

## Food Microbiology (11 :400 :423)

Spring Semester, TOTAL 3 CREDITS

Lectures - 3 credits, 80 min session, twice a week, total of 28 sessions

**Prerequisites:** General Microbiology

### **Objective:**

This course is designed to give students an understanding of the role of microorganisms in food processing and preservation; relation of microorganisms to food spoilage, foodborne illness and intoxication, general food quality, and role of microorganisms in health promotion.

### **Students completing this course should be able to:**

1. understand the factors and predict microorganisms, which can cause food spoilage;
2. understand the causes of foodborne diseases and their etiology;
3. evaluate the measures required to control undesired microorganisms in food;
4. understand the role of microorganisms in food processing, preservation and safety, and the possible health benefits from the consumption of health-promoting microorganisms or products derived from their fermentation.

### **Student Evaluation:**

**Quizzes** will be given to provide students feedback on their course performance and to prepare them for the exams. Quizzes will be arranged in a form of multiple-choice test and will cover material presented in previous lectures and reading, assigned for the day of the quiz.

**Two exams** will test students' knowledge and their ability to independently make decisions and solve problems using the knowledge obtained during the course of study.

Students may request re-evaluation of exam or quiz scores within 2 weeks of receiving a grade. No grades will be changed after two weeks. Students are required to follow the **ACADEMIC INTEGRITY RULES:**

#### **ACADEMIC INTEGRITY**

All exams, quizzes, and short written assignments should represent student's exclusive effort. Books and reference material may be consulted for the exam, but students may not discuss exam questions, work together on the exam, or receive any other assistance. Do not copy material from books or Internet directly to answer a question.

Any work of the student should be original effort of a scholar, based on reading, digestion, and synthesis of primary literature. Failure to indicate direct quotes, inadequately citing others work, and presentation of another's work as one's own are all varying degrees of plagiarism, the theft of intellectual property. Plagiarism and other ethical breeches are not tolerated at Rutgers University. Students should consult and be familiar with the full policy on academic integrity published in the Graduate School Handbook. Should the student have any doubts about understanding of the distinctions therein, *it is strongly advised* to see the course co-ordinator for explanations and clarification. Academic dishonesty will be severely penalized, with punishment up to and including dismissal from Rutgers University.

**Expectations:**

Students are expected to attend all lectures and to prepare for lectures ahead of time by consulting food microbiology textbooks and the lectures materials. They are also expected to actively participate in class discussions and to ask questions in class, to complete and turn in assignments on time and to notify in advance about their possible absence.

The lectures and activities in this course are designed to help students learn the basic principles of food microbiology, to solve problems, and to report clearly and concisely their knowledge in both an oral and written format.

Final course grade will be based on:	Approximate grading cut-offs:
	90-100 A = outstanding, does it all
Mid-term Exam 30%	85-89 B+
End of Term Exam 35%	80-84 B = excellent in most areas
Quizzes and assignments 20%	75-79 C+
Lab course 15%	70-74 C = satisfactory factual knowledge
	< 70 F = unsatisfactory

**Textbook and references:**

Students are expected to learn a significant amount of information on their own by reading. There is no required text for this course. Any textbooks on food microbiology may be used as references. The suggested textbooks are:

1. Food Microbiology. Fundamentals and Frontiers. M.P. Doyle, L.R. Beuchat and T.J. Montville, eds., ASM Press, Washington, DC. 1997 (or 2001).
2. Modern Food Microbiology. Seventh Edition. J.M. Jay. Aspen Publishers, Inc., Gaithersburg, Maryland 2005.
3. Fundamental Food Microbiology. Second Edition. Third Edition. B. Ray. CRC Press 2005.
4. Food Microbiology: An Introduction. T.J. Montville and K.R. Matthews (any edition) ASM Press, Washington, DC.

**Communication:**

Students are encouraged to feel free to ask questions and to express any concerns that they may have. Should they like to talk with the course co-ordinator or a teaching professor outside of class, an appointment can be set up. Students can talk to the professor before or after class, send an email, or stop by the professors' offices. If the student stops by without an appointment, s/he should understand that the professor may have other commitments and may not be able to talk at that time.

