

Cover Sheet: Request 10800

MCB4XXX Archaea and Biotechnology

Info

Process	Course New Ugrad/Pro
Status	Pending
Submitter	Maupin,Julie A jmaupin@ufl.edu
Created	2/22/2016 2:30:48 PM
Updated	4/21/2016 1:06:16 PM
Description	Students will learn about the evolution, physiology, and molecular biology of Archaea including extremophiles. Principles of energy production and biosynthesis will be examined in aerobic and anaerobic habitats. Research that incorporates cutting-edge techniques and biotechnology applications for using archaea to solve real world problems will also be explored.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Agricultural and Life Sciences - General 514903000	Brendemuhl, Joel H	Incorrectly entered the college instead of dept for group but I have verified with the dept that they approve of this course.	3/4/2016
Deleted Maupin 2016_MCBxxx_Archaea_Syllabus_reviewed_summer A.docx					2/22/2016
Deleted Archaea and Biotechnology_syllabus using template_2-18-16.docx					2/23/2016
College	Recycled	CALS - College of Agricultural and Life Sciences	Brendemuhl, Joel H	The CALS CC requested this submission to be recycled to the department. Needed revisions have been sent to the submitter.	3/18/2016
No document changes					
Department	Approved	CALS - Agricultural and Life Sciences - General 514903000	Brendemuhl, Joel H	This course was reviewed a second time by the CALS CC on 4/15/16 and it was approved pending minor modifications.	4/21/2016
Deleted Re_ Archaea and Biotechnology Course - Maupin,Julie A.pdf					3/21/2016
Added Re_ Archaea and Biotechnology Course - Maupin,Julie A.pdf					3/21/2016
Deleted Archaea and Biotechnology_syllabus using template_2-18-16.docx					3/21/2016
Added Archaea and Biotechnology_syllabus_approved_042116.docx					4/21/2016
College	Approved	CALS - College of Agricultural and Life Sciences	Brendemuhl, Joel H	Corrections requested by the CALS CC on 4/15/16 have been made.	4/21/2016
No document changes					
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			4/21/2016
No document changes					

Step	Status	Group	User	Comment	Updated
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 10800

Info

Request: MCB4XXX Archaea and Biotechnology

Submitter: Maupin,Julie A jmaupin@ufl.edu

Created: 4/21/2016 1:13:32 PM

Form version: 4

Responses

Recommended PrefixMCB

Course Level 4

Number xxx

Lab Code None

Course TitleArchaea and Biotechnology

Transcript TitleArchaea-Biotechnology

Effective Term Earliest Available

Effective YearEarliest Available

Rotating Topic?No

Amount of Credit3

Repeatable Credit?No

S/U Only?No

Contact Type Regularly Scheduled

Degree TypeBaccalaureate

Weekly Contact Hours 3

Category of Instruction Advanced

Delivery Method(s)On-Campus

Online

Course Description Students will learn about the evolution, physiology, and molecular biology of Archaea including extremophiles. Principles of energy production and biosynthesis will be examined in aerobic and anaerobic habitats. Research that incorporates cutting-edge techniques and biotechnology applications for using archaea to solve real world problems will also be explored.

Prerequisites CHM 2211 (C) & (MCB 3020 or 3023) (C) & (MCB 3020L or 3023L) (C)

Co-requisites none

Rationale and Placement in Curriculum Study of archaea will provide the student with a holistic understanding how life works. Current classes provide students with only limited knowledge of these microbes, which cluster to one of three domains of life and account for an estimated 20 percent of the world's biomass. Archaea are critical to global carbon and nitrogen cycling and share deep evolutionary roots with eukaryotic cells. Due to their extremophilic properties and unusual metabolisms, Archaea also have the potential to produce methane gas and other useful products in a biobased economy.

Course Objectives • To become an expert on the molecular and cellular biology of Archaea.

- To gain the concepts and skills needed to understand and critically evaluate research articles that address Archaea biology.
- To creatively apply knowledge of Archaea biology to current problems (e.g. engineering Archaea for high level production of biofuels and renewable chemicals).

