COURSE INFORMATION:

FOOD PROCESSING TECHNOLOGY 11:400:301 (4 credits)
Offered every fall semester. Core course required for all Food Science students

CONTACT INFORMATION:
Instructor(s): Dr. Paul Takhistov
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COURSE MATERIALS:

- **Food Processing Technology: Principles and Practice, by P. J. Fellows (Second Edition)** that includes some materials 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.
- 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.

COURSE DESCRIPTION:

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.

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.

ASSIGNMENTS/RESPONSIBILITIES & ASSESSMENT:

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
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:

GENERAL PRINCIPLES OF MANUFACTURING PROCESS

- Manufacturing processes: batch, Semi-batch and continuous
- Mass-balance calculations

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

MIDTERM EXAMINATION

PRESERVATION OPERATIONS

- Non-thermal processing and Hurdle technologies
- 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).

LABORATORY EXERCISES (5 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

FIELD TRIP (2)