

**Advanced Food Microbiology (3 cr)**  
**FS532 (WSU & UI)**  
**Spring Semester, 2016**

**INSTRUCTOR:**

Dr. Meijun Zhu, Rm 232, Food Science and Human Nutrition Building;

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**DAY AND TIME:** T, Th, 2:50 - 4:05 pm

**LOCATION:** FSHN104A

**OFFICE HOURS:**

- M 1:00 - 3:00 pm or by appointment
- Location: FSHN 232

**COURSE PREREQUISITES:**

This is a graduate level course which builds on undergraduate coursework in Biology, Microbiology and Biochemistry. One course (3 credits or more) related to microbiology is recommended and could include courses such as MBioS 305 General Microbiology and/or FS 416 Food Microbiology.

**CLASS FORMAT:**

In-class lectures, guest lectures, paper discussion, and student projects

**NO TEXTBOOK IS REQUIRED**

**READING MATERIALS:**

- PowerPoint lecture notes
- Research papers handed out in the class.

**COURSE OBJECTIVES:**

1. To build a comprehensive understanding about foodborne pathogens regarding their prevalence and virulence, interactions with the environment and the host.
2. To learn molecular biology and other cutting-edge techniques to detect and identify microorganisms associated with foods.
3. To explore bacterial signaling and their possible roles in biofilm formation and pathogenesis of foodborne pathogens.
4. To critically read and communicate on current literatures of foodborne pathogens.

**STUDENT LEARNING OUTCOMES:**

1. After this course, the student will have a comprehensive understanding about virulence and pathogenesis of foodborne pathogens and their interaction with environment and the host, as well as applications of knowledge in food industry and implications to human health.
2. Understand the principles behind advanced techniques and develop the basic skills to apply these techniques to solve food industry problems as well as research questions.
3. Have a broad and in depth knowledge about the current literatures on foodborne pathogens.
4. Locate, critically evaluate, and apply scholarly literature and other scientific information to design experiments and solve problems in food microbiology and foodborne pathogens and related disciplines.

**COURSE REQUIREMENTS AND EXPECTATIONS:**

Attendance is essential to your success in this class. Therefore, students are expected to attend all classes. Excused absences include university-sanctioned events, illness and family emergencies. Students should become engaged in interactive learning processes, participate in classroom discussions, and ask questions when a particular topic or point is unclear. Appropriate professional behavior demonstrating respect for fellow students and instructor is expected.

**EXAMS, ASSIGNMENTS AND GRADING:**

1. Course assignments and points:

|                            |     |
|----------------------------|-----|
| Mid-term exam              | 100 |
| Final exam                 | 100 |
| Paper discussion           | 60  |
| Final project/review paper | 100 |
| Student presentation       | 60  |
| Attendance/participation   | 40  |
| <hr/>                      |     |
| TOTAL POINTS               | 460 |

2. Grade scale

| <u>Grade</u> | <u>% of Total Points</u> |
|--------------|--------------------------|
| A            | ≥90.0                    |
| A-           | 88.0 - 89.9              |
| B+           | 85.0 – 87.9              |
| B            | 82.0 - 84.9              |
| B-           | 80.0 - 81.9              |
| C+           | 77.0 - 79.9              |
| C            | 72.0 - 76.9              |
| C-           | 70.0 - 71.9              |
| D+           | 67.0 - 69.9              |
| D            | 60.0 - 66.9              |