Course Textbook(s) and/or Other Assigned ReadingTextbook:

Cavicchioli, R. 2007. Archaea Molecular and Cellular Biology. ASM Press. Washington DC ISBN-13: 978-1-55581-391-8, ISBN-10: 1-55581-391-7

Other Assigned Reading:

References for Reading Material and Articles for Writing Assignments

- Albers, S.V., Van de Vossenberg, J.L., Driessen, A.J., and Konings, W.N. (2001). Bioenergetics and solute uptake under extreme conditions. *Extremophiles* 5, 285-294.
- Bang, C., and Schmitz, R.A. (2015). Archaea associated with human surfaces: not to be underestimated. *FEMS Microbiol Rev* 39, 631-648.
- Briegel, A., Ortega, D.R., Huang, A.N., Oikonomou, C.M., Gunsalus, R.P., and Jensen, G.J. (2015). Structural conservation of chemotaxis machinery across Archaea and Bacteria. *Environ Microbiol Rep* 7, 414-419.
- Charpentier, E., Richter, H., van der Oost, J., and White, M.F. (2015). Biogenesis pathways of RNA guides in archaeal and bacterial CRISPR-Cas adaptive immunity. *FEMS Microbiol Rev* 39, 428-441.
- Cui, M., Ma, A., Qi, H., Zhuang, X., and Zhuang, G. (2015). Anaerobic oxidation of methane: an "active" microbial process. *Microbiologyopen* 4, 1-11.
- Dridi, B., Raoult, D., and Drancourt, M. (2011). Archaea as emerging organisms in complex human microbiomes. *Anaerobe* 17, 56-63.
- Ellen, A.F., Zolghadr, B., Driessen, A.M., and Albers, S.V. (2010). Shaping the archaeal cell envelope. *Archaea* 2010, 608243.
- Koga, Y. (2012). Thermal adaptation of the archaeal and bacterial lipid membranes. *Archaea* 2012, 789652.
- Koster, M.J., Snel, B., and Timmers, H.T. (2015). Genesis of chromatin and transcription dynamics in the origin of species. *Cell* 161, 724-736.
- Lindås, A.C., and Bernander, R. (2013). The cell cycle of archaea. *Nat Rev Microbiol* 11, 627-638.
- Lopez, T., Dalton, K., and Frydman, J. (2015). The Mechanism and Function of Group II Chaperonins. *J Mol Biol*.
- Mayer, F., and Müller, V. (2014). Adaptations of anaerobic archaea to life under extreme energy limitation. *FEMS Microbiol Rev* 38, 449-472.
- Peeters, E., Driessen, R.P., Werner, F., and Dame, R.T. (2015). The interplay between nucleoid organization and transcription in archaeal genomes. *Nat Rev Microbiol* 13, 333-341.
- Pohlschröder, M., Hartmann, E., Hand, N.J., Dilks, K., and Haddad, A. (2005). Diversity and evolution of protein translocation. *Annu Rev Microbiol* 59, 91-111.
- Reeve, J.N. (1999). Archaeobacteria then ... Archaea now (are there really no archaeal pathogens?). *J Bacteriol* 181, 3613-3617.
- Schönheit, P., Buckel, W., and Martin, W.F. (2015). On the Origin of Heterotrophy. *Trends Microbiol*.
- Shin, D.S., Pratt, A.J., and Tainer, J.A. (2014). Archaeal genome guardians give insights into eukaryotic DNA replication and damage response proteins. *Archaea* 2014, 206735.
- Spang, A., Saw, J.H., Jørgensen, S.L., Zaremba-Niedzwiedzka, K., Martijn, J., Lind, A.E., van Eijk, R., Schleper, C., Guy, L., and Ettema, T.J. (2015). Complex archaea that bridge the gap between prokaryotes and eukaryotes. *Nature* 521, 173-179.
- Stahl, D.A., and de la Torre, J.R. (2012). Physiology and diversity of ammonia-oxidizing archaea. *Annu Rev Microbiol* 66, 83-101.
- Zeldes, B.M., Keller, M.W., Loder, A.J., Straub, C.T., Adams, M.W., and Kelly, R.M. (2015). Extremely thermophilic microorganisms as metabolic engineering platforms for production of fuels and industrial chemicals. *Front Microbiol* 6, 1209.

