

## MBIO 4600 Food Microbiology Fall 2019

Lecture MWF 1:00P – 1:50P, N331

Lab M 2:00P – 4:50P, N331

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<b>Instructor</b>	My Lo Thao, Ph.D.
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<b>Office hours</b>	M 10:00A-11:00A, T 9:00A – 10:00A or by appointment
<b>E-mail</b>	<a href="mailto:mthao@csustan.edu">mthao@csustan.edu</a> <ul style="list-style-type: none"><li>• This is the best method to contact me regarding emergencies, appointment set up, or questions with very short answers. Please ask complex questions during class or office hours. Questions regarding grades or answered on the syllabus will not be acknowledged.</li><li>• Include your name and the course number in the subject line.</li></ul>
<b>Webpage</b>	<a href="http://moodle.csustan.edu">http://moodle.csustan.edu</a>

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**Course Description:** Study of the relationship of microorganisms to foodborne disease, food spoilage, and food production as well as food preservation.

### Course objectives:

At the end of this course, students will be able to:

1. List and describe the parameters that influence microbial growth in foods.
2. List and identify some causes of food spoilage and foodborne microbial diseases.
3. Identify measures necessary to control spoilage and foodborne illnesses including food preservation to increase the shelf-life of foods.
4. Explain the use of microorganisms in food production
5. List and describe methods used for the detection, enumeration and identification of foodborne pathogens.

## COURSE REQUIREMENTS

**Prerequisites:** Successful completion of MBIO 3010 and MBIO 3032 or equivalent

**Required Text:** There is no required text. Students may use the following books as reference.

- Jay, James M. 2005. Modern Food Microbiology, 7<sup>th</sup> Edition. Springer Science + Business Media, Inc.
- Doyle, Michael P. 2001. Food Microbiology: Fundamentals and Frontiers, 2<sup>nd</sup> Edition, ASM Press.

**ADD/DROP Policies:** add/drop policies for this class are the same as the university add/drop policies, please consult the Class Schedule for more detail. **Last day to add is September 5<sup>th</sup>; last day to drop is September 19<sup>th</sup> (census date).**

### Course Etiquette:

1. Arrive prepared and on time for class.
2. **Silence or turn off all cell phones at the start of class and put away.**
3. **No laptops, cameras, or any other recording devices allowed in class. Audio\Video Recording** of lectures is not permitted without consent from instructor.
4. Please do not carry on conversations with your neighbors once class has started. Such behavior is highly disrespectful and very distracting to me and to the other students around you so you may be asked to leave.

## Grading Policies:

1. **Academic Dishonesty and Misconduct:** There is zero tolerance for cheating. Cheating in any capacity in this class will result in penalties ranging from a minimum of a zero on the assignment or exam, an F in the class, to a maximum of expulsion from California State University, Stanislaus as indicated by the official University Policy regarding dishonesty and misconduct. Exams, reports, and/or other assignments are indicators of individual performance. Copying off of another student's exam, plagiarized reports, or other assignments constitutes cheating. If your phone rings during the exam, ten (10) points will be deducted from your exam score. Taking out a cell phone during an exam is considered cheating, your exam will be confiscated, and you will receive zero points for that exam.
2. **Regular class attendance is vital to your success in this course.** Attendance requires not only your physical presence, but your attention and participation as well. Students who are physically present, but inattentive (including, but not limited to, sleeping, excessive conversation, texting, e-mailing, web-surfing, being disruptive, arriving late, leaving early, etc.) may be asked to leave. If you are absent on the days when students are presenting, you will **lose 10 points of your participation points per lecture period, if you are late for presentations, you will be deduct points depending on how many groups are presenting and how many you missed. Lab attendance is mandatory!** If you have missed an entire exercise you will forfeit the entire number of points allotted for that lab exercise. Excessive tardiness or leaving early may be constituted as absences. **More than 2 lab absences (includes excused absences) will result in a penalty of 30 points deducted per absence from your total score, thereby significantly reducing your grade.** You are responsible for any information or assignments you missed in your absence.
3. You are expected to study regularly, and to consult your notes when you have a question. Your instructor will be happy to answer questions once you have made an honest effort to do so on your own. A question may sometimes be answered with a question, or your fellow classmates may be called upon to help answer it. This is part of a thought process to lead you to the answer, not to embarrass you.
4. **Exams:**
  - a. Exams are written with the course objectives in mind. Because the information in this course cannot be divided into separate, discreet units, exams will be cumulative and comprehensive to some extent. There will be three midterms (80 points each) and a final (150 points).
  - b. Exam date/time changes will be made only in case of an emergency or if they conflict with official university activities. **Do not** schedule any appointments, nor make any travel plans that conflict with a scheduled exam.
  - c. Questions that may appear on exams include multiple choice, matching, short answer, discussion, problem-solving and case study interpretation. You will need Scantron form # 882-E for the exams. Note that:
    - i. Only answers on the Scantron will be graded, so transfer answers carefully
    - ii. Take care to erase well those answers you do not want marked
    - iii. Illegible answers in the written portion of the exam may be not be graded or receive full credit, i.e., if I cannot read it, I cannot give you credit for it.
    - iv. Correct spelling and grammar are necessary for effective communication. Therefore, spelling and/or grammatical errors will result in loss of points on exams.
  - d. Unless otherwise stated, exams will begin at the beginning of the scheduled class time. **Traffic and/or car problems are not acceptable excuses for being late. If you are late,**
    - i. You will have less time to complete the exam.
    - ii. If you arrive after the first person is done with the exam, you will not be allowed to take it.
  - e. Once the exam has started, you will not be allowed to leave the room until you have finished and turned in your exam.

