

Microbiology 331- Structure and Function of Bacteria

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Office Hours: TBA

Lecture 01: MW 11:40-12:55
BS 244

Course Description: MICR 331 will cover the structure and function of bacteria.

Course Objectives: By completing this course, students will gain an understanding of the structures of bacterial cells and their function. Additionally, students will be exposed to critical reading of scientific articles related to bacterial structure and function.

Course Text: The *recommended* text, *Physiology and Biochemistry of Prokaryotes*. David White. Oxford University Press, New York, 2000. (3rd ed.); however, since there is no appropriate text for this course, scientific papers will be assigned during class to supplement the lectures. These papers have been compiled into a reader that can be purchased at the Student Bookmart. The Bookmart is located at 1725 N. Eastern Ave. All students are **REQUIRED** to purchase their own individual copy of this reader and have it with them in class throughout the quarter. Remaining articles will be posted on the instructor's website for download.

Drop Policy: Please see the schedule of classes for information. No exceptions will be made to the established University deadlines.

Expectations: Regular attendance and participation are required.

Exams: There will be no make-up exams or assignments. Please inform your instructor should any special circumstances arise.

Academic Honesty: Students are expected to read and abide by the University's Academic Honesty Policy, which can be found at www.calstatela.edu/academic/senate/handbook/ch5a.htm. Students who violate this policy will be subject to disciplinary action, and may receive a failing grade in the course for a single violation.

ADA Policy: Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation.

Grading:

In Class Assignments (5)	10 points each
Lecture Exam #1	100 points
Lecture Exam #2	100 points
Scientific Literature Exercise	50 points
Lecture Final Exam (cumulative)	200 points
TOTAL	500 points

Final Course Grade:

Percent of Total	Point Total	Letter Grade
91-100	>455	A
90-90.9	454-450	A-
89-89.9	449-445	B+
81-88.9	444-405	B
80-80.9	404-400	B-
76-79.9	399-380	C+
60-75.9	379-300	C
59-59.9	299-295	C-
50-58.9	294-250	D
Below 50	<250	F

Lecture Schedule:

Week	Date	Topic	Reading and Assignments
1	01/04/10	Overview of Structure and Function	Goodsell, D. S. (1998). Chapter 1. Introduction. <u>The Machinery of Life</u> . New York, Springer-Verlag: 1-9. Goodsell, D. S. (1998). Chapter 2. Molecular Machines. <u>The Machinery of Life</u> . New York, Springer-Verlag: 13-23. Goodsell, D. S. (1998). Chapter 4. Escherichia coli: One of the Simplest Cells. <u>The Machinery of Life</u> . New York, Springer-Verlag: 55-60. White, D. (2007). Chapter 1. Structure and Function. <u>The Physiology and Biochemistry of Prokaryotes</u> . New York, Oxford University Press, Inc.: 1-45.
	01/06/10	<i>The Cell and Its Organization</i>	White, D. (2007). Chapter 2. Growth and Cell Division. <u>The Physiology and Biochemistry of Prokaryotes</u> . New York, Oxford University Press, Inc.: 1-45. Salton, M. R. (1961). "Anatomy of Bacterial Surface." <u>Bacteriological Reviews</u> 25 (2): 77-99. Braun, V. and K. Rehn (1969). "Chemical Characterization, Spatial Distribution and Function of a Lipoprotein (Murein-Lipoprotein) of E Coli Cell Wall - Specific Effect of Trypsin on Membrane Structure." <u>European Journal of Biochemistry</u> 10 (3): 426-438.
2	01/11/10	<i>Cell Wall</i>	
	01/13/10	Cell Surface of Gram Negative Bacteria	Beveridge, T. J. (1990). "Mechanism of Gram Variability in Select Bacteria." <u>Journal of Bacteriology</u> 172 (3): 1609-1620. Beveridge, T. J. (1999). "Structures of gram-negative cell walls and their derived membrane vesicles." <u>Journal of Bacteriology</u> 181 (16): 4725-4733.
3	01/18/10	NO CLASS	CAMPUS HOLIDAY
	01/20/10	Cell Surface of Gram Positive Bacteria	Rogers, H. J. (1983). The Cell Walls of Bacteria. <u>Bacterial Cell Structure</u> , Van Nostrand Reinhold (UK) Co. Ltd.: 6-27.
4	01/25/10	Capsule and Slime Layer	Costerton, J. W., R. T. Irvin, et al. (1981). "The Bacterial Glycocalyx in Nature and Disease." <u>Annual Review of Microbiology</u> 35 : 299-324.
	01/27/10	NO CLASS	FURLOUGH DAY*
5	02/01/10	<i>Periplasmic Space</i>	Ferguson, S. J. (1992). The Periplasm. <u>Prokaryotic Structure and Function</u> . S. Mohan, C. Dow and C. J.A., Cambridge University Press: 311-339. Stock, J. B., B. Rauch, et al. (1977). "Periplasmic Space in Salmonella-Typhimurium and Escherichia-Coli." <u>Journal of Biological Chemistry</u> 252 (21): 7850-7861.
	02/03/10	Cytoplasmic Membrane	Rogers, H. J. (1983). The Membranes of Bacteria. <u>Bacterial Cell Structure</u> , Van Nostrand Reinhold (UK) Co. Ltd.: 28-53.