3. Exams will cover material discussed in classes.
  - A university approved absence must be presented to the instructor prior to missing any written exam. Possibilities for a make-up exam will be discussed as problems arise.
  - Dictionaries, cell phones, computers, ipods, or ANY other electronic equipment cannot be used, played, or consulted during examinations.
4. On selected dates, students and the instructor will discuss the assigned research papers. The individual student will be assigned to lead the paper discussion. Understanding information of discussed papers will be required for examination purposes.
5. Students will be required to write a review paper on selected topics with minimum 4 single-spaced, 12 font Times and New Roman, 1-inch margin pages. References will be not included in page counts. With a minimum of 10 and maximum of 30 references. Please format your paper in “*International Journal of Food Microbiology*” style. Toward the end of semester, you will give a 20 min presentation based on the review paper.
  - The topic can be selected based on students’ research area and/or interests. It could focus on a particular pathogen, selected virulence factors, bacterial signaling involved in pathogenesis, or novel detection methods.
  - Graduate students are also welcome to link the review paper to their own research projects.
  - Once you select your paper topic you want to write, submit or discuss the topic with the instructor. The due date for the topic: March 10, 2016.
  - Due date for the review paper: April 19, 2016.
  - Each student’s paper will be graded for both technical and written quality.
  - Please submit your paper as a Word document electronically via email before or on the due date.
6. Paper discussion and final presentations will be evaluated by peer and the instructor using weighted criteria described in the attached sheet. After each presentation, anonymous comments and scores from peers will be summarized and a final score assigned by the instructor.
7. A total of 20 points will be awarded for those students who frequently participate in classroom paper discussion (>75% of lectures) with less points assigned to those students who participate less frequently. In addition, students may earn up to 20 points for attendance, and each unexcused absence will result in a 2-point deduction from your overall score. An excused absence requires prior approval by the instructor.

#### **STUDENTS WITH DISABILITIES:**

##### **WSU**

Reasonable accommodations are available for students with a documented temporary or permanent disability. If you have a disability and may need accommodations to fully participate in this class, please visit the Access Center (Washington Building 217) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.

##### **UI**

Reasonable accommodations are available for students who have documented temporary or permanent disabilities. Please notify your instructor(s) during the first week of class regarding accommodation(s) needed for the course. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 306; phone 885-6307; email at [dss@uidaho.edu](mailto:dss@uidaho.edu); website at [www.access.uidaho.edu](http://www.access.uidaho.edu) or [www.webs.uidaho.edu/taap](http://www.webs.uidaho.edu/taap).

### **CAMPUS SAFETY:**

Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the “**Alert, Assess, Act**” protocol for all types of emergencies and the “*Run, Hide, Fight*” response for an active shooter incident. Remain **ALERT** (through direct observation or emergency notification), **ASSESS** your specific situation, and **ACT** in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at [MyWSU](http://MyWSU). For more information on this subject, campus safety, and related topics, please view the [FBI's Run, Hide, Fight video](#) and visit the [WSU safety portal](#).

### **ACADEMIC HONESTY:**

Students who violate WSU's Standards of Conduct for Students will receive an F as a final grade in this course, will not have the option to withdraw from the course and will be reported to the Office of Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these standards: <http://conduct.wsu.edu/default.asp?PageID=338>.

### **PLAGIARISM:**

Plagiarism is defined by Webster's Dictionary as, “*to steal and pass off the ideas or words of another as one's own.*” There are two general forms of plagiarism:

- (a) Unintentional: the use of other writers' words, phrases, sentences, paragraphs as though they were your own *without understanding* the need to cite the original source. Unintentional plagiarism normally occurs when the individual does not understand the conventions of scientific writing and the need to cite sources of information.
- (b) Intentional: the use of another writers' work and claiming it as your own. Intentional plagiarism includes *knowingly copying* or incorporating sections of books, articles, or other sources into your work without citation.

To evade plagiarism, you must acknowledge the source of information. In scientific writing, this can be performed in the text of your work through the use of surnames of authors and the year of publication (e.g., Smith et al., 2003) or by using numbers enclosed by parentheses which correspond to specific citations in the reference section. In addition to employing citations in the text, plagiarism can be avoided by applying special techniques when writing about information obtained from a source:

- (a) Paraphrase: rewording information in which you accurately present the main ideas from the source but do so using your own organization, words, and sentence structures.
- (b) Summary: a concise statement of the main idea from a section within a source.
- (c) Direct quotation: use of quotes surrounding the passage written by another author.

In general, paraphrasing (a) and the use of summary statements (b) are very common techniques used in scientific writing. Use of quotations (c) in scientific writing is rare and should be avoided.

Plagiarism is dishonest and is **not** tolerated. If caught using all or portions of a current or former classmate's writing or other sources of information (e.g., purchase a paper), a grade of "zero" will be given for the exercise. Additional penalties for plagiarism are possible as outlined in the *Washington State University Student Handbook*.

