FOOD ENZYMOLOGY
400:511
SPRING 2013
(M-W 3:55 p.m. - 5:15 p.m.)

Faculty: Dr. George M. Carman (carman@aesop.rutgers.edu)
Dr. Stylianos Fakas (stfakas@aesop.rutgers.edu)
Dr. Gil-Soo Han (gshan@rci.rutgers.edu)

Description: Food enzymology covers basic and applied aspects of the enzymology important to food systems. The basic aspects of the course include: methods of measuring enzymatic activities; extraction of enzymes from microbial, plant and animal systems; methods of enzyme purification and characterization; and regulation of enzyme activities by activators, inhibitors, and by covalent modification. Applied aspects of the course focus on enzymes used by the food industry and methods for controlling endogenous enzyme activities. Students develop novel food concepts based on enzymatic reactions/processes.

Learning Outcomes: Students are expected to understand the enzymological aspects of food quality control that affects the color, flavor, and texture of fresh and processed foods. Ability to extract, isolate, and characterize enzymes that act on major food macromolecules is a major learning outcome of the course.

Prerequisites: Food Biology Fundamentals
General Biochemistry

Reference Texts: *Handbook of Food Enzymology*, eds J.R. Whitaker, A.G.J. Voragen, D.S.W. Wong. CRC Press (2002); General texts on enzymology

Reference Journals:

Anal. Biochem.
Arch. Biochem. Biophys.
Biochem. J.
Biochemistry
Biochim. Biophys. Acta
Enzyme Microbial Technol.
Eur. J. Biochem.
J. Biol. Chem.
J. Food Biochem.
J. Food Sci.
Nature Biotechnology
Plant Physiol.
Proc. Natl. Acad. Sci. USA
Trends Biotech.
Trends Food Sci. Tech.

Evaluation: Grades will be based on 2 exams, a research proposal, and class participation

Topic Outline:

Introduction-significance of enzymes in food systems
Nature of enzymes and definitions of enzyme activity
Measurement of enzyme activity
Enzyme localization, compartmentalization, and significance to food quality
Role of enzymes in the color, flavor, and texture of food
Carbohydrate-dependent enzymes
Protein-dependent enzymes
Lipid-dependent enzymes
Factors that affect enzyme activity in natural food systems
Effects of processing on enzyme activity
Role of enzymes in climacteric fruits (ripening and senescence)
Role of enzymes in meat quality
Enzymes used by the food industry
Use of enzymes in food analysis
Use of enzymes in food processing
Purification of soluble and membrane enzymes
Enzyme characterization
Enzyme kinetics
Regulation of enzyme synthesis and posttranslational modification
Genetic engineering to increase enzyme yield and alter enzyme properties

Research Proposal:

Each student is responsible for a proposal to develop of a novel food product based on the use of an enzyme(s). The novel food should be developed and characterized with an emphasis on the principles of food enzymology. Each student is responsible for a 10-min oral presentation and for a typed written report. The oral and written reports should consist of an introduction, proposed methods, potential problems, alternative approaches, discussion, and bibliography. Citations throughout the text and references listed in the bibliography should follow the format of the Journal of Food Science. The oral report should be presented in a professional manner using computer projections. The written report must be typed. Presentations will be made during the last weeks of the semester. The written report is due on the last day of class.