

Instructor: Dr. Hua Shen

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Office Hours: MTWR: 3-5pm; TW: 8-9 am (by appointment)

Textbook: "Brock Biology of Microorganisms" by Madigan, Martinko, Parker, 10th Ed. 2002. Publisher: Prentice Hall

Course description:

The course is designed to introduce the students to the basic concepts of microbiology and related techniques in the study of microorganisms with emphasis on bacteria. The course will discuss the following topics: microbial cellular structure and function, nutrition and growth, inhibition of growth and sterilization, environmental effects on microbes, bacterial metabolism, viruses, and microbe-human interactions.

Tests and exams:

There will be four scheduled tests and examinations, each worth 25%. These add to 100%. There will be homework/essay that worth 6% in total as extra credit. **No make-up exams** will be given. If a student misses an exam due to a *bona fide*, documented illness or family emergency, then scores from the remaining exams will be prorated.

Grade calculation: Grade Scale: 100-90% A, 89-80% B, 79-70% C, 69-60% D, <60 F.

Knowledge, skills and abilities**A. Knowledge**

1. The type of microbes that exist and the characteristics that separate the different group from each other.
2. The history of microbiology and why the theory of spontaneous generation was a hindrance to the full development of microbiology.
3. How the theory of spontaneous generation was shown to be false and what resulted when this happened.
4. How it is possible to show that a microorganism causes a disease.
5. What the basic elements of life are and why carbon is at the center of organic life.
6. How the unique chemical and physical properties of water make life possible.
7. Why the properties of amphipathic substances such as phospholipids make cellular structure possible.
8. How eukaryotes differ from prokaryotes.
9. How Gram-positive organisms differ from Gram-negative ones and why this difference has medical significance.
10. Why cell walls are important to bacteria even if they are not the outside boundary of the cell.
11. What effect oxygen has on cells and why some microbes cannot tolerate it.
12. How is it possible to measure the growth of microorganisms and from this data draw a growth curve.

13. What the different phases of the growth of microorganisms and why log phase bacteria are used for experiments.
14. What osmotic pressure is and what its effect on the growth of microorganisms is.
15. How chemoautotrophs differ from other nutritional kinds of bacteria and why these organisms play such an important role in the recycling of plant nutrients in soil.
16. What selective, differential and enrichment media are and why they are important in microbiology.
17. Why the presence of oxygen generally leads to greater production of microbial cells than its absence does.
18. Why cellular respiration is a more efficient process than fermentation is.
19. What the products of fermentation are and what uses these products are put to.
20. Why some photoautotrophs produce oxygen and others do not.
21. What plasmids are and how molecular biologists use plasmids to deliver new genes to bacteria.
22. How bacteria accomplish genetic recombination in the absence of sexual reproduction.
23. What the difference is between genetic recombination and mutation.
24. What some procedures for sterilizing microbial media and what the advantages and disadvantages are in using them.
25. What the major kinds of microbes are and what their importance is both ecologically, medically and economically.
26. How the body protects itself from microbial invasion and how microbes overcome those defenses.
27. How to protect your food, clothing and other organic materials from microbial invasion.
28. How vaccines and antibiotics work.

YOU WILL BE TESTED ON THE KNOWLEDGE LISTED.

HOWEVER, THE SAME SUBJECTS ARE NOT COVERED EVERY TERM. SOME MAY NOT BE COVERED AND SOME ADDITIONAL SUBJECTS MAY BE ADDED. THIS LIST IS USEFUL IN STUDYING THE SUBJECT BUT IT IS ONLY TENTATIVE SINCE TIME AND OTHER CONSTRAINS WILL ALTER WHAT IS COVERED.

FOR STUDYING CONSULT LECTURE NOTES AND READING ASSIGNMENTS. ONLY WHAT IS TAKEN UP IN CLASS OR IS GIVEN AS A READING ASSIGNMENT WILL BE TESTED.

B. Skills and abilities

The ability to explain both orally and in writing to an audience not trained in microbiology the knowledge gained in the course.

Class attendance: Attendance to all lecture and be on time. Three unauthorized absences from lecture class are allowed, absence beyond the authorized limit will result in lowered letter grade.

How to study this course:

- This course requires you to use your good reading, writing and math skills and knowledge learnt from previous biology classes (BIOL112). **Review the required background** while the course goes along.
- **Familiarize yourself with the lecture topic before each lecture** will make lecture more effective. Also, it is crucial to **review the lecture material immediately** following the lecture.
- Participate actively in the class by **asking and answering questions**.
- **Study** for the test and exams **well ahead, and study effectively**.
- **Be professional.**
 - Be **on time** for lectures.
 - Be **organized**.
 - **Observe all deadlines** closely.
 - Equip yourself with **materials required** for the class such as text book, note book, pen & pencil, a staple, and computer scantron sheets for exams.

Introductory Microbiology Lecture Schedule (tentative)

Week	Dates	Laboratory Exercises	Chapter
1	Jan. 12-16	Introduction	1, 2
	<i>Jan. 19</i>	<i>Martin Luther King JR. Birthday, school closed</i>	
2	20-23	Microbial cellular structure and function	4
3	26-30	Microbial cellular structure and function	4
4	Feb. 2-4	Nutrition, isolation, sterilization	5
		Exam 1, Feb. 5 (BIOL24102), 6 (BIOL24101)	
5	9-13	Antimicrobial agents	20
6	16-20	Microbial growth I: kinetics	6
7	23-27	Microbial growth II: env. parameters	6
8	Mar. 1-3	Microbial metabolism diversity	5,17
		Midterm, Mar. 4 (BIOL24102), 5 (BIOL24101)	
9	<i>8-12</i>	<i>Spring break</i>	
10	15-19	Microbial metabolism diversity	5, 17

11	22-26	Essentials of Virology	9
12	29-Apr. 2	Microbial Genetics	10
		Exam 3, Apr. 1 (BIOL24102), 2 (BIOL24101)	
13	5-7	Microbial Genetics	10
14	12-16	Human-Microbe interactions	21
15	19-23	Epidemiology/ Food Microbiology	25/handouts
16	26	Food Microbiology	
16	May 3	Final Exam	

Note: There will be one guest lecture from ASM meeting and the date is to be announced. The instructor has the right to revise the contents of the syllabus.

Lecture notes: available on VSU “Blackboard” website (<http://blackboard.vsu.edu>), and subject to revision. It is the students’ responsibility to note the revision during the class period.

CONTRACT

To facilitate effective teaching and learning, students should show respect to your fellow student’s right of an effective learning environment by abide by the following rules.

1. No talking during class except when appropriate, such as when answering or asking questions.
2. Cell phones or beepers must be turned off in class.
Student who violates this rule will be asked to leave the class for the remainder of the class period. Violation of this rule the second time will result in one letter grade in addition of being asked to leave the class. Violation of this rule the third time will results in being permanently suspended from class and receive an “F” grade. The Biology Department Chair and Dean will be notified.
3. By accepting admission to Virginia State University, each student automatically makes a commitment to understand and abide by the “University Honor Code”. This class will be conducted in strict observance of the Honor Code. Refer to your Student Handbook for details.
4. Read and understand the syllabus and follow guidelines set forth in the syllabus.
5. If the syllabus is revised at any time during the semester, the revisions will be announced in class. You will be responsible for the revisions, even is you are absent at the time revisions are announced.