- f. You must turn off cell phones and remove baseball caps during exams. If your cell phone rings during an exam ten (10) points will be deducted from your exam score. Cell phones must be silenced or off and put away during exams. Taking out a cell phone during an exam is considered cheating, your exam will be confiscated, and you will receive a grade of F in the course.
- g. After graded exams have been returned, you have one week to review exams or dispute errors; no grades will be changed after that time.
5. **Make-up exams are given under extenuating circumstances and only with proper documentation.** Make-up exams may be different than the exam given in class. Failure to appear at exam time without 24 hours prior notice to instructor with an appropriate excuse, or an appropriately documented emergency, will result in zero points for that exam. It is **your** responsibility to notify the instructor **prior** to missing an exam and to supply her with a valid, **written** excuse. If you miss an exam for a legitimate emergency, it is still your responsibility to notify the instructor as soon as practical to make up the exam. Under no circumstances will you be allowed to take an exam once it has been handed back.
6. Total points for course = 625

Assignment	Points	
Exams (3x75 pts each)	225	<b>Note:</b> 1. Presentations are required of all students. Students who do not present will have additional points equal to that of the assignment deducted from their final score. 2. Participation points include attendance and the asking of questions during student presentations. Each student is expected to ask at least ONE (1) question each class when students are presenting.
Outbreak presentation	55	
Lab reports	115	
Lab quizzes	60	
Class participation	20	
Comprehensive final exam	150	

3. **Grading** will be based on a percent scale:  
 93-100 = A, 90-92 = A-, 87-89 = B+, 83-86 = B, 80-82 = B-, 77-79 = C+, 73-76 = C, 70-72 = C-, 67-69 = D+, 60-66 = D, < 60 = F
- Note:**
- Take care of your grade. Remember you earn your grade; it is not given to you.
  - Grades/scores will not be sent to students via email or be given over the telephone.
  - Instructor will not calculate student's scores/grade.
  - The instructor reserves the right to reduce your grade due to excessive absences and/or tardiness.
4. **Late assignments will be accepted with a reduction of 10% of the total score per day including weekends.** This includes Powerpoint presentations. Presentation must be turned in presented on the assigned date and time or else it will be considered late and you will lose points as stated above.
5. **Course Page:** Information for the course (**Lecture notes**, objectives, and/or ppt lectures exam scores, syllabus, lab materials, etc.) can be found on the course's Moodle page (moodle.csustan.edu). All materials **are copyrighted** and are only for the personal use of students enrolled in the course. **Do not** give the username/password to anyone else. If you do, **no more** material will be provided.

