FOOD PROCESSING TECHNOLOGY 11:400:301 (4 credits)

Instructor: Dr. Paul Takhistov
takhistov@aesop.rutgers.edu

Food processing is the set of methods and techniques used to transform raw ingredients into food for consumption by humans. In order to meet the sensory quality, safety, nutrition, health, economy and novelty demanded of food products by consumers, it is necessary to improve food processing operations. Food processing has moved on from being a craft to a modern technology. This course covers principles of operation and design of industrial equipment, used in the processing, storage and packaging of foods. Food quality and food safety aspects, related to food processing equipment, are emphasized. Food processing equipment is classified and described according to the basic unit operations, including mechanical transport, mechanical processing and separations, heat transfer operations, evaporation, dehydration, thermal processing, etc.

The descriptive information provides students with background on the process and the impact of the process on food product quality. Examples utilizing different food commodities are incorporated to ensure that the student gains an understanding of the relationship between commodities and processes.

e-College: There is an e-College web page associated with this course. Students who are on the class roster can access the web page by logging into Sakai at http://www.rutgersonline.net. Check the class web page for announcements and grades. Any questions about the material should be addressed to the instructor or TA.

About the Textbook and course materials: Food Processing Technology: Principles and Practice, by P. J. Fellows (Second Edition) that includes the chapters covered in this course. If the student chooses to use a prior edition, it is the student's responsibility to overcome any difficulties associated with using a book other than the one prescribed for this course such as chapter numbering, problems, or material. Some additional materials will be provided in form of class notes, web sources and excerpts from professional publications. They will be available through the class web.
Learning objectives: Upon completion of the course students should be able to understand general processing flow for various food products, physical principles of operation for various types of equipment and impact of the processing on the physical, chemical and sensory properties of the food products. Additionally, they learn on how to select the food processing method most suitable for specific application. The students will complete laboratory work cooperatively in small groups, and will present a final project to the entire class.

COURSE SYLLABUS

NON-CONVERSION OPERATIONS

- Food raw materials: physical, functional and geometric properties
- Cleaning of raw materials: cleaning methods and contaminations
- Sorting and grading of foods: weight, size, shape, buoyancy, photometry sorting

FOOD CONVERSION OPERATIONS

- Size reduction and screening of solids: equipment, modes of operation.
  Disintegration of materials: slicing, dicing, shredding, pulping
- Mixing and emulsification
- Filtration and membrane separation: principles, design features and general applications
- Centrifugation: principles and applications
- Solid-liquid extraction and expression

PRESERVATION OPERATIONS

- Evaporation: evaporation principles and equipment
- Dehydration: water in food, drying (contact, radiation, sublimation)
- Freezing: freezing/thawing
- Food storage: storage conditions and packaging (materials, filing, closing and sealing equipment).

**FOOD PRODUCTS PROCESSING PRIMER: DAIRY PRODUCTS, MEAT PRODUCTS, JUICE, VEGETABLES**

**LABORATORY WORKS (8 TOTAL)**

Laboratory sessions are intended to incorporate actual engineering data and situations into the class taught materials and provide basic practical knowledge of food processing operations (cleaning, sorting, size reduction, basic thermal and non-thermal processing etc.). Additionally, some laboratory sessions, (approximately two per course), will consist of field trips to local food processing plants in which tours will be provided and, in some cases, data will be collected to provide input for classroom/homework problems.

**COURSE PROJECT**

Course project is dedicated to comprehensive study of the technological processing of the foodstuff and interest for the student that will contribute to the in-depth knowledge in the subject. Students will choose their own topic i.e. food product that must be appropriate for study instructor will provide the feedback to promote success.

In order to complete the project students will prepare two 15 min presentations: 1) general processing consequence for the chosen food product, description of raw materials and general considerations (nutrition value, safety etc.) for the specific product; 2) in-depth description of the design, operation principle and cost/energy requirements for one operational unit from the processing of the chosen product. Additionally, written report is required.
FINAL EXAMINATION

GRADING AND EVALUATION

Grade Components:

- Laboratory works (40%)
- Course project (30%)
- Final Exam (30%)

Letter Grade:

A= 90-100% B=80-89% C=70-79% D=60-69% F<60%

Cheating/Academic Dishonesty

All Academic Integrity issues will be considered accordingly to the Academic Integrity Policy http://academicintegrity.rutgers.edu/integrity.shtml