Weekly Schedule of Topics COURSE SCHEDULE

Please note the following:

1. Biotechnology applications will be emphasized at the end of the semester BUT will also be integrated in lectures throughout the entire course schedule.
2. The citations listed as readings in the course schedule are referring to research articles/reviews compiled in a reference list at the end of the syllabus.

Note that all of the topics are focused on Archaea (not Bacteria or Eukaryotes), thus, no course overlap is anticipated.

Week 1

- M 05/09 The Archaea: an Invitation to Evolution
Readings: (Ch. 1 - textbook) and (Spang et al., 2015)
T 05/10 General Characteristics and Important Model Organisms
Readings: (Ch. 2 - textbook)
W 05/11 DNA Replication and Cell Cycle
Readings: (Ch. 3 - textbook) and (Lindås and Bernander, 2013)

- R 05/12 DNA-Binding Proteins and Chromatin
Readings: (Ch. 4 - textbook) and (Koster et al., 2015)
F 05/13 Catch up and Review Material (meet in class/online)

Week 2

- M 05/16 Exam 1 (all material/lectures covered in Week 1)
T 05/17 Mechanisms of Genome Stability and Evolution
Readings: (Ch. 5 - textbook) and (Shin et al., 2014)
W 05/18 Transcription: Mechanism and Regulation
Readings: (Ch. 6 - textbook) and (Peeters et al., 2015)
R 05/19 RNA Processing, translation and aminoacyl-tRNA synthesis
Readings: (Ch. 7-9 - textbook) and (Charpentier et al., 2015)
F 05/20 Catch up and Review Material (meet in class/online).

Week 3

- M 05/23 Exam 2 (all material/lectures covered in Week 2)
T 05/24 Protein-Folding Systems
Readings: (Ch. 10 - textbook) and (Lopez et al., 2015)
W 05/25 Sensing, Signal Transduction, and Posttranslational Modification
Readings: (Ch. 11 - textbook)

- R 05/26 Central Metabolism - Heterotrophic
Readings: (Ch. 12 - textbook) and (Schönheit et al., 2015)
Methanogenesis and Anaerobic Oxidation of Methane
Readings: (Ch. 13 - textbook) and (Cui et al., 2015)
F 05/27 Catch up and Review Material (meet in class/online)

Week 4

- M 05/30 Memorial Day
T 05/31 Exam 3 (all material/lectures covered in Week 3)
W 06/01 Ammonia Oxidizing Archaea
Readings: (Stahl and de la Torre, 2012)
R 06/02 Bioenergetics of Extreme Energy Limitation
Readings: (Mayer and Müller, 2014)
F 06/03 Proteinaceous Surface Layers: Ultrastructure and Biochemistry
Readings: (Ch. 14 - textbook) and (Ellen et al., 2010)

Week 5

- M 06/06 Lipids: Biosynthesis, Function, and Evolution
Readings: (Ch. 15 - textbook) and (Koga, 2012)
T 06/07 Solute Transport
Readings: (Ch. 16 - textbook) and (Albers et al., 2001)
W 06/08 Protein Translocation into and across Archaeal Cytoplasmic Membranes
Readings: (Ch. 17 - textbook) and (Pohlschröder et al., 2005)
R 06/09 Catch up and Review Material (meet in class/online)
F 06/10 Exam 4 (all material/lectures covered in Weeks 4-5)

Week 6

- M 06/13 Flagellation and Chemotaxis
Readings: (Ch. 18 - textbook) and (Briegel et al., 2015)
T 06/14 Structure and Evolution of Genomes

Readings: (Ch. 19 - textbook)

Functional Genomics and Molecular Genetics of Archaea

Readings: (Ch. 20 and 21 - textbook)

W 06/15 Biotechnology

Readings: (Ch. 22 - textbook) and (Zeldes et al., 2015)

R 06/16 Catch up and Review Material (meet in class/online)

F 06/17 Exam 5 (all material/lectures covered in Week 6)

Grading Scheme Learning will be evaluated based on the following criteria:

500 points (5 exams × 100 points each)

200 points (4 written assignments × 50 points each)

+50 points (extra credit, optional)

