

**FOOD MICROBIOLOGY LECTURE**  
**The Ohio State University**

**(Food Science & Technology 5536/ Microbiology 5536)**  
**Autumn Semester**

*<https://carmen.osu.edu>*

**INSTRUCTOR**

Ahmed E. Yousef, Professor  
Department of Food Science & Technology &  
Department of Microbiology  
217 Parker Food Science Building  
**E-mail:** yousef.1@osu.edu

**TIME and LOCATION**

Monday, Wednesday & Friday: 11:30-12:25  
Hamilton Hall, Room 0107

**OFFICE HOUR**

E-mail to schedule a meeting with the instructor.

**COURSE OBJECTIVES**

Students completing this course should:

- Understand the **causes** of food spoilage and predict the **microorganisms** that can spoil a given food, when prepared, processed and stored under given conditions.
- Understand the **causes** of foodborne microbial diseases and predict the **pathogens** that can grow in a given food, when prepared, processed and stored under given conditions.
- Be able to predict the necessary **measures to control** the spoilage and pathogenic microorganisms in food.
- Understand the role of **beneficial microorganisms** in food processing, preservation and safety, and the possible health benefits resulting from the consumption of these microorganisms.

## READINGS

### Handouts

- Provided for each lecture (Download from Carmen & print before lecture)
- Serve only as lecture outlines
- Do not contain enough information to prepare the students for quizzes or exams.

### Therefore, students are advised to

- Take detailed notes during the lecture
- Read assigned review articles or research papers (uploaded to Carmen)
- Read chapters, assigned occasionally, from the books on reserve.

### The following are recommended (but not required) books:

Ray, B., and A. Bhunia. 2007. Fundamental food microbiology, 4th Ed. CRC Press, Boca Ratan, FL.

Jay, J. M., M. J. Loessner, and D. A. Golden. 2005. Modern food microbiology, 7th ed. Springer, New York, NY.

Montville, T.J., and K.R. Mathews. 2005. Food microbiology, an introduction. ASM Press, Washington, DC.

## EXAMINATIONS and GRADING CRITERIA

- Three examinations will be given in this course; two midterms and a final.
- The final only is comprehensive: The final represents 35% of total grade, with 20% from the third part of the course and 15% from the first and second parts.
- Seven (7) quizzes will be given, and the highest 6 scores only will be considered.
- The distribution of the points in this course will be as follows:

|                                       |            |
|---------------------------------------|------------|
| First Mid-Term                        | 25%        |
| Second Mid-Term                       | 25%        |
| Quizzes (the best 6 of 7)             | 12%        |
| Random attendance check/participation | 3%         |
| <u>Final</u>                          | <u>35%</u> |
| Total                                 | 100        |

*Bonus points: Additional points (up to 3) are available to students who volunteer to present, in front of the class, a hot topic in food microbiology. **Eligible students are those with better than average grade by mid-quarter.** The chosen topic should complement, but not overlap with course material. Five minutes will be set-aside for such a presentation. For those who choose to present, their **topics should be selected and finalized with the instructor before the second mid-term examination.** The instructor reserves the right to accept or reject any topic for such class presentations.*

## Final Grade

Grade will be based on the relative performance of individual students within the class. A grading curve will be constructed with a (B-) median. The instructor reserves the right to skew grades below or above the grade median for exceptional or less than exceptional classes. The approximate cutoffs for the grading curve are as follows:

| Grade | Percentile | Explanation (of percentile ranking)   |
|-------|------------|---|
| A     | 75 to 100  | After grades are ranked, students in the top 25% of the ranking get A (regardless their actual score) |
| B     | 35 to < 75 |   |
| C     | 10 to < 35 |   |
| D     | 5 to < 10  |   |
| E     | < 5        | Lowest scoring students (the bottom 5% of ranked grades) get E, regardless their actual score         |

## Make-up Exams

There is NO make-up for mid-terms or final exam, except when a student is under **extraordinary circumstances**. The instructor reserves the right to determine what constitutes an extraordinary circumstance. Well-documented justification will be needed for any potential make-up exam. **There will be no make-up exams for the quizzes, regardless the circumstances.**

## ACADEMIC MISCONDUCT

Academic misconduct will not be tolerated. Academic misconduct will be dealt with as defined in the Code of Student Conduct: {[http://studentaffairs.osu.edu/resource\\_csc.asp](http://studentaffairs.osu.edu/resource_csc.asp)}. If questions arise, please refer to the web sites just listed or ask the instructor. Any suspected violation of the Code of Student Conduct will be forwarded to the Committee on Academic Misconduct.

## DISABILITY SERVICES

Any student who may need an accommodation because of a disability should contact the instructor privately to discuss specific needs. The Office for Disability Services assists faculty in verifying the need for accommodations and developing accommodation strategies. Students with disabilities are encouraged to contact the Office for Disability Services at 614-292-3307, room 150, Pomerene Hall.

## Tentative schedule

| Week | Topic  |
|------|--|
| 1    | Introduction   |
|      | Basics of food microbiology (review)                                   |
| 2    | <b>Food Microbiota</b>   |
|      | Gram-negatives   |
|      | Gram-positive bacteria   |
| 3    | Spore-forming bacteria   |
|      | Spore-forming bacteria (con'd)   |
|      | Foodborne fungi  |
|      | Characteristics of food microbiota                                     |
| 4    | Characteristics of food important to microbial contaminants            |
|      | Incidence and behavior of microorganisms in meat and poultry           |
|      | Incidence and behavior of microorganisms in dairy products             |
| 5    | Incidence and behavior of microorganisms in fresh produce              |
|      | Incidence and behavior of microorganisms in seafood                    |
|      | <b>Exam (First Midterm)</b>  |
| 6    | <b>Pathogenic foodborne microorganisms</b>                             |
|      | <i>Salmonella</i>  |
|      | Pathogenic <i>Escherichia coli</i>                                     |
|      | Other pathogenic <i>Enterobacteriaceae</i>                             |
| 7    | <i>Staphylococcus aureus</i>   |
|      | <i>Listeria monocytogenes</i>  |
|      | <i>Clostridium botulinum</i>   |
| 8    | <i>Clostridium perfringens</i> and <i>Bacillus cereus</i>              |
|      | Other Gram-positive pathogens  |
|      | Pathogenic fungi   |
| 9    | Pathogenic fungi (con'd)   |
|      | Foodborne parasites  |
|      | Pathogenesis   |
| 10   | Foodborne viruses  |
|      | Miscellaneous topics   |
|      | <b>Exam (Second Midterm)</b>   |
| 11   | <b>Control of microorganisms during food production and processing</b> |
|      | Water removal  |
|      | Chilling and refrigeration   |
|      | Freezing   |

|                   |                                    |  |
|-------------------|------------------------------------|--|
| 12                |                                    |  |
|                   |                                    | Modified atmosphere                                |
|                   |                                    | Heat   |
|                   |                                    | Heat (con'd)                                       |
| 13                |                                    | Heat (con'd)                                       |
|                   |                                    | Emerging technologies                              |
|                   |                                    | Preservatives                                      |
| 14                |                                    |  |
|                   |                                    | Cleaning and sanitization                          |
|                   |                                    | Biopreservation and probiotics                     |
|                   |                                    | Hazard analysis and critical control point (HACCP) |
| 16                |                                    |  |
|                   |                                    | Foodborne disease outbreaks: Case studies          |
|                   |                                    | Review   |
|                   |                                    |  |
| <b>Final Exam</b> | <b>Time:</b> -----                 |  |
|                   | <b>Location: Same lecture room</b> |  |