

## ANFS 429/629 Food Analysis



Nutrition Facts		
Serving Size 1/2 cup (66 g)		
Servings Per Container 12		
Amount Per Serving		
Calories 130		
Calories from Fat 70		
		% Daily Value
Total Fat	7 g	11%
Saturated Fat	4.5 g	23%
Trans Fat	0 g	
Cholesterol	25 mg	8%
Sodium	50 mg	2%
Total Carbohydrates	16 g	5%
Dietary Fiber	0 g	0%
Sugars	12 g	
Protein	2 g	4%
Vitamin A 6%	Vitamin C 0%	
Iron 0%	Calcium 8%	
Caffeine: 0 mg to 0 mg		
Ingredients: MILK, CREAM, CORN SYRUP, SUGAR, WHEY, NONFAT MILK, CELLULOSE GEL, CELLULOSE GUM, VANILLA, MONO & DIGLYCERIDES, CARRAGEENAN, VANILLA BEAN.		
Contains: MILK		
Additional Info: Gluten-Free, Caffeine-Free		

Want to know *how* to determine water, fat, protein, carbohydrate contents in your *favorite food*?

Want to know how to determine nutrition label for your new food products?

### Course Schedule

Lecture: Monday, Wednesday, Friday 10:10 am -11:00 am, 006 Townsend Hall

Lab: Wednesday, 12:20 – 3:15 pm, 202 Worrilow Hall

### Textbook

*Food Analysis, 3<sup>rd</sup> edition.* 2003. S. Suzanne Nielsen (ed). Springer.

Or *Food Analysis, 4<sup>th</sup> edition.* 2010. S. Suzanne Nielsen (ed). Springer

### Additional resource:

AOAC International: [www.aoac.org](http://www.aoac.org)

American Chemical Society: [www.acs.org](http://www.acs.org)

The Institute of Food Technologists: [www.ift.org](http://www.ift.org)

### Contact Information:

Tel: (302)-831-3029

Email: [changwu@udel.edu](mailto:changwu@udel.edu)

### Office Hours

2:00 –4:00 pm Thursday, at Room 021, Townsend Hall or by appointment

### Course Description

This course provides an introduction to the theory and practice of the analysis of food composition and characteristics. Analytes of nutritional, functional, safety and regulatory importance will be measured. Techniques and instrumentation used for the analysis of foods including spectroscopy, chromatography, and titration will be examined. Selection of the appropriate method for analytes and food systems will be discussed. Students will be familiarized with resources relevant to the field, and assignments will address critical thinking, written and oral communication skills.

### Course Format

Food Analysis **ANFS 429/629** is a 4-credit course with laboratory components. The course will be taught by Dr. Changqing Wu. Various teaching and learning formats will be utilized including, but not necessarily limited to lectures, presentations, discussions, hands-on laboratory exercises, and laboratory demonstrations. Students will be responsible for participation in these activities, related assignments, mid and final exams, laboratory reports, case studies, article

critiques, and presentations. Questions regarding specific topics should be addressed to the instructor. Dr. Wu can be reached by email, phone, or office visit. Please do not wait until deadlines to seek assistance.

Other support is available through:

Academic Enrichment Center: <http://www.aec.udel.edu/>

Writing Center: <http://www.english.udel.edu/wc/resource/news.html>

Library: <http://www.lib.udel.edu/>

Computing Sites: <http://www.udel.edu/sites/>

### **Course Objectives and Student Learning Goals**

1. Become knowledgeable of food components and characteristics and techniques available for their analysis.  
ANFS Learning Goals: “critical thinking” and “knowledge of core concepts in Animal and Food Sciences”
2. Be able to choose appropriate methods for the analyte and/or food system of interest and interpret analytical data including use of common calculations, and resources relevant to food analysis.  
ANFS Learning Goals: “Students will use critical thinking and reasoning, skeptical inquiry and scientific approach to solve problems”
3. Demonstrate oral and written communication skills to effectively communicate scientific ideas related with food analysis  
ANFS Learning Goals: “Students will demonstrate oral communication skills important for communicating scientific ideas” and “Students will demonstrate written communication skills important for communicating scientific ideas”

Note: The Department of Animal and Food Sciences assessment learning program can be found at <http://canr.udel.edu/anfs/policies-committees/>.

### **Laboratory Safety**

Protective eyewear is required (must provide own). Lab coats (must provide own) and gloves (provided) will be required for exercises as indicated by instructors. No open-toe shoes or shorts are permitted.

### **Academic Honesty**

Academic dishonesty in any form will not be tolerated. Please familiarize yourself with the University's Policy on Academic Honesty found in the *Student Guide to University Policies*. (<http://www.udel.edu/stuguide/14-15/code.html>). The content of the guide applies to this course. Responsible computing guidelines can be found at <http://www.udel.edu/stuguide/14-15/code.html>.

### **Code of Conduct**

Guidelines for appropriate conduct can be found at <http://www.udel.edu/stuguide/14-15/code.html>. Electronic devices should be turned off and not accessed during class, including cellular phones, pagers, and personal digital assistants. Class attendance is required.