## COURSE OUTLINE

Approximate listing of dates and tentative topics

| <u>Week</u>       | <u>Date</u>  | <u>Day</u> | <u>Topic(s)</u>  |
|-------------------|--|------------|--|
| <b>Section I</b>  | Introduction   |            |  |
| 1                 | 1/12/16  | T          | Overview of microorganisms and their growth in foods   |
|                   | 1/14/16  | Th         | Food preservation and bio-preservation   |
| 2                 | 1/19/16  | T          | Food fermentation, probiotic and their roles in health and diet induced disease  |
| <b>Section II</b> | Foodborne pathogens: Prevalence, virulence and pathogenesis of foodborne pathogens and their interaction with environment and the host |            |  |
|                   | 1/21/16  | Th         | Foodborne illness overview and new emerging foodborne pathogen   |
| 3                 | 1/26/16  | T          | <i>Listeria monocytogenes</i> and its pathogenesis   |
|                   | 1/28/16  | Th         | <i>Shigella spp.</i> , <i>Vibrio spp.</i> ,  |
| 4                 | 2/2/16   | T          | In class paper discussion on <i>Listeria monocytogenes</i>   |
|                   | 2/4/16   | Th         | <i>E. coli</i> O157:H7 and its silent reservoir, cattle<br>(Invited speaker: Dr. Carolyn Bohach, School of Food Science)                         |
| 5                 | 2/9/16   | T          | non-O157 Shiga toxin producing <i>E. coli</i> (STEC)<br>Prophage and Stx   |
|                   | 2/11/16  | Th         | In class paper discussion on STEC  |
| 6                 | 2/16/16  | T          | <i>Salmonella spp.</i> and its pathogenesis/stress response<br>(Guest speaker: Dr. Leigh Knodler, Paul G. Allen School for Global Animal Health) |
|                   | 2/18/16  | Th         | <i>Salmonella supplemental</i> , <i>Staphylococcus aureus</i>  |
| 7                 | 2/23/16  | T          | In class paper discussion on <i>Salmonella spp.</i> and its stress response  |
|                   | 2/25/16  | Th         | Spore forming bacteria focusing on <i>Clostridium botulinum</i> ,<br><i>Clostridium perfringens</i>  |
| 8                 | 3/1/16   | T          | Review and discussion  |
|                   | <b>3/3/16</b>  | <b>Th</b>  | <b>Midterm exam</b>  |

|   |  |    |   |
|---|--|----|---|
| 9   | 3/8/16   | T  | <i>Campylobacter jejuni</i><br>Foodborne virus focusing on hepatitis A virus and norovirus  |
|   | 3/10/16  | Th | <i>Yersinia</i> spp. and its pathogenesis<br>(Invited speaker: Dr. Sam Minnich, School of Food Science)   |
| 10  | 3/15/16  | T  | Spring break  |
|   | 3/17/16  | Th | Spring break  |
| 11  | 3/22/16  | T  | Toxic molds, mycotoxins and mycotoxicosis; Prion diseases<br>Agricultural antibiotic use, bacterial antibiotic resistance and associated molecular mechanism  |
|   | 3/24/16  | Th | In class paper discussion foodborne virus and mycotoxins  |
| 12  | 3/29/16  | T  | In class paper discussion on antibiotic resistance and food safety  |
| <b>Section III</b>  | Detection of microorganism in foods, biofilm and bacterial signaling |    |   |
|   | 3/31/16  | Th | Food microbiological samples, sampling plan and conventional detection methods  |
| 13  | 4/5/16   | T  | Immunological methods and DNA based assay<br>(Invited speaker: Dr. Gulhan Unlu, School of Food Science)   |
|   | 4/7/16   | Th | Phage based assay and rapid methods   |
| 14  | 4/12/16  | T  | Nanotechnology and biosensors principle and its application in foodborne pathogen detection<br>(Invited speaker: Dr. Annie Du, Dept. of Mol. Biosciences, School of Mechanical and Materials Engineering) |
|   | 4/14/16  | Th | In class paper discussion new emerging foodborne detection methods  |
| 15  | 4/19/16  | T  | Molecular fingerprinting  |
|   | 4/21/16  | Th | Student presentation on the final project   |
| 16  | 4/26/16  | T  | Student presentation on the final project   |
|   | 4/28/16  | Th | Student presentation on the final project   |
| Final Exam @ 10:10-12:10pm, May 4 <sup>th</sup> (Wednesday) |  |    |   |