

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:

Food Analysis, 4th Edition, by S. S. Nielsen
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.
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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, 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%):

Home work & Lab reports 20%

Mid-term 30%

Quiz 15%

Final 35%

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

ACADEMIC INTEGRITY

The University's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academicintegrity-policy>

The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

STUDENT WELLNESS SERVICES

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS). (848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/www.rhscaps.rutgers.edu/.

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932- 1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>. Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>. Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.