How to enroll yourself in our Moodle site:

- a. Go to <http://moodle.csustan.edu> and click Course Categories to find our class: Microbiology, then MBIO 4600: Food Microbiology.
- b. At the login screen, use your Warrior ID and Password to log in.
- c. Next, in the box labelled "Student self-enrollment" use the enrollment key: **foodmicrofa19** and you will be able to access the class site.
- d. If you have any problems logging in or enrolling, please email Glenn Pillsbury ([moodleadmin@csustan.edu](mailto:moodleadmin@csustan.edu)).

## 6. Laboratory reports:

Each student is expected to complete their own report. Here are a few simple rules to keep in mind.

- 1) Lab reports do not have to be "neat" but they should be legible (i.e. write neat enough for me to be able to read it).
- 2) Record the date at the beginning of each day when you carry out a particular activity.
- 3) Laboratory reports will be handed in as loose leaf pages stapled together. Lab reports are required to be done on a word processor. I strongly recommend the use of a computer and using programs such as excel for graphing, but this is not required. If not using a computer, graphing must be done neatly on graph paper using a straight edge to make straight lines.
- 4) You may use either pen (blue or black only) or pencil. If you use pen and make a mistake, neatly cross it out and continue; if you use pencil, make sure it is dark enough to be seen easily.
- 5) **Print outs of the lab exercise will serve as the basis of your lab reports, add pages as necessary.** For each experiment, record all measurements, calculations, interpretations of the results, i.e., What do the numbers mean??! Refer to the hard copy of your data and write detailed explanations of what your data mean to you and what you need to do next.

The following area may warrant further elaboration:

- a. **Procedure:** One very important element is the **recording of any deviations from/changes to the protocol** as written. Explain in enough detail/information so someone else who is not in the class can understand and repeat what you did. Note any problems you may have encountered in carrying out the protocol. Record all information even some that may seem insignificant at the time, but may be very valuable later.
  - b. **Results:**
    1. **What data did you get?** – Tables of raw data, **write your own data down, DO NOT copy/Xerox your lab members' tables.**
    2. **How did you analyze the data?** – include calculations, tables, graphs, etc.
      - a) All calculations or a sample calculation in the case of repetitive calculations must be shown in a neat, organized manner in the space provided or a separate page outlining the calculations.
      - b) When information/data are presented by a graph, diagram, or a photograph, this is referred to as a figure and must be referred to as FIG. 1 or FIGURE 1 placed **below** the presented information followed by a title and a legend that describes the information presented in the figure.
    3. **Summarize results** - narrative of results as supported by data.
  - c. **Conclusion:** What conclusions can you draw from the results? If you were to repeat the experiment, what would you change?
  - d. Record any observations that you think might be significant.
  - e. Answer all questions posed in the lab exercises (some are embedded with the procedure and results; others are at the end of the exercise).
- 6) Reports will be graded on the basis of academic excellence, neatness, spelling, grammar, and most importantly, on the demonstration that **original thought** was put into your interpretation of the experiment. **A report that is incomplete, looks thrown together and sloppy will receive few points.** If at **any** time you have questions about data presentation, interpretation and/or calculations, please come see me!
  - 7) Each Lab report is worth the number of points indicated in the Lab Schedule. Laboratory reports must be turned in on time for consideration of full credit. They will be accepted up to a week late only and will be docked 10% of total points for report per day late (including weekends!!). **I will not accept lab reports by email. If you miss a laboratory session from an unexcused absence you will forfeit all of the points possible for that lab!!**

**7. Foodborne disease outbreak presentation (55 points)**

This assignment will be done in groups of two students. Failure to complete this assignment will result in a loss of 100 points/student.

Research a recent (Jan 2018 – present) foodborne or waterborne outbreak caused by a(n) microbe/agent of your choice. The outbreak could be one that occurred anywhere in the world. Each group's oral presentation will address/discuss the questions indicated in the grading rubric below.

Powerpoint presentations should run 10-12 min with 3 minutes for questions. The last day to get your outbreak topics approved is noon on September 16, 2019. You will lose 5 points if outbreak topics are late. Electronic versions of presentations in Powerpoint format are due by noon on October 4, 2019 to Dr. Thao by email. Ten percent will be deducted from final score if received after the deadline, even by 1 minute. Note that you cannot make any more changes after your Powerpoint has been submitted. Students will start presenting on October 7, 2019.