### **Disability Statement**

Any student who thinks s/he has a need for accommodation based upon the impact of a disability should contact the professor as soon as possible. You should also contact the Office of Disabilities Support Services (<http://www.udel.edu/DSS/>) to coordinate appropriate accommodations.

### **Grade Scale**

Straight arithmetic average with 100-93 an A, 92-90 an A-, 89-88 a B+, 87-83 a B, 82-80 a B-, 79-78 a C+, 77-73 a C, 72-70 a C-, 69-68 a D+, 67-63 a D, 62-60 a D-, 59 and below an F.

***Attendance is required. Late assignments will not be accepted. Students are responsible for informing the instructor of absences and obtaining missed material.***

<b>Assignments and Exams</b>	<b>Percentage of Total Grade</b>
Assignments - All weighted equally Includes case studies, quizzes, article reviews, and other as indicated by instructor	30
Mid Exam	15
Final Exam	20
Class attendance and engagement	10
Lab assistance and engagement	20
Oral Presentation	5

### **Assignments (30%)**

Assignments may include homework, article critiques, quizzes, case studies or other formats.

### **Journal Article Reviews**

Reviews of journal articles should include comments on the importance of the food analytical method, appropriateness of methodology utilized, whether conclusions match results presented, and general presentation. This can be broken down according to the sections of the article being reviewed. A summary paragraph should include an overall impression of the article addressing its importance, clarity, and any opportunities for improvement. Please refer to Review Article Guidelines for additional grading expectations.

### **Mid and Final exam (15% and 20% respectively)**

The mid and final exam format may include multiple choice, calculations, graphing, and essay questions.

### **Class attendance and engagement (10%)**

Because this class is taught using constructivist theory, your attendance in class and lab is essential. Constructivist theory says that the learner constructs his/her knowledge from experiences, reading, etc. in and outside the classroom. In order to learn the maximum amount and perform well on assignments in this course, the learner has to be present for the in-class experiences. In addition, the learner needs to bring a desire to learn to the experience. I will try to

help motivate you, but in the end, you must **WANT** to learn to maximize the experience. We want you to become “life long active learners”. Because it is impossible to duplicate an entire class session just for you, the only way to stay fully informed is to attend class.

You are required to actively participate in group discussions and other in-class exercises. I will help you to form groups in the middle of class. Roll will be taken in most class periods by participation and engagement in group discussions and other in-class activities. Please notify me in advance if you will need to be absent from class. If you *are not* in class, you are *absent*. The *exception* will be times that the University of Delaware campus is closed by the University administration or other emergency situation. In such a case, absences will not count. If you have a unique and urgent situation, the instructor will work with you individually. You will need to document the absence in such a case. You might have up to three excused absence in an entire semester, depending on your individual situation.

The grading of your active participation in group discussion and other in-class exercises are shown as below, all of which counts for class attendance (10 % of total course grade):

<b>Class Activities</b>	<b>Total number in a semester</b>	<b>Percentage of Total Course Grade</b>
Group discussion or online posting	10	0.8 % for each participation and sharing in a class
Pre-class assessment	1	1 %
Engagement in other types of class activities	10	0.1 % for each class, in your best efforts

### **Lab assistance and engagement (20%)**

Lab exercises are centered on a semester-long group lab activity focused on evaluating major food components in a food item that each group selects at the beginning of a semester. Students compare and discuss experimental outcomes with data on the product nutritional label or in the USDA nutrient database.

#### Lab assistance (5%)

Lab attendance is required. Actively participate and engage in all the lab activities during the assigned lab periods. Assist with lab instructor and Teaching assistant to set up and clean the lab space as needed. Electronic devices should be turned off and not accessed during lab sections, including cellular phones and personal digital assistants.

#### Lab assignments and lab reports (15%)

Lab assignments including pre-lab or post-lab questions should be submitted before due date. Post-lab assignments or lab reports will be due one week from completion of lab exercise unless notified otherwise. ***Late submission of assignments will not be accepted.***

The required lab report for each laboratory experiment must follow the listed format. Lab reports should include the following sections: abstract, introduction, objectives, major equipment/apparatus used in analysis, methodology, results, discussion, conclusions, and references. Please refer to lab report rubrics for additional grading expectations.

### Oral Presentation (5%)

Students may select the same topic used for journal article review, or choose another topic with instructor approval. Oral presentations should be approximately 15 minutes, followed by a 5-minute question/answer period, and cover relevant information on importance, applications, and analytical methodology. Presentations will be evaluated for content, style, and demonstration of knowledge (evaluation form included in syllabus). Evaluations will be given by instructors and the rest of class, with instructor evaluations twice the weight of student evaluations. The presentation will include an abstract. The abstracts should be no longer than 300 words and address the following: the topic to be addressed, why the topic is important for the food industry, the objective of the presentation, and highlights of the specific topics to be included in the presentation.

