

FOS 6455C
Industrial Food Fermentations
3 Credits, Fall 2014
Proposed Course Syllabus

Course Instructors and Office Hours

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Gayathri Balakrishnan

FSHN Doctoral Candidate and Supervised Teacher

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Dr. Goodrich Schneider will be responsible for overall coordination and administration of the course, as well as instructional duties. She will be assisted by Ms. Gayathri Balakrishnan for lab/demo set up, as well as Mr. Lemâne Delva who will have the role of Supervised Teacher for this course. Additionally, the specialized expertise of the members of FSHN and other faculty will be utilized in the form of guest lectures, laboratory exercises and/or discussions; see syllabus for tentative dates/topics.

Official Time/Location:

- ☐ M W F: Period 3 (9:35am – 10:25am) FSN 362. We will be meeting in the 3rd floor conference room for better Polycomm utility. Graduate students at the Citrus Research and Education Center (CREC) should call into the FSHN Polycomm approximately 5-10 minutes prior to class.

- ☐ M: Period 4 (10:40am – 11:30am) FSN 130 (FSHN Pilot Plant) and Teaching Lab as directed. The laboratory aspect of this class will be a combination of hand-on experiments, demonstrations, taste panels and field trips. There will generally be NO lab exercise if a lecture is scheduled for Monday period 3 per the syllabus. Due to the nature of food fermentations, demos and trips, there will be occasional events that will not fit into the official time/locations noted. Every effort will be made to accommodate individual schedules.

Course Objectives

The overall objective of the course is to provide graduate-level knowledge, theory and practice for a variety of commercially-important fermented food products and ingredients, from a technical perspective. There will be an interdisciplinary emphasis upon safety, regulatory, nutritional, microbiological and economic considerations of processes which add value to and/or reduce waste from agricultural commodities and natural resources.

Prerequisites

The prerequisite course is FOS 4222 or an equivalent course in food microbiology, or permission of instructor. All students must be 21 years of age or older by the first day of class (8/25/14).

Course Format

Students will acquire knowledge of the microbiological, chemical and physical aspects of food industry fermentations through the use of lectures, discussions, laboratory exercises/demonstrations and assignments.

Textbook and References

The required text, containing the basis for the course material, will be available at the UF Bookstores. It will also be on reserve at the Marston Science Library under FOS 6455C and will be made available for 2-hr use, along with other additional resources, in Room 329, FSHN Building. An updated syllabus, lectures and supplemental material will be posted on the UF eLearning site: <https://lss.at.ufl.edu/>

We will be utilizing the Canvas platform primarily as an archive of class lectures, supplemental material and exercises.

Required Text:

Hutkins, R. 2006. Microbiology and Technology of Fermented Foods. Blackwell Publishing, Ames, IA.

Additional Text Resource:

Hui, Y.H. et al. 2004. Handbook of Food and Beverage Fermentation Technology. Marcel Dekker, Inc., New York, NY.

Grading

- Exams (4) 65%

These exams will each cover approximately ¼ of the course material and be equally weighted for each quarter. Exam 4 will also have a section with your choice of 1 of 2 questions that cover the entire course, which will increase the number of points for which Exam 4 is worth.

- Assignments/Lab Exercises 35%

Assignments/exercises represent a significant part of the course grade, and their successful completion is critical. One of these assignments will be a term paper, in the form of a scientific review paper on a particular topic relevant to commercial fermented foods, beverages or food ingredients. Please adhere to stated deadlines for maximum credit.

Course Average Grade Equivalents:

90 - 100 A
87 - 89 B+
80 - 86 B
77 - 79 C+
70 - 76 C
67 - 69 D+
60 - 66 D

This course will not be graded on a curve, and will not utilize minus grades. Please see <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html> for official University of Florida grading policies.

Course Outline

Week 1

8/25/14: Review of syllabus and course objectives: Lecture: History and overview of food fermentations (Hutkins, Chap. 1)
8/27/14: Lecture: Review of fermentation microbiology and biochemistry (Hutkins, Chap. 2); Assignment 1 handed out
8/29/14: Lecture: Culturing techniques, starter cultures, growth (Hutkins, Chap. 3) (Dr. Keith Schneider, keiths29@ufl.edu)

Week 2

9/1/14: No class – UF Holiday
9/3/14: Lecture: Fermented soy products (Hutkins, Chap. 12); Assignment 1 due
9/5/14: Lecture: Fermented soy products (con't)

Week 3

9/8/14: Lab: Tempeh production; Discussion/tasting of soy-based products (Ms. G. Balakrishnan)

- 9/10/14: Lecture: Cereal fermentations – yeast-leavened products, sour dough bread (Hutkins, Chap. 8)
 9/12/14: Lecture: Bakery products – commercial production, preservatives, packaging, QC and sanitation

Week 4

- 9/15/14: Lecture: Fermentation technology: unit operations and processing equipment
 9/17/14: Exam 1 (50 minutes, closed book)
 9/19/14: Lecture: Biogenic amines; the toxicology of fermented foods and EtOH (GB)

