



University of Florida
Department of Microbiology and Cell Science
Prokaryotic Cell: Structure and Function
MCB 4403 Section 3376 (3 credits)



FALL SEMESTER 2008

COURSE DESCRIPTION:

MCB 4403. Prokaryotic Cell Structure and Function. Credits: 3; Prereq: CHM 2211; MCB 3020, MCB 3020L with C or better. It is recommended that BCH 4024 or CHM 4207 be taken before or concurrent with MCB 4403. This course explores the structure and physiology of bacterial cells. The principles of energy and biosynthetic metabolism will be examined in aerobic and anaerobic microorganisms. Several current research topics in microbiology will also be covered including quorum sensing, proteases, chaperones, and microbes in extreme environments. Topics in microbial biotechnology will be discussed such as improvement of biological ethanol production and bioremediation.

COURSE INSTRUCTOR: Dr. Julie A. Maupin-Furlow

MCB4403 WEB PAGE: <http://maupin.ifas.ufl.edu/maupin/MCB4403.htm>

OFFICE HOURS: Tuesday 11:30 AM – 12:30 PM
Thursday 12:35 PM – 1:35 PM or by appointment
Rm. 1153 Microbiology and Cell Science Building (#981)
Phone: 352-392-4095
e-mail: jmaupin@ufl.edu

LECTURES: Tuesday, Period 4, 10:40 - 11:30 AM
Thursday, Period 4-5, 10:40 AM - 12:35 PM

FINAL EXAM PERIOD: Exam Period 18D, Thursday, December 18, 2008, 3:00 - 5:00 PM

LECTURE AND EXAM LOCATION:

Computer Science Engineering (CSE) Building , E119 Room..

COURSE OBJECTIVES:

- To become an expert on the structure and function of prokaryotic cells (bacteria and archaea).
- To develop the concepts and skills required to understand and critically evaluate research articles that address the physiology and biochemistry of prokaryotes.
- To apply the theories of bacterial cell physiology to current problems (*e.g.* controlling bacterial pathogens, engineering microorganisms for the high level production of biofuels and other products).

REQUIRED TEXTBOOK:

Kim, B. H., and G. M. Gadd. 2008. Bacterial physiology and metabolism. Cambridge University Press. Cambridge, UK. ISBN # 978-0-521-712309 paperback.

CLASS LECTURE NOTES:

Class lecture notes are available on WebCT Vista to assist you in understanding the material. The notes are NOT a substitute for attending class.

ADDITIONAL READINGS:

Additional readings, written by microbial physiologists who are experts in their field, will be listed during lectures. The articles are published in journals available through the UF library or Internet at no charge. These articles are intended to assist you with understanding the course material.

EVALUATION OF LEARNING:

Learning will be evaluated based on the following criteria:

3 × 125 points each (Exams I, II and III)

50 points (periodic assignments/quizzes)

425 points total

Exams: Three exams are scheduled throughout the semester for this course. Each exam is worth 125 points. The exams will focus on the material covered in class. The student is highly encouraged to read the textbook chapters noted in parenthesis prior to attending class to enhance their understanding of the material. Practice questions will be provided to assist you in understanding the format to be used for the exams.

Make-up policy: No make-up exams. If one exam is missed, it will result in a score of 0 for the test (see below for “Excused absences”). The final exam is mandatory.

Excused absences: Documentation MUST be provided for absences caused by serious illness, accident, jury duty or death in the immediate family. You MUST contact the instructor IN ADVANCE of the missed exam. An alternative time for the exam will be arranged by the instructor.

Assignments/Quizzes/Critiques: Attendance is expected and encouraged. During lecture, quiz questions or written assignments will be periodically administered to monitor class learning and attendance. Students are expected to meet all announced deadlines for assignments. A maximum of 50 points can be earned by participating in the class quizzes and assignments (grade: 50 points for presence and learning in over 95% of monitored lectures, 25 points for presence and learning in over 85% of monitored lectures, 15 points for presence and learning in over 75% of monitored lectures).

Extra-credit opportunities (20 points maximum): Attend and write a summary (1 ½ - 2 pages, 12 point font, double-spaced, 1 inch margin) of seminars presented at the Microbiology and Cell Science Department Seminar Room 1044 every Monday at 4 pm (5 points each). Summaries are due within the week each seminar is presented.