700 points total

Exams (5 exams × 100 points each): Five equally weighted exams are scheduled throughout the semester (see course schedule for details on exam times). Each exam is worth 100 points. The final cumulative exam is optional and can be used to replace the lowest score of your Exam 1 to 5 scores. All exams will focus on the material covered in the online class lectures which are based on textbook and other scientific literature as noted in the syllabus. The student should first read the textbook chapters and references noted in course outline, second print out the lecture notes (in pdf format, online) and finally watch the online lectures to enhance understanding of the material. The exams are multiple choice/short answer and will be administered through Canvas e-learning by ProctorU services (<http://www.proctoru.com/index.php>). ProctorU allows you to take your exam on demand or by appointment. All appointments should be made at least 3 days in advance. To make an appointment, simply create an account at <http://go.proctoru.com>, log in, click on the "new exam" link and select the exam, date, and time you desire. You will receive a confirmation email of your reservation at the email address that you provided to ProctorU. Reservations made within 72 hours of your exam are subject to a \$5 late reservation fee. Students without an appointment can take their exam on demand within 15, 30 or 45 minutes utilizing "Take it Now". This premiere feature is designed to give test takers added convenience and only costs \$8.75. Late registrations and "Take it Now" are subject to availability.

Assignments (4 × 50 points each): Written assignments related to lecture material are due throughout the semester. The goal of these assignments is to enhance your understanding of the lecture material. The assignments also provide you with the opportunity to read scientific literature (outside of the textbook) and express yourself in written format (not simply answer multiple choice questions).

For each assignment (4 × 50 points each), students must:

- a. Choose one research review/article among a list of references provided by the instructor at the beginning of the semester.
- b. Obtain a copy of the assigned research article/review as soon as possible to allow time for reading the material. Please note that all of the assigned literature is available online FREE of charge to UF students in pdf format through Medline or the UF library at <http://www.uflib.ufl.edu/> (be sure to sign in via off-campus access if using a computer that is not linked to the UF mainframe). Please see the course instructor if you require assistance in gaining free access (you should not have to pay for this service).
- c. Read the assigned research article/review as soon as possible.
- d. Write a 500 word summary of the research article/review. The summary should be at least 500 words (typed) and encompass the major points. You will not receive a higher grade if you go over 700 words so please keep your summary focused. Discussion of future directions and applications is appropriate.
- e. DO NOT PLAGIARIZE (see <http://web.uflib.ufl.edu/msl/07b/studentplagiarism.html> for details).
- f. Upload the assignment onto Canvas (e-learning course website) by no later than

11:59 PM on the date of the deadline. Deadlines are posted below and are in the "COURSE SCHEDULE". Submit only one attachment per assignment. Only use file types: Word, PDF, HTML, RTF, or plain text. Always include the file extension.

Extra Credit (50 points, optional):

Please provide a comprehensive single 700 word summary that includes a brief discussion of your opinion regarding John Reeve's bold question "Archaeobacteria then ... Archaeas now (are there really no archaeal pathogens?)" (Reeve, 1999) with supporting evidence from recent human microbiome studies [for supporting evidence see reviews by (Bang and Schmitz, 2015) and (Dridi et al., 2011)].

Instructor(s) Julie Maupin-Furlow, Professor

Archaea and Biotechnology

MCB 4XXX/6XXX,

Summer A 2016 (annually)

Instructor

Julie A. Maupin-Furlow, PhD.

Contact information: email:jmaupin@ufl.edu, Department of Microbiology and Cell Science, office location Microbiology and Cell Science Bldg 981 Museum Rd., Rm 1053 phone 352-392-4095, office hours Tuesday/Thursday 3-4 PM or by appointment

Preferred methods for communication with the instructor regarding the course are by email.

Please resolve technical issues by contacting the UF helpdesk (e.g. <http://helpdesk.ufl.edu>; (352) 392-HELP (4357); helpdesk@ufl.edu · HUB 132).

