FSTC 489/POSC 489  
FSTC 689/POSC 689  
Fall, 2003  
MICROBIOLOGY OF FOOD IRRADIATION

Instructor:  
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Course Objectives

This course will be taught as a undergraduate-graduate “stacked course.”  
The primary objective of this course is to provide students with a working knowledge of  
using Electron Beam irradiation as a means of irradiating foods to destroy microbial  
pathogens or retard microbial spoilage. In this lecture-laboratory course, the students will  
get hands-on experience in determining the D_{10} values of specific microorganisms,  
dosimetry, and evaluating effectiveness of e-beam food irradiation. Additionally, the  
students will obtain state of the science information on the microbiological principles  
underlying food irradiation, the criteria used in deciding irradiation dose, criteria used in  
choosing packaging materials and current consumer attitudes towards irradiated foods. A  
secondary objective of the course is to train students to be competitive for employment  
in the food irradiation industry.

The course will include a laboratory component at Kleberg Center and hands-on  
experiments at the Electron Beam Food Research Facility on Discovery Drive.

Prerequisites: Microbiology or molecular biology course work/Instructor approval

Course Outline

1) Rationale for Food Irradiation  
2) Principles of irradiating technologies  
3) Mechanisms of microbial inactivation under irradiation conditions  
4) Microbial targets for ionizing and non-ionizing radiation  
4) Biological effects of irradiation on microorganisms, insects and parasites  
5) Biotic and abiotic factors controlling microbial inactivation during ionizing irradiation  
6) Comparing irradiation effectiveness using microbial inactivation curves and D_{10} values  
7) Detection of Irradiated Foods for regulatory purposes  
8) Packaging issues in food irradiation.  
9) Consumer Acceptance of Irradiated Foods and Market Trends
Laboratory work Outline

1) Dose-mapping of beef patties and ready to eat meats.
   a. Dose distribution on irradiated materials
   b. Data analysis and interpretation
2) Irradiation of pathogen-spiked food products to calculate $D_{10}$ values.
   a. *Salmonella* sp. inoculation
   b. *E.coli* inoculation
   c. Data Analysis and Interpretation
3) Irradiation of dried fruits and nuts to reduce fungal infestation
   a. Data Analysis and Interpretation
4) Irradiation of viral suspensions.
   a. Data analysis and interpretation.

Grading

Grading will be separate for graduate and undergraduate students. Graduate students will have an option of preparing a brief white-paper on a food-irradiation related topic, or prepare a brief research proposal. There will not be a final exam for the graduate students.

Examinations
Exam 1: 25%
Exam 2: 25%
Laboratory Reports: 25%
(undergraduate students only): Final Exam 25%
(graduate students only) White Paper/Research Proposal 25%

Reading Material
Hand-outs, scientific papers

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