

Food Science Instrumentation Course Outline - Fall Semester

Tuesday Evenings 7:15 - 10:05 pm Food Science Reading Room

Instructor: Dr. Thomas G. Hartman, (848) 932-5543, hartmantg@aol.com

Week

- 1 (Sept. 3) Introduction, Course Overview, Take Home Assignment, Gas Chromatography Instrumentation & Theory
- 2 (Sept. 10) GC Continued. Take Home Assignment.
- 2 (Sept. 17) HPLC Instrumentation & Theory
- 3 (Sept. 24) HPLC Continued. UV-Vis, Theory & Instrumentation, AA, ICP, X-Ray Emission Spectroscopy
- 4 (Oct. 1) Infra Red Spectroscopy Instrumentation & Theory
- 5 (Oct. 8) Mass Spectrometry Instrumentation & Theory
- 6 (Oct. 15) Mass Spectrometry Data Management. Interpretation of Mass Spectra
- 7 (Oct. 22) Midterm Exam
- 8 (Oct. 29) Techniques for Flavor/Aroma Analysis including Headpace, SPME, DTD, P&T-TD, SDE etc.
- 9 (Nov. 5) Student Presentations - Instruments for Functional Measurements in Foods
- 10 (Nov. 12) Student Presentations - Instruments for Functional Measurements in Foods
- 11 (Nov. 19) Student Presentations - Instruments for Functional Measurements in Foods
- 12 (Nov. 26) Student Presentations - Instruments for Functional Measurements in Foods
- 12 (Dec. 3) Analytical Method Validation
- 13 (Dec. 10) Analytical Aspects of Food Packaging, Food Forensics
- 14 (Dec. 17) Final Exam

Course Hand-Outs Available on Sakai:

Sakai.Rutgers.EDU/Portal

Course # : 16:400:502:01 F13

Class Take Home Assignment

Each student in the course will be assigned an analytical instrument used to measure a functional property of a food (or a food ingredient, beverage, food packaging or anything related to food). Write a brief but comprehensive summary (2-3 typewritten pages excluding figures) describing the instrument, what it is used for, the theory of the measurement, what type of results are obtained, potential analytical biases, advantages & disadvantages, shortcomings, what type of units the results are reported if applicable, what is a typical report format, what type of useful information is provided, photographs, drawings, illustrations, schematic diagrams or representations of the instrument or technique, examples of food science applications, references etc.

Some examples of functional attributes of food/food ingredients include texture, rheology, color, morphology, particle size distribution, physical properties etc.. Please prepare a 20 minute presentation on your instrument using a powerpoint presentation to be given to the class. The due date for the take home assignment is November 5th and presentations will begin on this date. The take-home assignment will represent 1/3 of your grade for the course.

Some examples:

- 1) Hunter Colorometer for measuring color of food
- 2) Metrohm Rancimat for measuring oil stability index
- 3) Rheological testing equipment such as Instron, Rheometrics, Bholin etc.
- 4) Farinograph for measuring dough consistency
- 5) Refractive Index for measuring BRIX or other RI properties of liquids
- 6) Polarimeter for measuring optical rotation of sugars
- 7) Magna Mike for measuring thickness of polymer films
- 8) Mocon Analyzer for measuring gas diffusion properties of polymer films, MTRV's etc.
- 9) GPC for molecular weight distributions of food biopolymers
- 10) Laser Light Scattering for molecular weight distributions of food biopolymers
- 11) Differential Scanning Calorimetry (DSC)
- 12) Thermogravimetric Analysis (TGA)
- 13) Densitometer
- 14) Viscosimeter (various types)
- 15) Porosimeter
- 16) Microscopy (SEM, TEM)
- 17) Microscopy (Atomic Force Microscopy)
- 18) Microscopy (Controlled Temperature Stage for Study of Ice Crystal Growth etc.)
- 19) Particle Size Analyzer
- 20) Penetrometer
- 21) Machine Vision Technology (for monitoring on-line processing, food ripening etc.)