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

FALL SEMESTER 2011

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

OFFICE HOURS: Wednesday 8-9 AM or by appointment
Rm. 1153 Microbiology and Cell Science Building (#981)
Phone: 352-392-4095
E-mail: jmaupin@ufl.edu

LECTURES: Tuesday, Period 9, 4:05 – 4:55 PM
Thursday, Period 8-9, 3:00 – 4:55 PM

LECTURE AND EXAM LOCATION:
MCCB 2102

Final Exam Period 14B: 10 AM – noon, December 14, 2011

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 prokaryotic cell physiology to current problems (e.g. controlling bacterial pathogens, engineering microorganisms for high level production of biofuels and renewable chemicals).
REQUIRED TEXTBOOK:

CLASS LECTURE NOTES:
Class lecture notes are available on the University of Florida E-learning in Sakai support services to assist you in understanding the material. You can access this account from the LSS homepage -- http://lss.at.ufl.edu/. The notes are NOT a substitute for attending class.

ADDITIONAL READINGS:
Research articles and reviews written and published by microbial physiologists (who are experts in their field) will serve as additional readings and are listed below and highlighted in the class schedule. 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:

- 200 points each × 3 exams (Exams I, II and III)
- 200 points (group presentation)
- 800 points total

Final grades will be based on the following performance standard:

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Exams: Three exams are scheduled throughout the semester for this course. Each exam is worth 200 points. The exams will focus on the material covered in class. The student should read the textbook chapters noted in parenthesis prior to attending class to enhance understanding of the material.

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”).

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.
Group presentation/summary (200 points total): At the beginning of the semester, the class will be divided by the instructor into 8 groups of 4 - 6 students per group. Each group will present a 20 min PowerPoint presentation (reserve 5 min of this time for a question/answer period) on an assigned topic/article and date. Presentations will be graded on the following:

1. Instructor’s evaluation of group presentation.................................................................100 pts
2. Summary of each article (1 ½ - 2 pages of text excluding your name, title etc.; double spaced; 1 inch margins; due on day that article is presented in class).................................................................................................................................8 x 10 pts each
3. Summary of your activities and your group member’s activities within your assigned group (1 page of text, double spaced, 1 inch margins, due on the Tuesday after your presentation).........................................................................................................................20 pts

Group 1 – 9/15 - Prokaryotic Cell Motility

Group 2 – 9/29 – Bacterial cell division

Group 3 – 10/6 – Microbial production of biofuels

Group 4 – 10/13 – Sulfate-reducing bacteria (SRBs)

Group 5 – 10/20 - Syntrophy

Group 6 – 11/3 – Cyanobacteria and cell differentiation

Group 7 – 11/10 – Regulatory RNAs

Group 8 – 11/17 - Bacterial c-di-GMP signaling
### COURSE SCHEDULE:

**Week 1**
- **T 08/23**: Introduction to course – Syllabus, pre-test and divide into groups
- **R 08/25**: Basic composition and structure of prokaryotic cells (Ch 2)

**Week 2**
- **T 08/30**: Membrane transport – nutrient uptake (Ch. 3a)
- **R 09/01**: Meetings to initiate group presentation/project

**Week 3**
- **T 09/06**: Membrane transport – protein translocation and secretion (Ch. 3b)
- **R 09/08**: Glycolysis and substrate level phosphorylation (Ch. 4)

**Week 4**
- **T 09/13**: TCA cycle (Ch. 5a)
- **R 09/15**: Electron transport and oxidative phosphorylation (Ch. 5b)

**Group 1 presentation**

**Week 5**
- **T 09/20**: Catch up and review of material
- **R 09/22**: **Exam 1 (Chapters 2-5)**

**Week 6**
- **T 09/27**: Biosynthesis: assimilation of inorganic compounds, amino acids (Ch. 6a)
- **R 09/29**: Biosynthesis: nucleotides, phospholipids, heme, murein (Ch. 6b); cell division (Ch. 6c)

**Group 2 presentation**

**Week 7**
- **T 10/04**: Heterotrophic metabolism on substrates other than glucose (Ch. 7)
- **R 10/06**: Anaerobic fermentation (Ch. 8)

**Group 3 presentation**

**Week 8**
- **T 10/11**: Anaerobic respiration (Ch. 9a)
- **R 10/13**: Methanogenesis (Ch. 9b)

**Group 4 presentation**

**Week 9**
- **T 10/18**: Acetogenesis and syntrophy (Ch. 9c)
- **R 10/20**: Chemolithotrophy (Ch. 10)

**Group 5 presentation**

**Week 10**
- **T 10/25**: Catch up and review of material
- **R 10/27**: **Exam 2 (Chapters 6-10)**

**Week 11**
- **T 11/01**: Photosynthesis (Ch. 11)
- **R 11/03**: Metabolic regulation (Ch. 12a)

**Group 6 presentation**

**Week 12**
- **T 11/08**: Metabolic regulation (Ch. 12b)
- **R 11/10**: Metabolic regulation (Ch. 12c)

**Group 7 presentation**

**Week 13**
- **T 11/15**: Metabolic regulation (Ch. 12d)
R 11/17     Metabolic regulation (Ch. 12e)  
Week 14  
T 11/22     Metabolic regulation (Ch. 12f)  
R 11/25     Thanksgiving – no class  
Week 15 
T 11/29     Catch up and review of material  
R 12/01     Exam 3 (Chapters 11 - 12)  
Week 16 
T 12/06     Course Summary

ACADEMIC HONESTY:
As a result of completing the registration form at the University of Florida, every student has signed the following 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.

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.

ACOMMODATIONS 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).
IMPORTANT LIBRARY LINKS:

Library Homepage
http://www.uflib.ufl.edu/
(for all library services and collections)

Course Reserves
https://ares.uflib.ufl.edu/
(for hard copy and/or electronic reserves)

Ask-A-Librarian
http://www.uflib.ufl.edu/ask/
(direct email or online chat for assistance)

IR @ UF
http://ufdcweb1.uflib.ufl.edu/ufdc/?g=ufirg
(to access the UF digital Institutional Repository)

Library Tools and Mobile Apps
http://www.uflib.ufl.edu/tools/
(smart phone apps, RSS feeds, and much more)

Subject Guides/Specialists
http://apps.uflib.ufl.edu/staffdir/SubjectSpecialist.aspx
(by discipline and/or course)