

# MICROBIOLOGY 401

## MICROBIAL PHYSIOLOGY AND STRUCTURE

FALL SEMESTER, 2007

102 Chemistry Building

MWF 9:05-9:55

**INSTRUCTOR:** Dr. Don Bryant  
S-235 Frear Building  
Telephone: 865-1992  
e-mail: dab14@psu.edu

**OFFICE HOURS BY  
APPOINTMENT ONLY**

**TEXT:** *The Physiology and Biochemistry of Prokaryotes.* David White.  
Oxford University Press, New York, 2007. (3rd edition).

**ON RESERVE:** *Physiology of the Bacterial Cell.* F. C. Neidhardt, J. L. Ingraham & M.  
Schaechter. Sinauer Associates, Inc., Sunderland, MA, 1990

*The Physiology and Biochemistry of Prokaryotes.* David White.  
Oxford University Press, New York, 2007. (3rd edition).

**RECOMMENDED:** *Biology of Microorganisms.* Michael T. Madigan, John M. Martinko,  
and Jack Parker. Prentice Hall, New York, 2002 (Any recent edition).

**CLASS NOTES:** Class notes and other materials for this course are available on the World Wide Web. To access these materials, open a link using your Web browser (e.g., Netscape) to: <http://www.bmb.psu.edu/courses/micro401/default.htm> You may find it convenient to establish a bookmark for this link. Materials may be added to the site at any time, but I will attempt to have materials available to you prior to lectures. **Please note:** these materials are supplemental and will not serve as a substitute for attending lectures. A critical element that is missing in the notes is emphasis, and there is much too much material to sift through if you don't have some idea of what is most important. There will also be quite a significant number of handout materials throughout the semester.

The primary textbook is the best available in this area that is presently in print, and this textbook is not as expensive as many. I have used it extensively as a background resource in recent years but do not intend to cover the material in the order presented there. However, I prefer the philosophical approach to the subject taken by Neidhardt et al., which is on reserve. Unfortunately, this textbook is no longer available nor has it been updated.

### ADDITIONAL GENERAL REFERENCES

1. *Annual Review of Microbiology and Microbiology and Molecular Biology Reviews*
2. *Escherichia coli and Salmonella typhimurium: Cellular and Molecular Biology*, 2nd ed. American Society for Microbiology, Washington, D. C. 1996
3. *Methods of General and Molecular Bacteriology.* P. Gerhardt, American Society for Microbiology, Washington, D. C. 1993.

4. *Bacillus subtilis* and Its Closest Relatives. A. L. Sonenshein, J. A. Hoch, and R. Losick. American Society for Microbiology, Washington, D. C. 2002.
5. Microbial Physiology, 3rd Edition. Albert G. Moat and J. W. Foster. Wiley-Liss, New York, 1995.
6. Biology of the Prokaryotes, J. Lengeler, G. Drews, and H. Schlegel. Blackwell Science Publishers, Blackwell Science Ltd., 1998.
7. *Journal of Bacteriology*, *Molecular Microbiology*, *Microbiology*, and other specialty journals

## EVENING EXAMS

Examinations will **NOT** be multiple-choice and will consist of a variety of essay and short-answer questions (e.g., List the major components of an *E. coli* cell). **No sample examinations will be provided.** You **WILL** have to explain things to me in sufficient detail that I can see that you understand major concepts. You may be asked to draw general diagrams, cellular structures, etc. but you will **NOT** be asked to draw chemical structures (e.g., draw the structure of tryptophan) or identify a chemical structure. Likewise, you will not be asked to regurgitate all steps in the glycolytic pathway or the TCA cycle or the enzymes involved. I will sometimes specifically tell you things that you **WILL** have to know. If you are in lecture, you will hear this. If you are not—it's not my fault.

The first two examinations will be given in the evening, and the 3rd examination will be given in the period scheduled by the University as the final exam. Conflict exams will be given the same day as the evening exam by pre-determined appointment (usually the conflict exam will be at 4:00-4:30 on the same day of the evening exam). **Only in extraordinary circumstances will make-up exams be given, although accommodation for course scheduling conflicts in the evenings will be made. Exams that are missed will be scored as a zero and considered the “drop” score. In those cases for which make-up examinations are given, the exam will be an oral examination.**

<b>Exam 1</b>	<b>October 04, 2007</b>	<b>6:30 to 7:45 P. M.</b>	<b>073 Willard Building</b>
<b>Exam 2</b>	<b>November 06, 2007</b>	<b>6:30 to 7:45 P. M.</b>	<b>073 Willard Building</b>
<b>Exam 3</b>	<b>As scheduled by the University in Final Exam Period.</b>		

## TERM PAPER

A paper (minimum length for text, 10 pages, double spaced, 1-inch margins; maximum length for text, 15 pages) is required and will count for approximately **33%** of your final grade (and may **NOT** be dropped; see below). The paper should be formatted to have margins of **one inch** on the top, bottom and sides, and should be printed in **12-point font (Times or Times New Roman)**. Headings should be printed in bold font, and a title page should be included (not included as part of the 10-pages for text required!). I must approve the subject of the paper by e-mail no later than **October 10, 2007**; the subject and a very brief outline of the paper should be provided and approved by e-mail. Examples of some suitable topics are provided below, and the paper may be focused on a particular aspect of one of these subjects. **The effect of bacterial products on eucaryotic cells/plants/animals is NOT a suitable subject.** Figures and tables may be used and are encouraged, but these are not to be included in the body of the paper and will not count against the page limits. The paper must cite at least 10 references; 8 of these must be primary research articles (for example an article taken from the *Journal of Bacteriology*) while the remaining 2 references may be reviews, books, book chapters, or other reference materials). **Textbooks are NOT suitable as references.** Citations in the paper **MUST** follow the form used by the *Journal of Bacteriology* (see **journal for style**). The references should be listed alphabetically and then numbered per *ASM/Journal of Bacteriology* style; cite the references in the text by number. Failure to follow these very simple instructions will reduce the total possible points for the paper. All references should be listed at the end of the paper, and the references will not count as part of the 10-page minimum page limit for the paper. Papers may be submitted to me for grading at any time **until 5:00 P. M. on Monday, November 16, 2005**. You will submit an electronic file by e-mail as well as a hardcopy for evaluation and comments. For

