

--- TENTATIVE SCHEDULE SUBJECT TO CHANGE ---

**MICROBIOLOGY LABORATORY IN THE KINGDOM OF SMILES
SYLLABUS 2017**

**Instructor: Dr. Glenn Young
UC Davis Summer Abroad**

Course Units Available

Core Course(s)*

Either

Food Science and Technology (FST) 104L (4 units total): Food Microbiology Laboratory

OR

Microbiology (MIC) 102 (3 units): Introductory Microbiology & 103L (2 units): Introductory Microbiology Laboratory

Independent studies Course

Either FST 198 (4 units) **or** MIC 198 (3 units)

*Students requiring FST 104L or MIC 102&103L for their degree requirements will register for the appropriate course. Students that are taking the class as an elective and who have previously taken MIC 102&103L or FST 104L will be eligible to register for the other course for credit.

UC Davis courses that this program's core course is based on are FST 104L and MIC 102&103L, which have a high degree of similarity both in course content and participatory laboratory exercises. Each of these courses offers students the opportunity to gain experience that develops knowledge of fundamental concepts of natural sciences through an introduction to microbiology. The course involves students in participatory problem solving exercises using laboratory-based experimentation. The core course for this program will be offered to students who wish to register for FST104L (4 units) or MIC 102&103L (5 units). All students will be offered the additional opportunity to expand their studies to include independent cultural and applied field studies through registration for FST 198 (4 units) or MIC 198 (3 units). The total course credit available for a student through this program is 8 units. Optional enrollment of an FST/MIC 199 unit is available to accommodate students from other UC campuses or other universities that have a semester-based system.

Core Course Description (FST 104L or MIC 102&103L)

Syllabus for Microbiology Laboratory – UC Davis Summer Abroad, Thailand

The core course for this program is an upper division microbiology course that will be scheduled for Monday – Friday during the four weeks that the class operates. Weekends are for independent studies, field excursions and some free time for self-exploration (the first and third Sundays of the program). The core class will have lectures and discussions to provide forums for learning, discussing and reflection. Laboratory exercises/field excursions will be scheduled to provide students with participatory experiences for problem solving and exploration -- this provides perspectives on applied science and experience in real-world situations. This core class will meet the goals of MIC 102 & 103L to introduce students to general microbiology, including food microbiology, and to the goals of FST 104L to introduce students to similar material with food serving as a common, but not exclusive, nexus for discussion. Importantly, FST 104L and MIC 102/103L emphasize related areas of subject overlap such as bacteriology, infectious disease/food safety, applied science and molecular biology. I am a professor of food science and Chair of the campus-wide Microbiology Graduate Program. Prior to proposing this program, I contacted and visited with Eric Schroeder, UCD EAC Director, about my ideas. Then I contacted Professor Wolf Heyer, Chair of the Department of Microbiology and Molecular Genetics, to describe the course idea and to gain the approval from that faculty. I also consulted with the Major Advisor for the Food Science Major to approve this idea. I will give most lectures, but will invite some guests to present selected lectures to expand the student's experience. I will work with a local coordinator to co-organize the laboratory exercises and field excursions.

Core Course Contact Hours

The core course is five units with 50 contact hours distributed as follows:

Lecture (32 hours): 2 h per day Monday – Thursday x 4 weeks

Discussion (8 hours): 2 h each week on Friday x 4 weeks

Laboratory/Field excursions (>24 hours): [3 h on Tuesday + 3 h on Thursday] x 4 weeks + many extra hours of time during the field excursions and multiday trip

Core Course Schedule

Lecture : 9:00 – 11:00 AM, M - Th

Laboratory: 1:00 – 4:00 PM, T, W, Th (field excursions will require extra time)

Required Reading Material

Reading material will be made available online, including lecture outlines and the laboratory manual. Students will also be provided with hard copies of the lecture outlines and laboratory protocols. I will have these materials printed in Thailand to save costs on the production and shipping.

Syllabus for Microbiology Laboratory – UC Davis Summer Abroad, Thailand

Recommended Reading Material

1. *A Photographic Atlas for the Microbiology Laboratory*

The program will purchase instructor's copies to be made available for students to use during the laboratory exercises. The copies will be a one-time investment and I already have some copies. Note – this is a reference normally used by both FST 104L and MIC 102/103L.

2. <http://www.textbookofbacteriology.net/>

This is Kenneth Todar's "Online Textbook of Bacteriology" (It's Free)

Grading*

Students will earn grades based on assessments from written exams and by the completeness and quality of their written laboratory reports. The grades will be weighted as follows:

Exam 1	35%
Exam 2	35%
Laboratory Reports	30%

*For students registering for FST104L plus one unit of FST 199, a letter grade will be assigned for FST104L combined with a S/U grade for the FST199.

