BE 4340: Food and Bioprocess Engineering -- Design Elective Course

Course catalog description: none, **Prerequisites**: N/A
Meeting Schedule: Lecture 9:40-10:30 am M/W/F 115 E. B. Doran Bldg.
Lab 1:40-4:30 Thursday 140 Ag Metal Bldg.

Text Books (not required):
Geankoplis, C. J. Transport Processes and Unit Operations. Third Edition. Prentice Hall, Englewood Cliffs, NJ. 1993.
Singh, R. P. and D. R. Heldman. Introduction to food engineering Third Edition. Academic Press. Orlando, Fl. 2001.
Smith, P. G. Introduction to Food Process Engineering. Kluwer Academic, New York, NY. 2003.

Instructor: Dorin Boldor, PhD E-mail: dboldor@agcenter.lsu.edu
Phone: 225 578 7762 175 EB Doran Bldg.
Office Hours: M: 8:30 – 9:30 pm (or by appointment)

Teaching Assistant: Pranjali Muley, 101 EB Doran Bldg., E-mail: pmuley1@tigers.lsu.edu;
Office Hours: TBA

Course Objectives and Learning Outcomes:
The course covers the application of laws of conservation of mass and energy to various bioprocesses. The four major preservation methods (evaporation, refrigeration, freezing, and dehydration) will be presented and discussed, along with membrane filtration. The specific objectives of the course are to:

1. Apply the laws of conservation of mass and energy to various bioprocesses
2. Evaluate the effectiveness of different types of heat exchangers
3. Compute the heating requirements in single and multiple-effect evaporators
4. Compute refrigerant requirements for freezing and storage (using pressure-enthalpy tables)
5. Predict freezing times of products with simple geometrical shapes
6. Use a psychrometric chart in designing and evaluating drying and evaporation processes
7. Predict drying times during food dehydration

Web Page: A course web page will be made available through LSU's Moodle to enhance the course contents. Students are requested to visit this web site on a regular basis. The course web site contains the course syllabus, the lecture schedule, lecture notes, and review materials. Class notes will be posted on-line before each lecture.

Course Policies

- Each student will undertake an individual project, consisting of a review of a paper and the design, preparation, and completion of a laboratory related to the topics covered in class. Each student will have the opportunity to present their project results in front of the class at the end of the semester.
- Working individually on the homework is strongly encouraged. Homework is due at the beginning of class on the due date. Homework assignments turned in late will not be accepted and will be assigned a grade of zero.
- **Exams** will be divided into open book and closed book sections.
- **Examinations** and **labs** missed due to an unexcused absence cannot be made up and a grade zero will be given for each one missed.
- Any student requiring **special arrangements** for taking exams, taking-notes and other special arrangements please see or contact the instructor within the first two weeks of class.

Academic Integrity and Academic Misconduct
Students are expected to comply with the Code of Student Conduct at all times throughout this course. For your information, the Code of Student Conduct can be found at
http://appl003.lsu.edu/slas/dos.nsf/$Content/Code+of+Conduct?OpenDocument

Grading policy: Grades will be determined based on the following break down:
Exam 1: 25 % Final exam: 35 % Homework and labs: 25 %
Design Project Report and presentation: 15 %

Grade Assignments: A: > 90 B: 80-89.9 C: 70-79.9 D: 60-69.9 F:< 60

Topics:

1. Evaporation (5 lectures): Boiling point elevation, types of evaporators, design of a single-effect evaporator and a multiple-effect evaporator, vapor recompression systems.
2. Refrigeration (4 lectures): Selection of a refrigerant, pressure-enthalpy charts, components of a refrigeration system, mathematical expressions useful in analysis of vapor-compression refrigeration.
3. Membrane filtration (2 lectures)
4. Freezing (5 lectures): Freezing systems, frozen food properties, freezing time.
5. Dehydration (6 lectures): Psychrometrics, basic drying processes, dehydration systems, dehydration system design, drying time predictions.

LECTURE SCHEDULE (tentative):

Week of		Topic
January	18	Introduction to the course
		Lab: Safety in a Processing Lab
	25	Evaporation
		Lab: Data logging
February	1	Evaporation
		Lab Evaporation
	8	Evaporation and Refrigeration (guest lecturer)
		Lab Evaporation Problem Session
	15	MARDI GRAS holiday, no classes, no lab
		Lab Refrigeration
	22	Membrane Filtration (guest lecturer)
		Lab Refrigeration Problem Session
March	1	Refrigeration (guest lecturer)
		Lab Field Trip
	8	Refrigeration and Midterm Review
		Lab: MIDTERM March 11th
	15	Freezing
		Lab Freezing
	22	Freezing
		Lab Freezing Problem Session
	29	Freezing and Dehydration
		Lab Field Trip
April	5	SPRING BREAK, no classes, no lab
		No lab this week
	12	Dehydration
		Lab Dehydration
	19	Dehydration
		Lab Dehydration Problem Session
	26	TBA
		Lab Paper Presentations
May	3	Dehydration and Review for Final
		Lab Design presentations
	10	***Final MAY 14 10:00 AM - NOON***