each 24-h period (or part thereof) that the paper is late, the maximum possible score will be reduced by 10%.

**Suitable examples of topics for paper:**

1. flagellar structure/assembly
2. chemotaxis
3. bacterial photosynthesis
4. electron transport chains/complexes
5. protein secretion mechanisms
6. nitrogen fixation
7. methanogenesis
8. specific aspects of gene regulation
9. cell division
10. quorum sensing
11. signal transduction

**Example of a topic that is NOT suitable for term paper:**

1. Mechanism of action of diphtheria toxin

**Example of a topic that is suitable for term paper:**

1. Iron regulation of diphtheria toxin expression.

## GRADING

Your final letter grade will be determined by your performance on two mid-term examinations, the final examination, and the term paper (see above). Each examination will be worth approximately about 120 points, and the term paper will be worth 100 points. **You may drop your lowest exam score**, and thus the total points available for the course will be approximately 300-340 points. You may **NOT** take the three exams and drop the term paper--i. e., the paper is mandatory. Attendance is not formally considered, but **attendance and class participation can be used at the discretion of the instructor to adjust scores at grade borders**. The anticipated grade point average for the class will be approximately 2.7 to 3.0 based upon past experience.

## POLICY ON ACADEMIC INTEGRITY

All Penn State policies regarding ethics and honorable behavior apply to this course (see links below for policy statements). Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. For any material or ideas obtained from other sources, such as text or things you find on the web, in the library, etc., a source/reference must be given. **Plagiarism is one of the most serious forms of cheating/academic dishonesty!** Direct quotes from any source must be identified as such. **Plagiarism on the term paper led to failing grades for 2 students in 2003.** Each student in this course is expected to work entirely on her/his own while taking any exam, to complete assignments on her/his own effort without the assistance of others unless directed otherwise by the instructor, and to abide by University and Eberly College of Science policies about academic integrity and academic dishonesty. Academic dishonesty can result in assignment of "F" by the course instructors or "XF" by Judicial Affairs as the final grade for the student.

Any instances of academic dishonesty **WILL** be pursued under the University and Eberly College of Science regulations concerning academic integrity. Refer to the following URL for further details on the academic integrity policies of the Eberly College of Science:

<http://www.science.psu.edu/academic/Integrity/Index.html>

## COURSE CONTENT

Some of the writings, lectures, or presentations in this course might include material that some students could find offensive or that they do not personally believe to be true—which is fine. However, because the course content fulfills legitimate pedagogical goals, the instructor does not grant content accommodation requests.

**MICROBIOLOGY 401 FALL SEMESTER 2007 102 Chemistry Building: 9:00-9:55 AM**

**Approximate order of topics and relevant chapters in textbook; changes from year to year**

1.	August 27		Chapter 1, Web notes
2.	August 29		
3.	August 31		
	<b>September 3</b>	<b>Labor Day Holiday—NO CLASS</b>	
4.	September 5		Chapter 10
5.	September 7		
6.	September 10		
7.	September 12		
	<b>September 14</b>	<b>NO CLASS—Library Day for term paper topic</b>	
8.	September 17		Chapters 11 and 17
9.	September 19		
10.	September 21		
11.	September 24		
12.	September 26		
13.	September 28		
14.	October 1		
15.	October 3		Chapters 7 and 12
16.	<b>October 4</b>	<b>FIRST EVENING EXAM 6:30-7:45 PM</b>	<b>073 Willard Bldg.</b>
17.	October 5		
18.	October 8		Chapter 8
19.	<b>October 10</b>	<b>TERM PAPER TOPICS MUST BE APPROVED BY THIS DATE!!</b>	
20.	October 12		
21.	October 15		
22.	October 17		Chapter 3
23.	October 19		
24.	October 22		
25.	October 24		Chapter 4
26.	October 26		
27.	October 29		
28.	October 31		
	<b>November 2</b>	<b>NO CLASS</b>	Chapter 5 and 13
29.	November 5		
30.	<b>November 6</b>	<b>SECOND EVENING EXAM 6:30-7:45 PM</b>	<b>073 Willard Bldg.</b>
31.	November 7		
32.	November 9		
33.	November 12		Chapter 14
34.	November 14		

- 35. November 16**      *(Late Drop Deadline)* **TERM PAPERS DUE AT 5:00 P. M.**
- November 19-23**      **Thanksgiving Holiday—NO CLASS**
36. November 26      Chapter 16
37. November 28
38. November 30      Chapter 2
39. December 3      Chapter 15
40. December 5
41. December 7
42. December 10      Chapter 6
43. December 12
44. December 14      *(Last Day of Classes)*
- 45. December 17-December 21, 2007**      **Exam 3 (Scheduled as Final Exam by the University)**