Delivery Method/Meeting time

ALL LECTURES, EXAMS, ASSIGNMENTS AND QUESTION /ANSWER SESSIONS WILL BE AVAILABLE ONLINE. Weekly in class discussion/review sessions will be held on campus (Building/room TBD) for students to ask questions and interact with their instructor (see class schedule for meeting times). The sessions will be taped for those students who attend the class online. In total, the online/in-class meetings will be equivalent to 75 min per day for 6 weeks.

Credits - 3

Course Description

MCB 4xxx/6xxx. Archaea and Biotechnology. Credits: 3; Prereq: CHM 2211 (C) & (MCB 3020 or 3023) (C) & (MCB 3020L or 3023L) (C). Students will learn about the evolution, physiology, and molecular biology of Archaea including extremophiles. Principles of energy production and biosynthesis will be examined in aerobic and anaerobic habitats. Research that incorporates cutting-edge techniques and biotechnology applications for using archaea to solve real world problems will also be explored.

Course Objectives/Goals/Learning Outcomes

- To become knowledgeable on the molecular and cellular biology of Archaea.
- To gain the concepts and skills needed to understand and critically evaluate research articles that address Archaea biology.
- To creatively apply knowledge of Archaea biology to current problems (e.g. engineering Archaea for high level production of biofuels and renewable chemicals).

Course Material and Assignments

All required course materials will be available through the Canvas e-Learning site (<http://elearning.ufl.edu/>). Instructions for and submission of assignments will also be through Canvas.

Exams (5 exams × 100 points each):

- Five equally weighted exams are scheduled throughout the semester (see course schedule for details on exam times). Each exam is worth 100 points. The final cumulative exam is optional and can be used to replace the lowest score of your Exam 1 to 5 scores.
- All exams will focus on the material covered in the online class lectures which are based on textbook and other scientific literature as noted in the syllabus. The student should first read the textbook chapters and references noted in course outline, second print out the lecture notes (in pdf format, online) and finally watch the online lectures to enhance understanding of the material.
- The exams are multiple choice/short answer and will be administered through Canvas e-learning by ProctorU services (<http://www.proctoru.com/index.php>). ProctorU allows you to take your exam on demand or by appointment. All appointments should be made at least 3 days in advance. To make an appointment, simply create an account at <http://go.proctoru.com>, log in, click on

the “new exam” link and select the exam, date, and time you desire. You will receive a confirmation email of your reservation at the email address that you provided to ProctorU. Reservations made within 72 hours of your exam are subject to a \$5 late reservation fee. Students without an appointment can take their exam on demand within 15, 30 or 45 minutes utilizing “Take it Now”. This premiere feature is designed to give test takers added convenience and only costs \$8.75. **Late registrations and “Take it Now” are subject to availability.**

Assignments (4 x 50 points each):

- Written assignments related to lecture material are due throughout the semester. The goal of these assignments is to enhance your understanding of the lecture material. The assignments also provide you with the opportunity to read scientific literature (outside of the textbook) and express yourself in written format (not simply answer multiple choice questions).
- For each assignment, students must:
 - a. **Choose one research review/article among a list of references provided by the instructor at the beginning of the semester.**
 - b. Obtain a copy of the assigned research article/review as soon as possible to allow time for reading the material. Please note that all of the assigned literature is available online FREE of charge to UF students in pdf format through Medline or the UF library at <http://www.uflib.ufl.edu/> (be sure to sign in via off-campus access if using a computer that is not linked to the UF mainframe). Please see the course instructor if you require assistance in gaining free access (you should **not** have to pay for this service).
 - c. Read the assigned research article/review as soon as possible.
 - d. **Write a 700 word summary of the research article/review.** The summary should be at least **700 words** (typed) and encompass the major points. You will not receive a higher grade if you go over 700 words so please keep your summary focused. Discussion of future directions and applications is appropriate.
 - e. DO NOT PLAGIARIZE (see <http://web.uflib.ufl.edu/msl/07b/studentplagiarism.html> for details).
 - f. Upload the assignment onto Canvas (e-learning course website) by no later than 11:59 PM on the date of the deadline. Deadlines are posted below and are in the “COURSE SCHEDULE”. Submit only one attachment per assignment. Only use file types: Word, PDF, HTML, RTF, or plain text. Always include the file extension.
 1. Summary of (Spang et al., 2015) – Due F 05/13
 2. Summary of (Shin et al., 2014) - Due F 05/20
 3. Summary of (Lopez et al., 2015) - Due F 05/27
 4. Summary of (Mayer and Müller, 2014) - Due M 06/06

Extra Credit (50 points, optional):

- Please provide a comprehensive single 700 word summary that includes a brief discussion of your opinion regarding John Reeve's bold question "Archaeobacteria then ... Archaea now (are there really no archaeal pathogens?)" (Reeve, 1999) with supporting evidence from recent human microbiome studies [for supporting evidence see reviews by (Bang and Schmitz, 2015) and (Dridi et al., 2011)].

