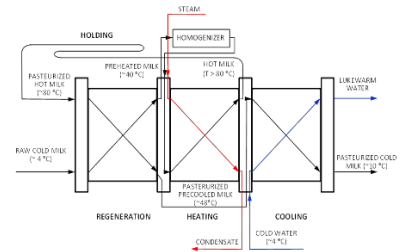


FDST 4012/6012 4012L/6012L - FOOD PROCESSING II
Spring 2018
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Academic Honesty: As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, "A Culture of Honesty," and the Student Honor Code. All academic work must meet the standards described in "A Culture of Honesty" found at: www.uga.edu/honesty. Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

Disclaimer: The course syllabus is a general plan for the course; deviations may be needed and will be announced to the class by the instructor.

Course Description: FDST 4012 Food Processing II is designed to learn the industrial processing, packaging, and preservation of liquid foods, including fruit juices and concentrates, dairy, sodas, sauces, and soups, as well as the most relevant effects of processing in the quality of liquid foods. The course will be taught in sections that cover selected liquid food industries, through to the solution of industry-inspired problems. Students will have to identify the information that can be gathered from the literature, the information that they need to obtain experimentally, and the information that the instructor needs to provide them with. Students will calculate mass balances around the entire processes, portions of the processes and individual unit operations. Food engineering principles learned in FDST 4011/6011 will be applied along with the description of selected technologies, pieces of equipment, and the most relevant quality tests for each of the selected liquid foods. Lectures will be delivered Mondays and Wednesdays from 10:10 to 11:00 AM.

Overall Learning Outcomes: Upon successful completion of this course students should have the ability to:

- Recognize the main processes and unit operations involved in liquid food processing
- Name the pieces of equipment used for processing liquid foods
- List and recognize the most commonly used instrumentation used in the processing of liquid foods
- State the order of magnitude of liquid food processing operations
 - a. Rate of usage of raw materials
 - b. Flow rates of main streams
 - c. Daily and annual production
- Describe the main unit operations involved in the following processes
 - a. Fruit juices and concentrates, nectars and fruit beverages
 - b. Carbonated beverages
 - c. Milk
 - d. Vegetable oil
 - e. Sauces and soups
- Describe proper industrial sanitation and CIP of liquid food processing pipes and equipment
- Analyze the major food processing operations
 - a. Draw process flow diagrams
 - b. Interpret pipe and instrumentation diagrams
- Solve mass balances in the absence of chemical or biochemical reactions
- Solve basic energy balances associated to food refrigeration and thermal processing of foods
- Examine the main factors affecting food processing operations
 - a. Raw material variability
 - b. Effects of processing on the physical, chemical and organoleptic properties of foods
 - c. Effects of processing on enzymes and microorganisms
- Critically formulate and solve problems associated with liquid food processing
- Assess the impact of modifying processing conditions on the quality of liquid foods
- Compare different processes and propose improvements to processing liquid foods

Summary of Lecture Topics

1. Fruit juice processing
 - a. Extraction and size reduction
 - b. Finishing
 - c. Clarification
 - d. Enzyme inactivation
 - e. Concentration
 - f. Storage
 - g. Packaging (carton, polymer bottles, aseptic packaging)
2. Carbonated beverages
 - a. Water treatment and quality
 - b. HFCS production and use
 - c. Sugar dissolution
 - d. Syrup production
 - e. Flavor mixing
 - f. Carbonation
 - g. Packaging (aluminum cans)
3. Milk
 - a. Raw milk transportation and storage
 - b. Skimming
 - c. Homogenization
 - d. Pasteurization
 - e. Packaging (carton, glass, bags, jugs)
4. Sauces and Soups
 - a. Mixing
 - b. Packaging (Canning, metal and plastic pouches)
 - c. Sterilization
5. Special topics (complex liquids)
 - a. Ketchup
 - b. Mayonnaise
 - c. Fruit pulps and pastes

Course Prerequisites: FDST 4011/6011-4011L/6011L or permission of department.

Textbook: Singh R.P. and Heldman D.R. (2014) *Introduction to Food Engineering*, 5th Edition, Academic Press, New York.

