?cite=504-26-010>. If you have any questions about what is and is not allowed in this course, you should ask course instructors before proceeding. Please use these resources to ensure that you don’t inadvertently violate WSU’s standard of conduct. If you wish to appeal a faculty member’s decision relating to academic integrity, please use the form available at [conduct.wsu.edu](http://conduct.wsu.edu).”

**WSU Plagiarism Statement:** Plagiarism is defined by Webster’s Dictionary as, “*to steal and pass off the ideas or words of another as one’s own.*”

You must acknowledge the source of information used when writing lab reports. See the Journal of Food Science style guide (<http://www.ift.org/knowledge-center/read-ift-publications/journal-of-food-science/authors-corner/useful-abbreviations-and-nomenclature.aspx>) for acceptable options.

Plagiarism is dishonest and is **not** tolerated (this includes using all or portions of a current or former classmate’s work). Plagiarism will result in a grade of “zero” for the assignment. Additional penalties for plagiarism are possible as outlined by WSU policies.

**WSU Safety and Emergency Notification (Updated August 2016):** “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. 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.”

**Additional Class Resources:**

Official Methods of Analysis, 20<sup>th</sup> edition, Association of Official Analytical Chemists (AOAC) International, Gaithersburg, MD, 2016.

Methods for Chemical Analysis of Water and Wastes, Environmental Protection Agency (EPA), Washington, DC.

Standard Methods for the Examination of Water and Wastewater, 22<sup>nd</sup> edition, American Public Health Association (APHA), Washington, DC.

Standard Methods for the Examination of Dairy Products, 17<sup>th</sup> edition, American Public Health Association (APHA), Washington, DC.

Approved Methods of Analysis, American Association of Cereal Chemists (AACC) International, St. Paul, MN.

Official Methods and Recommended Practices, American Oil Chemists' Society (AOCS), Champaign, IL, 2011.

Chemistry Laboratory Guidebook, United States Department of Agriculture, Food Safety and Inspection Service (USDA-FSIS), Athens, GA. Available online.

(<https://www.fsis.usda.gov/wps/portal/fsis/topics/science/laboratories-and-procedures/guidebooks-and-methods/chemistry-laboratory-guidebook>)

Handbook of Food Analytical Chemistry, 2000-2005, Ed: RE Wrolstad et al. (2 volumes), John Wiley and Sons, Hoboken, NJ.