MCB6000 level Summary Paper (**Graduate Students ONLY**):

- The summary paper is an overview of a topic related to prokaryotic biochemistry, metabolism and/or cell physiology of interest to you. The paper must be typed (double-spaced with 1 inch margins). The summary paper should include **10 pages of text plus extra pages for references**, a title page and figures (the latter is optional but enhances the ability to convey the information within the text). The paper is not a summary of your graduate research findings but is instead a summary of peer-reviewed research articles that have been published in scientific journals.
- Please contact the instructor early in the semester to discuss the topic of your summary paper (including potential references you will use for the final paper). This discussion will enable me to confirm that your topic is relevant to the area of prokaryotic cell structure and function and has an adequate amount of information available to write a comprehensive summary.
- Please upload the paper through Canvas e-learning by the deadline indicated on the class schedule. Note that your submission will be automatically scanned by TurnItIn for plagiarism. If you need assistance in understanding what is considered plagiarism please ask me.
- **Please use the Journal "Cell" for citation and reference formats:**
<http://www.cell.com/cell/authors>
- You are highly encouraged to use "EndnoteWeb" as your reference management software – it's free for UF students <http://web.uflib.ufl.edu/endnoteweb.html>

Required Textbooks

Cavicchioli, R. 2007. Archaea Molecular and Cellular Biology. ASM Press. Washington DC ISBN-13: 978-1-55581-391-8, ISBN-10: 1-55581-391-7

Weekly Course Schedule

Week 1

M 05/09	01_The Archaea: an Invitation to Evolution Readings: (Ch. 1 - textbook) and (Spang et al., 2015)
T 05/10	02_General Characteristics and Important Model Organisms Readings: (Ch. 2 - textbook)
W 05/11	03_DNA Replication and Cell Cycle

R 05/12	Readings: (Ch. 3 - textbook) and (Lindås and Bernander, 2013) 04_DNA-Binding Proteins and Chromatin
F 05/13	Readings: (Ch. 4 - textbook) and (Koster et al., 2015)
F 05/13	Catch up and Review Material (meet in class/online);
	Summary 1 of (Spang et al., 2015) Due
	<u>Week 2</u>
M 05/16	Exam 1 (all material/lectures covered in Week 1)
T 05/17	05_Mechanisms of Genome Stability and Evolution Readings: (Ch. 5 - textbook) and (Shin et al., 2014)
W 05/18	06_Transcription: Mechanism and Regulation Readings: (Ch. 6 - textbook) and (Peeters et al., 2015)
R 05/19	07_RNA Processing, translation and aminoacyl-tRNA synthesis Readings: (Ch. 7-9 - textbook) and (Charpentier et al., 2015)
F 05/20	Catch up and Review Material (meet in class/online).
F 05/20	Summary 2 of (Shin et al., 2014) Due
	<u>Week 3</u>
M 05/23	Exam 2 (all material/lectures covered in Week 2)
T 05/24	08_Protein-Folding Systems Readings: (Ch. 10 - textbook) and (Lopez et al., 2015)
W 05/25	09_Sensing, Signal Transduction, and Posttranslational Modification Readings: (Ch. 11 - textbook)
R 05/26	10_Central Metabolism - Heterotrophic Readings: (Ch. 12 - textbook) and (Schönheit et al., 2016)
	11_Methanogenesis, CO ₂ fixation and Anaerobic Oxidation of Methane Readings: (Ch. 13 - textbook) and (Cui et al., 2015)
F 05/27	Catch up and Review Material (meet in class/online)
F 05/27	Summary 3 of (Lopez et al., 2015) Due
	<u>Week 4</u>
M 05/30	Memorial Day
T 05/31	Exam 3 (all material/lectures covered in Week 3)
W 06/01	12_Ammonia Oxidizing Archaea Readings: (Stahl and de la Torre, 2012)
R 06/02	13_Bioenergetics of Extreme Energy Limitation Readings: (Mayer and Müller, 2014)
F 06/03	14_Proteinaceous Surface Layers: Ultrastructure and Biochemistry Readings: (Ch. 14 - textbook) and (Ellen et al., 2010)
	<u>Week 5</u>
M 06/06	15_Lipids: Biosynthesis, Function, and Evolution Readings: (Ch. 15 - textbook) and (Koga, 2012)
M 06/06	Summary 4 of (Mayer and Müller, 2014) Due
T 06/07	16_Solute Transport Readings: (Ch. 16 - textbook) and (Albers et al., 2001)
W 06/08	17_Protein Translocation into/across Archaeal Cytoplasmic Membranes

