COURSE INFORMATION:

Food Analysis (11:400:304, 4 credits). 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.

CONTACT INFORMATION:

Instructor(s): Dr. Qinrong Huang
Office Location: Food Science Building Room #221
Office Hours: 2:00 – 4:00 pm Wednesday
Phone: 848-932-5514
Email: qhuang@aesop.rutgers.edu

COURSE MATERIALS:

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

COURSE DESCRIPTION:

Modern methods of analytical chemistry, with emphasis on chromatography. Application of analytical methodology to lipids, amino acids, carbohydrates, and other food components. Importance of precision, accuracy, and significance of results.

LEARNING OBJECTIVES:

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.
ASSIGNMENTS/RESPONSIBILITIES & 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, assay, 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>Component</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Homework &amp; Lab reports</td>
<td>20%</td>
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<tr>
<td>Quiz</td>
<td>15%</td>
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<tr>
<td>Mid-term</td>
<td>30%</td>
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<tr>
<td>Final</td>
<td>35%</td>
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</tbody>
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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
OTHER INFORMATION:
Students will be responsible for adhering to the academic integrity policies found at http://academicintegrity.rutgers.edu.

It is important that students have the tools to succeed in this course. Please see the instructor *as soon as possible* with any difficulties or questions regarding the course materials. In addition, the Office of Student Affairs is available at http://studentaffairs.rutgers.edu for any other needs or concerns.

COURSE SCHEDULE:

Lecture 1: Introduction
Lecture 2: Evaluation of Analytical Data
Lecture 3: pH and Titratable Acidity (quiz 1)
Lecture 4: pH Meter and Buffer capacity (1)
Lecture 5: Buffer Capacity (2)

Lab1: Determine Acid Content and pKa of Food Beverages

Lecture 6: Basic Principles of Spectroscopy
Lecture 7: Introduction of UV Spectroscopy (1)

Lab 2: Determine Food Protein Concentration with UV Spectroscopy

Lecture 8: UV Spectroscopy and Instrumentation (2)
Lecture 9: Fluorescence Spectroscopy (1)

Lab 3: Fluorescence Spectroscopy demo

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)
Lecture 11: Infrared (1)
Lecture 12: Infrared (2)
Lecture 13: Infrared (3)

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

Lecture 14: Rheological Principles for Food Analysis

Lecture 15: Review of exam (quiz 3)

Lab 5: Determine Viscosities of Carbohydrate solutions