SYLLABUS

Advanced Food Microbiology

Food Science and Technology/ Microbiology 736

Fall 2013

Aug 21-Oct 10

Time: TBA

Parker Bld. Rm 118

Instructor: Hua Wang

219 Parker Food Science and Tech. Bld.

292-0579 (phone)

wang.707@osu.edu (e-mail)

Office Hour: By appointment, Parker Bld Rm 219

Pre-requisites: Micro 509 (General Microbiology), Micro/FSc&Te 636 (Food Microbiology) or equivalent, or permission from the instructor.

Course description: The study of food microbiology involves three major components: foods, microorganisms and hosts. This advanced food microbiology course is designed to help students to build a comprehensive understanding about food-borne microorganisms through studying their interactions with the environment and with the host. Discussions will be focused on critical pathways and mechanisms for microorganisms to survive the environment. Their implication to human health will be addressed. Microorganisms and topics of industrial significance will be emphasized. Genetics and molecular biology approaches important for studying food-borne microorganisms and cutting edge techniques in solving industrial food microbial problems will be introduced. The course is offered in the forms of 1) lecturing by the faculty, 2) discussion and research paper presentations by the students. The class meets twice a week, 78 minutes for each session.

Objectives:

Students will establish knowledge background and develop problem solving skills in the following areas:

1. proteolytic enzyme system which enable microorganisms to utilize exogenous nutrients, such as those involved in food fermentation;
2. the microbial signals and sensing systems in bacteriosin production, stress responses and biofilm development;
3. the impact of microbial stress responses on food safety;
4. biofilms as the abundant microbial form of living in both natural and host environment;
5. toxins and other pathogenic pathways that cause foodborne diseases;
6. disease as a result of interaction between pathogenic agents and the host;
7. food as an important carrier for toxins and foodborne microorganisms, the effects of food ingredients on microbial activities and host responses;
8. application of cutting-edge molecular biology techniques to solve food industry problems and to promote human health.

Reading Materials:

Research papers covering lecture topics given in the classroom.

Additional references:

Jaykus L, H.H. Wang, and L.S. Schlesinger 2009. **Foodborne Microbes: Shaping the Host Ecosystems**. ASM Press, Washington, D.C.

Doyle, M.P., L.R. Beuchat, and T.J.Montville (eds). 2001. **Food microbiology, fundamentals and frontiers**. 2nd Ed. ASM Press, Washington, D.C.

Ray, B. 2001. Fundamental Food Microbiology. CRC Press, Boca Raton, FL.

Lewin, B. 2000**. Genes VII**. Oxford University Press, New York and Cell Press, Cambridge, Mass.

Cotran, R.S., Kumar, Vinay, and Collins, T. 1996. **Robbins pathologic basis of disease.** W.B. Sounders Company, Philadelphia, Pennsylvania.

Salminen, S. and von Wright, A. (ed.) 1998. **Lactic acid bacteria: microbiology and functional aspects.** Marcel Dekker, New York.

van Eden, W., Young, D.B. (ed.) 1996. **Stress proteins in medicine.** Marcel Dekker, New York.

Blasheck H., Wang H., Alge, M. (e.d), 2007. **Biofilms in the food environment**. Blackwell Publishing, Iowa.

Useful molecular biology laboratory technique manuals:

Molecular cloning: a laboratory manual, second edition. 1989. J. Sambrook, E.F. Fritsch, and T. Maniatis. Cold Spring Harbor Laboratory Press, Plainview, NY.

Current protocols: molecular biology (http://www.currentprotocols.com/)

Grading Criteria:

Participation	100
Homework assignments (three projects)	300
Classroom presentation (three discussions)	300
Mid-term exam	150
Final:	150
Total:	1000

Grades will be assigned by the percentage of the total points earned:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
below 60%	E

The instructor reserves the right to adjust the grading curve if necessary.

Attendance and make-up exams:

Attendance to lectures is encouraged. Students are responsible for all materials covered and announcements made during lecture. No incomplete grades or make-up exam or presentations will be given unless there is a certifiable reason such as illness, family death, etc.

Academic Misconduct:

Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. Academic dishonesty includes, but is not limited to, cheating, plagiarism, fabrication of information or citations, facilitating acts of academic dishonesty by others, unauthorized prior possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. At the beginning of each course it is the responsibility of the instructor to provide a statement clarifying the application of academic integrity to that course. Any suspected violation of the Code of Student Conduct will be forwarded to the Committee on Academic Misconduct.

7536 Tentative Lecture Schedule
Fall, 2013
T, R, FSc Room

Week One	
Aug 22 (R)	Course Introduction – food-borne microorganisms: interactions with the environment and host; Taking advantage of the nutrient environment (I): the proteolytic system of LAB
Week Two	
Aug 27 (T)	Plasmid-encoded traits: carbohydrate fermentation; bacterial phage resistance
Aug 29 (R)	Inhibition to the competitors: bacteriocin production; Horizontal gene transfer Homework#1: probiotics; antimicrobial resistance; phage
Week Three	
Sept 3 (T)	Discussion 1: Probiotics Adapting to the environment: stress responses;
Sept 5 (R)	Forming a microbial community: biofilms and cell-cell communication Biofilm model system (I &II)
Week Four	
Sept 10 (T)	Mid-term Homework #2 quorum sensing, biofilms
Sept 12 (R)	Biofilms; host microbiota; interaction with the host; pathogenecity
Week Five	
Sept 17 (T)	Discussion 2-student presentation
Sept 19 (R)	Pathogenecity: *Listeria monocytogenes;* Shiga Toxin Homework #3Pathogenecity
Week Six	
Sept 24 (T)	Foodborne viruses
Sept 26 (R)	Pathogenecity: Salmonella, Campylobacter
Week Seven	
Oct 1 (T)	Discussion #3 Pathogenecity (student presentation)
Oct 3 (R)	Research methods: microbial detection; proteomic and genomic approaches; summary
Week Eight	
Oct 9 or 10	Final