Faculty:

Dr. Michael Chikindas\*

732-932-9611 ext. 218

\*Course coordinator; please address administrative issues to him.

E-mail at: [tchikindas@aesop.rutgers.edu](mailto:tchikindas@aesop.rutgers.edu)



## SCHEDULE

Food Microbiology, Spring 2011  
Tuesday and Thursday 2:15 – 3:35  
Food Science, Room 101

Session	Professor	Topic
1. Tu 1/18	Chikindas	Introduction. History of Food Microbiology. Sampling and Determination of Microorganisms in Food.
2. Th 1/20	Chikindas	Classification of Food-Associated Microorganisms. Factors Affecting Microbial Growth.
3. Tu 1/25	Chikindas	Microorganisms Involved in Fermentation: Dairy.
4. Th 1/27	Chikindas	Microorganisms Involved in Fermentation: Meat and Vegetables.
5. Tu 2/1	Chikindas	Probiotics: Health-Promoting Microorganisms.
6. Th 2/3	Chikindas	Food Spoilage Microorganisms. <b>Quiz #1 (Sessions 1-5).</b>
7. Tu 2/8	Chikindas	Introduction into Foodborne Pathogens. Gram-Positive and Gram-Negative Organisms, Infections, Toxins and Non-Living Forms
8. Th 2/10	Chikindas	Foodborne illness: Infections - Salmonella, Shigella and Campylobacter.
9. Tu 2/15	Chikindas	Foodborne illness: Infections - <i>Escherichia coli</i> and <i>Listeria monocytogenes</i> .
10. Th 2/17	Chikindas	Foodborne illness: Infections Caused by Non-Living Forms - Viruses and Prions.
11. Tu 2/22	Chikindas	Foodborne illness: Intoxications - <i>Staphylococcus aureus</i> , <i>Clostridium botulinum</i> , <i>Bacillus cereus</i> . <b>Quiz #2 (Sessions 6-10).</b>
12. Th 2/24	Chikindas	Foodborne illness: Intoxications - Molds and Mycotoxins and Seafood Toxins.
13. Tu 3/1	Chikindas	Emerging Foodborne Pathogens and Topics of Current Interest. <b>Semi - Final Exam (Sessions 1-12).</b>
14. Th 3/3	Chikindas	Control of Microorganisms in Food - Physical Removal and Sanitation.
15. Tu 3/8	Chikindas	Control of Microorganisms in Food - High and Low Temperature. Death Kinetics.
16. Th 3/10	Chikindas	Low Water Activity and Preservation by Drying.
17. Tu 3/22	Chikindas	Physical Methods of Food Preservation: Radiation, High Pressure, Pulsed Electric Field, Light and Modified Atmosphere
18. Th 3/24	Chikindas	Chemical Preservatives.
19. Tu 3/29	Chikindas	Food Preservatives of Natural Origin – Bacteriocins and Bacteriophages.
20. Th 3/31	Chikindas	Bacterial Stress Response Factors as a Hurdle for Food Preservation. <b>Quiz #3 (Sessions 14-19).</b>
21. Tu 4/5	Chikindas	Hurdle Technology as Innovative Approach in Food Preservation.
22. Th 4/7	Chikindas	Genetically-Modified Foods - Reality and Concerns. <b>Home Assignment.</b>
23. Tu 4/12	Matthews	Food Safety Management Tools: HACCP, SSOP, GMP, GHP, TQM and ISO 9000 Standards.
24. Th 4/14	Chikindas	In-Class Presentation and Work on Home Assignment.
25. Tu 4/19	Chikindas	Food Processing by the Enzymes of Microbial Origin. <b>Home Assignment.</b>
26. Th 4/21	Chikindas	In-Class Presentations.
27. Tu 4/26	Chikindas	In-Class Evaluations and Topics of Current Interest.
28. Th 4/28	Chikindas	In-Class Presentations.
29. Th 5/3		<b>Final Exam.</b>