Week	Date	Topic	Reading and Assignments
6	02/08/10	Exam #1	
	02/10/10	Cytoplasmic Membrane <i>continued</i>	
7	02/15/10	The Cytoplasm	Vaniters.W (1965). "Symposium on Fine Structure and Replication of Bacteria and Their Parts .2. Bacterial Cytoplasm." <u>Bacteriological Reviews</u> 29 (3): 299-325. Kurland, C. G. (1972). "Structure and Function of Bacterial Ribosome." <u>Annual Review of Biochemistry</u> 41 : 377-408.
	02/17/10	Inner Structures of Bacteria	Drews, G. (1992). Intracytoplasmic Membranes in Bacterial Cells: Organization, Function and Biosynthesis. <u>Prokaryotic Structure and Function</u> . S. Mohan, C. Dow and C. J.A., Cambridge University Press: 249-274. Hannay, C. L. and P. Fitzjames (1955). "The Protein Crystals of <i>Bacillus-Thuringiensis Berliner</i> ." <u>Canadian Journal of Microbiology</u> 1 (8): 694. IMAGE ONLY. Higgins, I. J., D. J. Best, et al. (1981). "Methane-Oxidizing Microorganisms." <u>Microbiological Reviews</u> 45 (4): 556-590. Remsen, C. C., S. W. Watson, et al. (1968). "Fine Structure of Ectothiorhodospira Mobilis Pelsh." <u>Journal of Bacteriology</u> 95 (6): 2374-2392. Walsby, A. E. (1994). "Gas Vesicles." <u>Microbiological Reviews</u> 58 (1): 94-144. Watson, S. W. and M. Mandel (1971). "Comparison of Morphology and Deoxyribonucleic Acid Composition of 27 Strains of Nitrifying Bacteria." <u>Journal of Bacteriology</u> 107 (2): 563-569.
8	02/22/10	Cell Inclusions	Shively, J. M. (1974). "Inclusion-Bodies of Prokaryotes." <u>Annual Review of Microbiology</u> 28 : 167-187. Blakemore, R. P. (1982). "Magnetotactic Bacteria." <u>Annual Review of Microbiology</u> 36 : 217-238. Gorby, Y. A., T. J. Beveridge, et al. (1988). "Characterization of the Bacterial Magnetosome Membrane." <u>Journal of Bacteriology</u> 170 (2): 834-841.
	02/24/10	Endospores	Henriques, A. O. and C. P. Moran (2000). "Structure and assembly of the bacterial endospore coat." <u>Methods</u> 20 (1): 95-110. Driks, A. (1999). "Bacillus subtilis spore coat." <u>Microbiology and Molecular Biology Reviews</u> 63 (1): 1-20. Grossman, A. D. and R. Losick (1988). "Extracellular Control of Spore Formation in Bacillus-Subtilis." <u>Proceedings of the National Academy of Sciences of the United States of America</u> 85 (12): 4369-4373. Kaneko, I, R.H. Doi, and L.Y. Santo. (1974). "Bacterial Sporulation and Germination." <u>Cell</u> (Japan) also called <u>Gekkan Saibo</u> 6 :154-176. IMAGE ONLY.

Week	Date	Topic	Reading and Assignments
9	03/01/10	Exam #2	
	03/03/10	Nuclear Material	<p><i>Final Critical Review Due</i></p> <p>Eltsov, M. and B. Zuber (2006). "Transmission electron microscopy of the bacterial nucleoid." <u>Journal of Structural Biology</u> 156(2): 246-254.</p> <p>Robinow, C. and E. Kellenberger (1994). "The Bacterial Nucleoid Revisited." <u>Microbiological Reviews</u> 58(2): 211-232.</p> <p>Thanbichler, M., P. H. Viollier, et al. (2005). "The structure and function of the bacterial chromosome." <u>Current Opinion in Genetics & Development</u> 15(2): 153-162.</p>
10	03/08/10	Appendages	<p>Brinton, C. C. (1959). "Non-Flagellar Appendages of Bacteria." <u>Nature</u> 183(4664): 782-786.</p> <p>Giron, J. A., A. S. Y. Ho, et al. (1993). "Characterization of Fimbriae Produced by Enteropathogenic Escherichia-Coli." <u>Journal of Bacteriology</u> 175(22): 7391-7403.</p> <p>Ottow, J. C. G. (1975). "Ecology, Physiology, and Genetics of Fimbriae and Pili." <u>Annual Review of Microbiology</u> 29: 79-108.</p>
	03/10/10	Flagella and Motion	<p>Bardy, S. L., S. Y. M. Ng, et al. (2003). "Prokaryotic motility structures." <u>Microbiology-Sgm</u> 149: 295-304.</p>
	03/15/10	Final Exam (10:45-1:15 pm)	

*In July of 2009, members of the California Faculty Association voted to allow the California State University Chancellor to impose unpaid furlough days for all professors and lecturers at all 23 Cal State Campuses. The purpose of furloughs is to minimize the need for faculty layoffs given the current budget crisis. At Cal State LA, this means that most professors and lecturers are required to take 6 days of unpaid leave each quarter, during which time they are prohibited from performing any university work. My furlough days are January 15, 27 & 29 and February 19.