Week 5

- 9/22/14: Lecture: Vinegar production and *Acetobacter* (Hutkins, Chap. 11)
 9/24/14: Lecture: Fermented vegetable products – an overview (Hutkins, Chap. 7)
 9/26/14: Fermented vegetables (con't.); Begin Assignment 2 (review paper)

Week 6

- 9/29/14: Mini-lecture: Review papers and scientific presentations; Assignment 3: Coffee bean/cacao bean fermentation and flavor development (joint lab with Dr. Sarnoski)
 10/1/14: Lecture: Coffee and chocolate fermentations; Lecture: Tea “fermentation”
 10/3/14: Product Demo and Tasting: Fermented vegetable products – a world tour

Week 7

- 10/6/14: Lecture: Fermented meat products – introduction (Hutkins, Chap. 6); Turn in term paper topic for approval (optional)
 10/8/14: Lab 2: Sausage production and demonstration (Animal Sciences Meat Laboratory, Dr. Sally Williams and Mr. Larry Eubanks) – 9:35-11:35am
 10/10/14: No formal lecture; sample fermented meat products, receive report directions for Lab 2 (fermented meat products)

Week 8

- 10/13/14: Lab 1 – continue work on flavor development through fermentation project; receive lab report directions for Lab 1.
 10/15/14: Lecture: Fermented fish products (Hutkins, Chap. 12)
 10/17/14: No Class: UF Homecoming; Lab 2 write-up due (fermented meat products)

Week 9

- 10/20/14: Exam 2 (50 minutes, closed book)
 10/22/14: Lecture: Milk and dairy product chemistry and processing – A review
 10/24/14: Lecture: Introduction to dairy fermentations – cultured products (Hutkins, Chap. 4)

Week 10

- 10/27/14: Lecture: Cultured dairy products (con't.); Lab: Cultured dairy products---Begin yogurt/kefir lab (Lab 3) (GB)
 10/29/14: Lecture: Probiotics and use in commercial food products
 10/31/14: Demo: Lab product assessment and product demo (GB)

Week 11

- 11/3/14: Lecture: Cheese – Overview and Principles (Hutkins, Chap. 5)
 11/5/14: Lecture: Types of cheeses; Lab 3 due
 11/7/14: Lecture: Cheese manufacturing, sanitation and regulation

Week 12

- 11/10/14: Lab 4: Production of cheese
 11/12/14: Demo: Cheese evaluation
 11/14/14: Lecture: Microbial processes for ingredient production - Whey protein isolate, vitamins, amino acids, enzymes

Week 13

- 11/17/14: Lecture: Food processing equipment in the fermentation industries
 11/19/14: Lecture: Beer production and microbiology; Lab 4 due (Hutkins, Chap. 9)
 11/21/14: Lecture: Beer and brewing (con't.)

Week 14

- 11/24/14: Exam 3 (75 minutes, closed book); brewed product demo (Pilot Plant)
 11/26/14: No Lecture – UF Holiday; Draft of term paper due for instructor review and comment (optional but highly recommended; please submit electronically)
 11/28/14: No Lecture – UF Holiday

Week 15

- 12/1/14: Lecture: Wine and winemaking – history and economics (Hutkins, Chap. 10), Dr. Charles Sims (csims@ufl.edu)
 12/3/14: Lecture: Wine and winemaking – technology and analysis (CS)
 12/5/14: Product Demo: Wine analysis; sensory aspects of wine assessment (no report due)

Week 16

- 12/8/14: Lecture: Biotechnology, GMOs and ingredient production (KS)
 12/10/14: Last day of classes; Lecture: Biofuels and cellulose-based fermentations; Course review
 12/12/14: Reading day

Week 17

- 12/15/14: Assignment 2 due (Term Paper)
 12/18/14: Final Exam (Exam 4): 10:00am to 12:00pm, FSN 362; 2 hours, closed book

Information for All Students

Age restrictions:

Due to the nature of the products produced and evaluated in this course, all students must be 21 years of age or older at the time of the first class (8/22/12). Registration in this course serves as pledge by student that they meet this requirement.

Academic Honesty:

In the process of enrolling and registering for classes at the University of Florida, every student has signed and presumably understands the following statement:

“I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.”

The following information is implicit in all exams and assignments:

“On my honor, I have neither given nor received unauthorized aid on this exam/assignment.”

Use of Library, Personal References, PC Programs, and Electronic Data Bases:

These items are university property and should be utilized with other users in mind. Never remove, mark, modify nor deface resources that do not belong to you. If you're in the habit of underlining text, do it only on your personal copy. It is inconsiderate, costly to others, and dishonest to use common references otherwise.

Software Use:

All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

Disability Issues:

Students requesting classroom accommodation should register with the Dean of Students Office, who will then provide necessary documentation to the student. Please provide this documentation to the Instructor when requesting accommodation.

UF Counseling Services:

I hope to establish an effective and professional class relationship and encourage dialog so that students feel comfortable discussing academic problems directly with me. In addition, resources are available on-campus for students having personal problems or lacking clear career and academic goals that interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling;
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling;

3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual counseling; and
4. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.