Final grades: Final grades are based on the following performance standard:

90 - 100 %	=	A
87 - 89	=	B +
83 - 86	=	B
80 - 82	=	B –
77 - 79	=	C +
73 - 76	=	C
70 - 72	=	C –
60 - 69	=	D
Less than 60 %	=	E

COURSE SCHEDULE:

Week 1

T 08/26 Introduction to course and prokaryotes (bacteria, archaea) (Ch 1 and 2)

R 08/28 Composition and structure of prokaryotic cells (Ch 2)

Week 2

T 09/02 Membrane transport – nutrient uptake and protein secretion (Ch. 3)

R 09/04 Membrane Transport – nutrient uptake and protein secretion (Ch. 3)

Week 3

T 09/09 Glycolysis and substrate level phosphorylation (Ch. 4)

R 09/11 TCA cycle, electron transport and oxidative phosphorylation (Ch. 5)

Week 4

T 09/16 TCA cycle, electron transport and oxidative phosphorylation (Ch. 5)

R 09/18 Biosynthesis and microbial growth (Ch. 6)

Week 5

T 09/23 Catch up and review of material

R 09/25 **Exam 1 (Chapters 1-5)**

Week 6

T 09/30 Biosynthesis and microbial growth (Ch. 6)

R 10/02 Protein Quality Control (Ch. 6 +)

Week 7

T 10/07 Cell division (Ch. 6 +)

R 10/09 Heterotrophic metabolism on substrates other than glucose (Ch. 7)

Week 8

T 10/14 Oxidative stress and anaerobic fermentation (Ch. 8 +)

R 10/16 Anaerobic fermentation (Ch. 8)

Week 9

T 10/21 Anaerobic respiration (Ch. 9)

R 10/23 Anaerobic respiration (Ch. 9, cont.)

Week 10

T 10/25 **Guest Lecture**

R 10/28 **Guest Lecture**

Week 11

T 11/04 Catch up and review of material

R 11/06 **Exam 2 (Chapters 6-9, Guest lectures)**

Week 12

T 11/11 Veteran's Day – no class

R 11/13 Chemolithotrophy (Ch. 10)

Week 13

T 11/18 Photosynthesis (Ch. 11)

R 11/20	Metabolic regulation (Ch. 12)
<u>Week 14</u>	
T 11/25	Metabolic regulation (Ch. 12)
R 11/27	Thanksgiving – no class
<u>Week 15</u>	
T 12/02	Quorum Sensing (Ch. 12_b)
R 12/04	Chemotaxis (Ch. 12_c)
<u>Week 16</u>	
T 12/08	Energy, environment and microbial survival (Ch. 13)
<u>Week 17</u>	
R 12/18	Exam 3 (Chapters 10 - 13), 3:00 – 5:00 PM

ACADEMIC HONESTY:

As a result of completing the registration form at the University of Florida, every student has signed the following statements: “I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.”

UF COUNSELING SERVICES:

Resources are available on-campus for students having personal problems or lacking clear career and academic goals that interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575. Personal and career counseling.
2. Student Mental Health, Student Health Care Center, 392-1171. Personal counseling.
3. Sexual Assault Recovery Services, Student Health Care Center, 392-1161. Sexual assault counseling.
4. Career Resource Center, Reitz Union, 291-1601. Career development assistance and counseling.

SOFTWARE USE:

All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

We, the member of the University of Florida, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES:

The Dean of Students Office provides individualized assistance for students with documented disabilities. Services are based upon student need and impact of their specific disability. There is no requirement for any student to self-identify as having a disability. However, students requesting academic accommodations must register with the Dean of Students Office and provide the appropriate documentation verifying their disability. The Dean of Students Office determines what is and is not appropriate documentation. Examples of accommodations that are available to students include, but are not limited to, registration assistance, approval of reduced course load, course substitutions, classroom and examination accommodations, auxiliary learning aids, additional course drops when disability related, and assistance in other university activities. The designated coordinator for compliance with Section 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) is the Assistant Dean of Students responsible for Students with Disabilities Programs, P202 Peabody Hall, 392-1261 (Voice), or 392-3008 (TDD).