In addition, student presenters will give the class 3 questions they should be able to answer after listening to their talk immediately just prior to presenting; Answers to each question should be clearly stated in presentation. A copy of the questions with the answers should be turned in to Dr. Thao on the day they present.

The presentation will be graded using the following rubric. When you prepare your report and practice your presentation, I encourage you to use this rubric to identify the strengths and deficiencies for your own work. Note the respective points for each component. Your presentation will be rated on a 5-point scale for content and 3-point scale for delivery.

**Foodborne disease outbreak presentation evaluation sheet**

**Presenters:** \_\_\_\_\_

**Score:** \_\_\_\_\_

5 = excellent, outstanding, exemplary

4 = adequate, a few obvious deficiencies

3 = below expectations, incomplete, major deficiencies

2 = unacceptable, obvious last minute effort

1 = not provided

3 = good

2 = fair

1 = below expectations

0 = not provided

<b>Content (35 pts)</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
What organism/agent was responsible for the outbreak? How did they determine this?					
What was the source of the outbreak?					
What was the transmission route(s)?					
Statistics: how many people were affected, became ill, died, etc.					
How was the outbreak controlled/resolved?					
What is the potential for reoccurrence?					
In your opinion, should the world truly be concerned about such an outbreak? Explain.					
<b>Delivery (15 pts)</b>		<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
Presentation had no spelling or grammatical errors					
Presentation was clear, informative, polished and interesting					
Presenters displayed enthusiasm, made good eye contact with audience					
Print was easily visible (not too much/slide), had good visual aids					
Presentation ran in the allotted time					
<b>TOTAL</b>					

## **Guidelines for oral presentations (content and delivery are both important)**

1. Preparation and knowledge of materials
  - Do your homework to fill in gaps of knowledge
  - Anticipate questions that may be raised, find answers
2. Organized the presentation to flow from one section to another.  
Use clear transitions to take audience from one topic to another.
3. Rehearse the presentation to run in the allotted time
  - Speak clearly, loud enough to be heard and do not talk too fast (happens when one is nervous)
  - Have variety in your voice (tone)
    - Don't speak in a monotone or mumble.
4. Avoid distracting body movements.
  - Avoid cracking knuckles, jingling keys in pocket, using laser pointer inappropriately, etc.
  - Do use hand gestures
5. Do move around, instead of remaining in a "frozen" state
  - Avoid fidgeting, swaying or rocking in place.
  - Avoid having your back to the audience.
  - Avoid pacing or moving around so much to make the audience dizzy.
6. Make and maintain eye contact with the audience.
  - Make eye contact with every person in the room
  - Plug into the audience's brain
7. Make short notes but avoid reading your presentations - slides or notes
8. Display enthusiasm and genuine concern for your subject.
9. Avoid grammar errors, misspellings, typos in presentation
  - Unacceptable because of grammar and spell check
  - Shows audience your indifference
10. Avoid too many distracting "Uh"s & "Like"s, etc.

**Practice, practice, practice! The more prepared you feel, the less nervous you'll be.**

## **8. Lab exercises/activities**

- a. Come to the lab **FULLY PREPARED** to do the work for that period and plan to stay the **ENTIRE TIME**.
- b. **READ YOUR LAB PROTOCOL IN ADVANCE** so you understand what you are going to do and why. There will be many lab periods where we will be doing more than one exercise and you will need to know what you need to do to keep everything straight. Best way to do this is to make a short outline of activities for each exercise you will be doing that day.
- c. Come prepared to ask questions if you do not understand something.
- d. Your attendance and participation will have a direct and large effect on your final grade.
- e. The idea is to enjoy the lab but also to **THINK** and to **WORK**.

Please note: appropriate laboratory conduct and safety are extremely importance for your safety and the safety of others. Failure to follow safety rules as discussed in class will result in the lowering of your grade or dismissal from the course.