Note: *The textbook will be used mostly as a reference, for reading assignments, and for some exercises. Other reading material will be provided by the instructor and posted on the eLC.*

Attendance: Attendance at the lecture is not required, but most of the testing will be based on class lectures. In-class graded discussions will be given on random days to students who attend class. Quizzes will be given each Tuesday. Students not present in class and therefore, not turning in class discussions or quizzes will automatically be given a "0" grade unless they provide written medical justification or other reasonable justification and e-mail the instructor prior to class. In that case, a make-up assignment will be given.

Teams: Teams of three or occasionally four members will be formed. Once a team has been formed, during the first laboratory section, it **cannot be changed** for the remainder of the semester. Some semesters, the instructor will assign teams and some semesters the instructors will allow teams to be formed by students. Working in imbalanced teams (teams were some work more than others or with talents that are not necessarily complementary) is a part of professional life.

Use of electronic devices: Use of cell phones or other similar devices is not allowed in class and must be turned off. Any particular exception to this must be discussed ahead of time with the instructor. Texting, e-mailing, facebooking, instagramming, tweeting, internet browsing, etc. during a lecture is not allowed unless directed by the instructor. Recording of lectures is not permitted.

Assignments: All completed assignments should be uploaded via eLearning Commons. These assignments will be read, graded, and returned with comments to students. It is your responsibility to get the assignments and turn them in online.

Make-up tests: Make-up tests will be given for students who present an acceptable excuse accompanied with written documentation. The make-up test will differ from the regularly scheduled test but will be in the same format.

Grades: There will be two mid-term exams and a final exam. Test one will cover the material presented in Lectures 1-10, test two will cover material presented in Lectures 11-20, while the final exam will include lectures 21-30 plus a comprehensive test of the entire course. In addition to material covered in lectures, tests will have questions related to reading and other assignments not covered during lectures in class. A practice test will be prepared for you to familiarize you with the test format and the degree of difficulty of the questions. On Tuesdays there will be 15-min quizzes on reading assignments and material covered in lectures prior to the quiz. Only the quizzes given on the **third** Tuesday of the month will be graded. Extra credit opportunities associated to class participation or other activities will be given at the instructor discretion. Anyone with an average of 90 or higher on the two tests (and has completed all the assignments) will be allowed to only take the part corresponding to Lectures 21-30 in the final.

The final grade will be determined as follows:

Test One	15 %
Test Two	15 %
Final Exam	25 %
Quizzes	10 %
Laboratory Reports	30 %
Participation in Class*	5 %
Total	100 %

*Only regular undergraduate students are graded on participation. Graduate and honors students will have an extra assignment.

A	A-	B+	B	B-	C+	C	C-	D	F
94 - 100	90 - 93	87 - 89	84 - 86	80 - 83	77 - 79	74 - 76	70 - 73	65 - 69	0-64

The grading scale is set. There will be no “curving” of grades at the end of the semester.

Final Exam will be on Thursday May 4, 3:30 - 6:30.

Extra assignment for Honor and Graduate Students: Prepare and present a 12-min lecture on the processing of a liquid food assigned by the instructor. Write a four-page narrative of the lecture. The grade of this assignment will account for 5% of the final grade in lieu of the participation grade

The content of the lecture and written report must include:

- 1) Production of the raw agricultural commodities/ingredients worldwide and in the US as pertaining to the processing of the selected food by location or climate (1 slide)
- 2) Domestic and international Scale of production of the product in question (1 slide)
- 3) Overall composition of the product, highlighting the main components (1-3 slides depending on the complexity of the product)
- 4) Block diagram of the process highlighting the unit operations that are unique to that process or that have not been covered in class and with an overall mass balance of the process as indicated with flow rates (1 slide)
- 5) Detailed description of the unit operations that are unique to that process or that have not been covered in class (1- 2 slides)
- 6) Quality parameters that are measured and how they are measured (1-4 slides. The level of detail here should depend on the type of quality control test)

Graduate students will have exam questions that require higher level of critical thinking and mathematics skills.