R 06/09	Readings: (Ch. 17 - textbook) and (Pohlschröder et al., 2005)
F 06/10	Catch up and Review Material (meet in class/online)
<u>Week 6</u>	Exam 4 (all material/lectures covered in Weeks 4-5)
M 06/13	18_Flagellation and Chemotaxis
	Readings: (Ch. 18 - textbook) and (Briegel et al., 2015)
M 06/13	Extra Credit Assignment (optional)
T 06/14	19_Structure and Evolution of Genomes
	Readings: (Ch. 19 - textbook)
	20_Systems Biology, Functional Genomics, and Molecular Genetics of Archaea -- Readings: (Leigh et al., 2011)
W 06/15	21_Biotechnology
	Readings: (Ch. 22 - textbook) and (Zeldes et al., 2015)
W 06/15	MCB6000 level Summary Paper (Graduate Students ONLY)
R 06/16	Catch up and Review Material (meet in class/online)
F 06/17	Exam 5 (all material/lectures covered in Week 6)

References for Reading Material and Writing Assignments

- Albers, S.V., Van de Vossenbergh, J.L., Driessen, A.J., and Konings, W.N. (2001). Bioenergetics and solute uptake under extreme conditions. *Extremophiles* 5, 285-294.
- Bang, C., and Schmitz, R.A. (2015). Archaea associated with human surfaces: not to be underestimated. *FEMS Microbiol Rev* 39, 631-648.
- Briegel, A., Ortega, D.R., Huang, A.N., Oikonomou, C.M., Gunsalus, R.P., and Jensen, G.J. (2015). Structural conservation of chemotaxis machinery across Archaea and Bacteria. *Environ Microbiol Rep* 7, 414-419.
- Charpentier, E., Richter, H., van der Oost, J., and White, M.F. (2015). Biogenesis pathways of RNA guides in archaeal and bacterial CRISPR-Cas adaptive immunity. *FEMS Microbiol Rev* 39, 428-441.
- Cui, M., Ma, A., Qi, H., Zhuang, X., and Zhuang, G. (2015). Anaerobic oxidation of methane: an "active" microbial process. *Microbiologyopen* 4, 1-11.
- Dridi, B., Raoult, D., and Drancourt, M. (2011). Archaea as emerging organisms in complex human microbiomes. *Anaerobe* 17, 56-63.
- Ellen, A.F., Zolghadr, B., Driessen, A.M., and Albers, S.V. (2010). Shaping the archaeal cell envelope. *Archaea* 2010, 608243.
- Koga, Y. (2012). Thermal adaptation of the archaeal and bacterial lipid membranes. *Archaea* 2012, 789652.
- Koster, M.J., Snel, B., and Timmers, H.T. (2015). Genesis of chromatin and transcription dynamics in the origin of species. *Cell* 161, 724-736.

Leigh, J.A., Albers, S.V., Atomi, H., and Allers, T. (2011). Model organisms for genetics in the domain Archaea: methanogens, halophiles, *Thermococcales* and *Sulfolobales*. *FEMS Microbiol Rev* 35, 577-608.

Lindås, A.C., and Bernander, R. (2013). The cell cycle of archaea. *Nat Rev Microbiol* 11, 627-638.