**Tentative Lecture Schedule (open to revision):**

Date		Lecture topic	Lab day	Lab exercise	Lab topic
Aug	23	Introduction to course			
	26	Introduction to food microbiology and the history of microorganisms in food	1		Introduction, drawer check-in, safety review
	28	Introduction to Foodborne diseases			
	30	Introduction to Foodborne diseases (cont'd)			
Sept	2	<b>Labor Day!</b>			
	4	Gram negative foodborne pathogens			
	6	Gram negative foodborne pathogens (cont'd)			
	9	Gram negative foodborne pathogens (cont'd)	2	1 (15 pts)	Enumeration of microorganisms: Day 1: Standard plate count
	11	Gram positive foodborne pathogens			
	13	Gram positive foodborne pathogens (cont'd)			
	16	Food- and water-borne viral diseases <a href="#">Outbreak presentation topics due</a>	3	1	Enumeration of microorganisms: Day 2: Methylene blue reduction test
	18	Food- and water-borne viral diseases (cont'd)			
	20	Protozoa in food			
	23	<b>Exam I (Intro-Gram + pathogens)</b>	4	2 (30 pts)	Isolation of pathogens from food: Day 1 Homogenization and pre-enrichment
	25	Parasitic worms in foods		2	Isolation of pathogens from food: Day 2 Enrichment
	27	Parasitic worms in foods (cont'd)		2	Isolation of pathogens from food: Day 3 Plate on selective/differential media
	30	Prions in foods	5	2	Isolation of pathogens from food: Day 4 Analysis/streak for pure cultures
Oct	2	Fungal toxins in foods			
	4	Methods for detecting pathogens in food <a href="#">Outbreak PowerPoint presentations due!</a>			
	7	<b>Student outbreak presentations(3)</b>	6	2	<b>Student outbreak presentations (3)</b> Isolation of pathogens from food: Day 5 Final examination/confirmation of pure isolates
	9	<b>Student outbreak presentations (3)</b>			
	11	<b>Student outbreak presentations (3)</b>			
	14	Methods for detecting pathogens in food (cont'd)	7	3 (35 pts)	Detection of pathogens by PCR: Day 1 DNA isolation and PCR reactions
	16	Parameters affecting growth and survival of microorganisms in food: Temperature			
	18	Temperature (cont'd)			

Date		Lecture topic	Lab day	Lab exercise	Lab topic
Oct	21	Temperature (cont'd)	8	3	<b>Quizam #1 (25 pts): Lab ex. 1-2; Lab reports #1-2 due</b> Detection of pathogens by PCR: Day 2 Gel electrophoresis
	23	Temperature (cont'd)			
	25	Water activity			
	28	<b>Exam II (viral-mycotoxins)</b>	9	3	Detection of pathogens by PCR: Day 3 DNA purification, quantitation, and preparation for sequencing
	30	Water activity (cont'd)			
Nov	1	Low pH: Acids			
	4	Low pH: Acids (cont'd)	10	3 4 (20 pts)	Detection of pathogens by PCR: Day 4 Sequence analysis Detection of pathogens by immunoassay: Day 1 Latex bead agglutination test
	6	Atmosphere (oxygen)			
	8	Atmosphere (oxygen) (cont'd)			
	11	<b>Veterans Day!</b>			
	13	Controversial preservatives			
	15	Controversial preservatives (cont'd)			
	18	Microbial spoilage patterns	11	4	Detection of pathogens by immunoassay: Day 2 ELISA
	20	Microbial spoilage patterns (cont'd)			
	22	Microbial spoilage patterns (cont'd)			
	25	Lactic acid fermentation	12	5 (15 pts)	Food preservation: the effect of osmotic pressure and garlic
	27	<b>Exam III (methods-redox potential)</b>			
29	<b>Thanksgiving holiday!</b>				
Dec	2	Complex fermentations	13	5	Food preservation: the effect of osmotic pressure and garlic (cont'd)
	4	Complex fermentations (cont'd)			
	6	Food safety control measures and legal issues			
	9	Catch up	14		<b>Quizam #2 (35 pts): Lab ex. 3-5</b> <b>Lab report #3-5 due</b> Drawer check out
	18	<b>Final Exam (150 pts) 11:15A-1:15P</b>			