

BACTERIAL PHYSIOLOGY
MICR-430 Winter 2009
TR 4:20 pm – 5:35 pm, BS-246

Instructor

Dr. Howard Xu; Office: LKH-356; Office Hours: T: 2:00 pm – 3:20 pm; R: 10:40 am - noon; or by appointments
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Prerequisites: Micr331; Chem 431A, 432A; **Corequisites:** Chem431B, 432B

Required Textbook: The Physiology and Biochemistry of Prokaryotes, 3rd ed., by David White. Oxford University Press, Inc., New York, NY. (2nd edition is acceptable).

Additional Reference Textbooks: Microbial Physiology, 4th ed., by A. G. Moat, J. W. Foster and M. P. Spector, Wiley-Liss, Inc., New York, NY; Molecular Genetics of Bacteria, 2nd ed. By L. Snyder and W. Champness. ASM Press. Washington, DC.

Course Objectives

- To understand concepts in bacterial physiology with emphasis on basic bacterial biochemical pathways, metabolism and cellular development.
- To keep up with modern advancement in genomics and pathogenesis related to physiology.
- To advance technical analysis and written communication skills

Attendance

Attendance is strongly recommended since examinations will be based on materials presented in lectures.

Grading: 400 points total

Examination 1	90
Examination 2	90
Internet DNA analysis homework	30
Writing exercise homework	30
Final (comprehensive)	160

Final grades will be based on % of achievable points obtained:

Total points earned / 400 points x 100 = % achieved

	B+: 88-89%	C+: 78-79%	D+: 68-69%	F: ≤ 59%
A: ≥92%	B: 82-87%	C: 72-77%	D: 62-67%	
A-: 90-91%	B-: 80-81%	C-: 70-71%	D-: 60-61%	

In borderline cases (passing/ non-passing or grade levels), lecture attendance and active participation may be considered for the final outcome.

Web-based DNA analysis homework.

The students will be assigned a homework assignment involving retrieving, analyzing and comparing a bacterial gene sequence using web-based analysis tools (worth 30 points). Detailed assignment with instructions will be handed out on **January 22nd**. Homework is due on **Feb 12** immediately after class. Homework report handed-in late will result in deduction of report points (10% deduction per day after due date).

Scientific literature search and writing exercise.

The writing exercise will be worth 30 points and will consist of a summary report that explains a scientific paper related to Bacterial Physiology. The reference to the paper will be assigned to each student on **Feb 5th**. It is the responsibility of the student to find the paper via PubMed or library and print it out. The student will study the paper in detail and perform a background literature search to obtain at least two additional references (papers) published before and cited by this paper. The report shall cover the following four sections with clear subtitles: the **Background** of the research (why do it), major **Methods** used (how), **Results** obtained (what happened), **Conclusions** (significance to the field) and **References (naturally including the main reference)**. The report should follow routine rules relative to the format of species names and gene names. The explanation should be clear enough that a fellow classmate could read it and

understand it. The report should be 3 to 4 typed pages with double spacing between lines. Fonts of Times New Roman or Arial with 12 point size are to be used. The writing report is due after class on **March 5th**. Reports handed-in late will result in deduction of final report points (10% deduction per day after due date).

General Information

No make-up examinations. Missed exams will be given as “0 points” unless satisfactorily justified (e.g. doctors’ slips). The University Academic Honesty Policy and the Drop/Incomplete Policy explained in the University General Catalogue will be strictly followed. Students are responsible for the prerequisites for this course and are encouraged to discuss any questions regarding the policies and prerequisites with the instructor. Students with disabilities: please contact the instructor to arrange appropriate accommodations.

LECTURE SCHEDULE

DAY/DATE	TOPIC	TEXT CHAPTER
T/Jan 6	Overview of Bacterial Physiology	1, 2
R/Jan 8	Membrane bioenergetics	3
T/Jan 13	Energy production and metabolite transport	4, 16
R/Jan 15	Photosynthesis and fermentation pathways	5, 14
T/Jan 20	Central pathways of carbohydrate metabolism	8
R/Jan 22	Lipids and nitrogen metabolism (DNA analysis homework assigned)	9, 12
T/Jan 27	Examination 1 (90 pt)	
R/Jan 29	Methylotrophy	13
T/Feb 3	Macromolecular synthesis and processing: DNA and RNA	10
R/Feb 5	Macromolecular synthesis and processing: proteins (Writing exercise homework assigned)	10
T/Feb 10	Macromolecular synthesis and processing: cell wall	11
R/Feb 12	Protein transport (DNA analysis homework due on Feb 12 after class)	17
T/Feb 17	Bacterial genetics	Snyder book
R/Feb 19	Examination 2 (90 pt)	
T/Feb 24	Regulation of prokaryotic gene expression	6
R/Feb 26	Bacterial genomics and functional genomics	new info
T/Mar 3	Bacterial development	18
R/Mar 5	Bacterial physiological adaptation (Writing exercise due on Mar 5 after class)	18
T/Mar 10	Response to environmental stress	19
R/Mar 12	Bacterial pathogenesis	Moat book
T/Mar 17	Final Examination (4:30 pm – 7:00 pm) (160 points)	