### Suggested Topics for Journal Article Review and Oral Presentation

Lipid characterization – total fat, degree of saturation, trans-fats

Cholesterol analysis

Protein analysis

Flavor analysis

Heavy metals analysis

Vitamin analysis

Analysis of salt and potassium

Analysis of antibiotic and drug residues

Analysis of pesticide residue

### Tentative Course Schedule

*Topics and due dates are subject to change with advanced notice.*

Date	Topic	Technique/Tools	Relevant Chapter (s)
<b>Feb</b> Week 1	Introduction to Course	Steps in analysis	Ch. 1
	<u>Evaluation of Analytical Data</u>	Assessment of accuracy & precision, error source	Ch. 4
	<b>Lab</b>	<b>Lab orientation</b>	
Week 2	Sample Preparation	Sampling procedures	Ch. 5
	pH and Acidity	pH, Titration	Ch. 13
	<b>Lab 1</b>	<b>data evaluation</b>	
Week 3	Standards/Regulations	Regulations and international standards	Ch. 2
	Nutrition Labeling	Formulation & nutrition , labeling software	Ch. 3
	<b>Lab 1 (cont.):</b>	<b>Sampling and pH</b>	
<b>Mar</b> Week 4	Water Analysis	Drying, titration, water activity	Ch. 6
	Water Analysis	Drying, titration, water activity	Ch. 22, 23

	<b>Lab 1(cont.):</b>	<b>pH and total titratable acidity</b>	
Week 5	Ash Analysis	Dry ashing and wet ashing,	Ch. 23
	Spectroscopy	Basic principles, UV-Vis	Ch. 27
	<b>Lab 2</b>	<b>Measurement of water content and water activity</b>	
Week 6	Chromatography	Basic principle, size, ion exchange,	Ch. 28
	Chromatography	Gas Chromatography	Ch. 29
	<b>Lab 2 (cont.):</b>	<b>Measurement of water content and water activity, ash analysis</b>	
Week 7	Crude Fat Analysis	Solvent, non solvent extraction methods	Ch.8
Mar 25	Crude Fat Analysis (review abstract due)	Solvent, non solvent extraction methods	Ch.8
	<b>Lab 3:</b>	<b>Lipid analysis</b>	
Week 8	<b>Spring Break</b>		
Apr Week 9	Fat Characterization	Melting point, iodine value, oxidation	Ch. 14
TBA	<b>Mid Exam</b>		
	<b>Lab 3 (cont.):</b>	<b>Lipid analysis</b>	
Week 10	Protein Analysis	Nitrogen analysis, UV/Vis	Ch. 15
	Protein Separation	Separation by solubility, absorption, size,	Ch. 15
	<b>Lab 4:</b>	<b>Protein analysis</b>	
Week 11	Protein Characterization	Electrophoresis, amino acid analysis	Ch. 10
	Carbohydrate, Soluble Solids	Physical methods (Refractometry), total carbohydrate, total reducing sugar	Ch. 10
	<b>Lab 4 (cont.):</b>	<b>Protein analysis</b>	
Week 12	Carbohydrate, Fiber	Instrumental analysis (GC and enzymatic method), detergent Method	Ch. 7,

	Mineral Analysis	Colorimetry, atomic absorption	Ch. 12, Ch. 25
	<b>Lab 5:</b>	<b><i>Soluble solids and glucose content</i></b>	
May Week 13	Vitamin Analysis	Extraction, bioassays, chemical methods	Ch. 11
	Chromatography	HPLC, demo lab	Ch.17
	<b>Lab 5 (cont.):</b>	<b><i>Soluble solids and glucose content</i></b>	
Week 14	Oral Presentation		
	Oral Presentation		
	<b>Lab 6</b>	<b><i>Chip evaluation</i></b>	
Week 15	Review class (article review due)		
TBA	<b>Final Exam</b>		

**Food Analysis ANFS 429/629**

**Evaluation of Presentation**

Name of Presenter \_\_\_\_\_

Please give your evaluation of the presentation in the following categories by circling a number below (0 = very unsatisfactory; 10 = outstanding).

<b>Content</b>	<b>Your Rating</b>	<b>% of Final Points</b>
How well was the issue (topic) <u>introduced</u> ? Was sufficient <u>background</u> information provided?	1 2 3 4 5 6 7 8 9 10	10
Was the issue discussed in <u>sufficient detail</u> so that the magnitude of the problem became clear? How well did the <u>content</u> of the presentation reflect your expectations?	1 2 3 4 5 6 7 8 9 10	20
How <u>clearly</u> was the information conveyed? Did the presentation contain any confusing statements?	1 2 3 4 5 6 7 8 9 10	10
Were the conclusions justified by the information presented?	1 2 3 4 5 6 7 8 9 10	10
<b>Style</b>		
How well were the slides done? (readable, without distractions, typos and grammatical errors)	1 2 3 4 5 6 7 8 9 10	20
How would you rate the presenter? (Audible, confident, makes eye contact, etc.)	1 2 3 4 5 6 7 8 9 10	20
<b>Knowledge</b>		
How well did the presenter know his/her material?	1 2 3 4 5 6 7 8 9 10	10

**Very Important:** Please write down any comments about the presentation and/or the speaker: