Food Analysis (11:400:304, 4 credits)
Instructor: Dr. Qingrong Huang
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Tel: (732)-932-7193

Time & Place: Tuesdays & Fridays 9:15 - 10:35 am, room FS 109

Office Hours
2:00 – 4:00 pm Wednesday, at Room 315C, FS Building

http://foodsci.rutgers.edu/huang/Food_Analysis/FA2011.htm

Objectives: This course is designed to provide our students a clear understanding of the principles behind various instruments that are commonly used in food industry and academic research labs to characterize the structure and physical properties of food components, as well as laboratory experience on different instruments, which include pH meter, UV, fluorescence, FTIR, TLC, viscometer, HPLC, GPC, GC, and GC-MS.

Outcomes: After completing this course, our students are expected to
1. Understand weight to ppm/molar conversion, solution preparation and dilution, as well as statistical analysis of the data;
2. Understand the pH of food, buffer, buffer capacity, pH titration;
3. Understand the principles and instrumentation of UV, fluorescence, and FTIR;
4. Understand the physical properties, including thermal (DSC, TGA), rheological (viscometer) and mechanical properties (texture analyzer) of food systems;
5. Understand the principles of chromatography (HPLC, GC) and mass spectroscopy (MS, LC-MS, GC-MS);
6. Understand the principle and instrumentation of particle size measurements.

Assessment: The outcome will be assessed by
1. Quizzes: Seven quizzes will be given during the semester to evaluate how students perform in the class, and prepare them for the mid-term and final exams. Quizzes will be arranged in different formats, such as multiple choice, essay, fill-in the blank, and calculation, and cover the materials presented in previous lectures;
2. Homework: After the completion of each chapter, homework will be assigned to prepare the students for the quiz, and both exams;
3. Mid-term and final exams: These two exams will test students’ knowledge and ability to solve food science problems using the knowledge they learn during the semester;
4. Lab reports: After each lab, students are expected to write lab reports which usually include the background & rationale, experimental procedures, major experimental findings, data analysis, and interpretation of the experimental results.

Grading (Total 100%):
<table>
<thead>
<tr>
<th>Home work &amp; Lab reports 20%</th>
<th>Quiz 15%</th>
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<tbody>
<tr>
<td>Mid-term 30%</td>
<td>Final 35%</td>
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Typical grading cut-offs:
A: 90-100
B+: 86-89
B: 80-85
C+: 76-79
C: 70-75
D: 60-69
F: <60

Schedule

Lecture 1: Introduction 1/18/2011
Lecture 2: Evaluation of Analytical Data 1/21/2011
Lecture 3: pH and Titratable Acidity (quiz 1) 1/25/2011
Lecture 4: pH Meter and Buffer capacity (1) 1/28/2011
Lecture 5: Buffer Capacity (2) 2/1/2011

Lab 1: Determine Acid Content and pKa of Food Beverages 2/1/2011

Lecture 7: Introduction of UV Spectroscopy (1) 2/8/2011

Lab 2: Determine Food Protein Concentration with UV Spectroscopy 2/8/2011

Lecture 8: UV Spectroscopy and Instrumentation (2) 2/11/2011
Lecture 9: Fluorescence Spectroscopy (1) 2/15/2011

Lab 3: Fluorescence Spectroscopy demo 2/15/2011

Lab Report: please include the concept of fluorescence spectroscopy, and discuss the potential of fluorescence spectroscopy for food applications.

Lecture 10: Fluorescence Spectroscopy (2) (quiz 2) 2/18/2011
Lecture 11: Infrared (1) 2/22/2011
Lecture 12: Infrared (2) 2/25/2011
Lecture 13: Infrared (3) 3/1/2011

Lab 4: Determine chemical composition of your food samples using FTIR 3/1/2011
Requirements: Know how to correlate the major IR absorption bands with structure in your report.


Lab 5: Determine Viscosities of Carbohydrate solutions 3/8/2011
Mid-term

Spring Break

Lecture 16: Basic Principles of Chromatography (1) 3/22/2011
Lab 6: Separation of Food Colors using TLC 3/22/2011
Lecture 17: Basic Principles of Chromatography (2) (quiz 4) 3/25/2011
Lecture 18: Basic Principles of Chromatography (3) 3/29/2011
Lab 7: Determine total polyphenol contents of green tea extract using HPLC 3/29/2011
Lecture 19: Basic Principles of Chromatography (4) 4/1/2011
Lab 8: Determine MW of Carbohydrate using SEC 4/5/2011
Lecture 22: Gas Chromatography (2) 4/12/2011
Lab 9: Demo of GC

Lecture 24: Thermal Analysis (1) (quiz 6) 4/19/2011
Lab 10: Demo for Mass Spectroscopy 4/19/2011
Lecture 25: Thermal Analysis (2) 4/22/2011
Lecture 26: Particle Size Analyzer 4/26/2011

Final Exam 5/6/2011