Attendance is mandatory, with an absence being an automatic deduction of the final grade by 10% per absence. Late laboratory reports are an automatic deduction of the final grade by 5% per day that they are late.

SCHEDULE OF CORE CLASS ACTIVITIES (there are weekend field trips not listed as part of the core class schedule)

Week 1, July 3 - 7

Monday Lecture: Introduction to microbiology and prokaryotes

Tuesday Lecture: The Germ Theory, bacterial growth and control

Laboratory Exercise 1

Microbial Biodiversity: Laboratory Manual pages 1 – 18

Field sampling from local open-air markets with street food vendors and the terrestrial environment.

Syllabus for Microbiology Laboratory – UC Davis Summer Abroad, Thailand

- Wednesday Lecture: Bacterial Physiology
Laboratory Exercise 2
Microbial Biodiversity, Laboratory Manual pages 18 - 22
Active student investigation of samples from Monday's field excursion. Employ methods for observing microbial diversity, to quantify bacterial growth, to enrich for and isolate bacteria from field samples. This activity will allow students to begin learning how to examine samples for contaminants that are pertinent to public health/food safety. Students will also gain an appreciation for microbial ecology and diversity in the world around them.
- Thursday Lecture: Diarrheal Disease and Foodborne bacterial infections
 Communicable Infectious Diseases
Laboratory Exercise 3
Microbial Biodiversity, Laboratory Manual pages 18 - 22
Complete the experiments, record results and prepare laboratory reports.
Bacterial Physiology, Laboratory Manual pages 23 - 30
Initiate and set up a series of biochemical tests commonly used to identify phenotypic traits that distinguish bacteria species. This exercise provides experience with techniques commonly employed in clinical, public health, agricultural and biotechnology laboratories.
- Friday Discussion
Laboratory Exercise 4
Microbial Biodiversity, Laboratory report due
Bacterial Physiology, Laboratory Manual pages 23 – 30
Complete the experiments, record results and prepare laboratory reports.

Week 2, July 10 - 14

- Monday Lecture: Biochemical and physical technologies for controlling of bacterial growth

Syllabus for Microbiology Laboratory – UC Davis Summer Abroad, Thailand

- Tuesday Lecture: Microbial-caused foodborne Intoxications
Laboratory Exercise 5
Water - Bacteriological Analysis: Laboratory Manual pages 30 – 35
Collect water and environmental samples for microbial testing. Water quality assessment using standardized approaches. Coliform detection as an indicator of pathogen contamination.
- Wednesday Lecture: Viruses
Laboratory Exercise 6
Water - Bacteriological Analysis: Laboratory Manual pages 30 - 35
Interpretation of results, complete biochemical tests and microscopy. This time also will be used to facilitate completion of laboratory reports.
- Thursday Lecture: The Impact of Polio, Influenza and HIV/AIDS on humanity
- Friday Lecture: Parasites – How do Human Acquire Parasitic Infections from Water, Food and Insect Vectors?

Week 3, July 17 - 21

- Monday Midterm Exam during lecture time
- Tuesday Travel to Southern Thailand
- Wednesday Field studies: microbial ecology – terrestrial environments
- Thursday Field studies: microbial ecology – marine environments
- Friday Field studies: microbial ecology – urban development

Week 4, July 24 - 28

- Monday Lecture: Probiotics -- The Role of Microbes in Promoting Health

Syllabus for Microbiology Laboratory – UC Davis Summer Abroad, Thailand

- Tuesday Lecture: How do humans innately resist infection?
Laboratory Exercise 7
Viruses – bacteriophage isolation: Laboratory Manual pages 36 –38
Viruses are among the most elusive of microbes affecting public health and the environment. Bacteriophages are a type of virus that infects bacteria. This participatory activity provides experience with field techniques use to study viruses.
- Wednesday Lecture: How do humans acquire immunity to pathogens?
Laboratory Exercise 8
Laboratory Manual pages 36 –38
Viruses – Isolation of bacteriophages: Finish experiments --
Interpretation of results, and complete biochemical tests. This time also will be used to facilitate completion of laboratory reports.
- Laboratory exercise 9
Probiotic organisms: This is a guided exercise with the instructors.
Field sampling of local and international fermented foods. Students will sample traditional fermented foods such as natural sausage, fermented fish, fish sauce, soy sauce, fermented soybean, yogurt and many other foods that are suggested to promote health.
- Thursday Exam 2 during lecture covers material from Weeks 3 and 4
- Friday Discussion and Reflection on the Program