Lopez, T., Dalton, K., and Frydman, J. (2015). The Mechanism and Function of Group II Chaperonins. *J Mol Biol* 427, 2919-2930.

Mayer, F., and Müller, V. (2014). Adaptations of anaerobic archaea to life under extreme energy limitation. *FEMS Microbiol Rev* 38, 449-472.

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[Exam Dates/Calendar/Critical dates and deadlines]

Exam Dates

M 05/16 Exam 1 (all material/lectures covered in Week 1)

M 05/23	Exam 2 (all material/lectures covered in Week 2)
T 05/31	Exam 3 (all material/lectures covered in Week 3)
F 06/10	Exam 4 (all material/lectures covered in Weeks 4-5)
F 06/17	Exam 5 (all material/lectures covered in Week 6)

Writing assignment deadlines

F 05/13	Summary of (Spang et al., 2015)
F 05/20	Summary of (Shin et al., 2014)
F 05/27	Summary of (Lopez et al., 2015)
M 06/06	Summary of (Mayer and Müller, 2014)
M 06/13	Extra Credit Summary (optional)

MCB6XXX summary paper deadline (Graduate Students ONLY)

W 06/15	10 page summary paper plus references
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[Exam Administration - ProctorU]

All exams will be administered through ProctorU using Canvas in E-learning with students using personal computers. The exam may be taken at any location approved by ProctorU during previously announced times.

For students to sign up for a ProctorU account go to:

<http://www.proctoru.com/forstudents.php>

Evaluation of Learning/Grades

MCB4xxx learning will be evaluated based on the following criteria:

500 points (5 exams × 100 points each)
 200 points (4 written assignments × 50 points each)
+50 points (extra credit, optional)
 700 points total

MCB6xxx learning will be evaluated based on the following criteria:

500 points (5 exams × 100 points each)
 200 points (4 written assignments × 50 points each)
 200 points (summary paper/project – this is only for the MCB6000 level course)
+50 points (extra credit, optional)
 900 points total

[Materials and Supplies Fees]

There are no additional fees for this course.

Grading Policy

Final grades will be based on the following performance standard:

95 - 100 %	= A
90 - 94 %	= A-
87 - 89 %	= B+
84 - 86 %	= B
80 - 83 %	= B-
77 - 79 %	= C+
74 - 76 %	= C
70 - 73 %	= C-
60 - 69 %	= D
Less than 60 %	= E

More information on grades and grading policies is here:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Class Attendance and Make-Up Policy

Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation. Excused absences from exams and/or assignments (e.g., illness, serious family emergency, military obligations, religious holidays) must be communicated by formal signed documentation to the instructor prior to the missed exam or assignment. Appropriate documentation **MUST** be provided for the absence caused by serious illness, accident, jury duty or death in the immediate family. You **MUST** contact the instructor **IN ADVANCE** of the missed exam or assignment. An alternative time for the exam and/or assignment will be arranged by the instructor.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Campus Resources

Resources are available on campus for students having personal problems or lacking clear career and academic goals, which interfere with their academic performance.

These resources include:

Health and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
- Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575;
- Sexual Assault Recovery Services (SARS) at the Student Health Care Center, 392-1161.
- For emergencies call: University Police Department, 392-1111 (or 9-1-1 for emergencies). <http://www.police.ufl.edu/>

Academic Resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.
- Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <http://www.crc.ufl.edu/>
- Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <http://writing.ufl.edu/writing-studio/>

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

Class demeanor

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones and restrict eating to outside of the classroom. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

Netiquette guide for online courses

It is important to recognize that the online classroom is in fact a classroom, and certain behaviors are expected when you communicate with both your peers and your instructors. These guidelines for online behavior and interaction are known as

netiquette.

<http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

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.

Microsoft Office 365 Software is free for UF students

<http://www.it.ufl.edu/gatorcloud/free-office-365-downloads/>

Other free software is available at:

<http://www.software.ufl.edu/>

To check for availability of the media and technical requirements, contact the UF Computing Help Desk at (352)392-HELP(4357).

University of Florida Complaints Policy and Student Complaint Process

Most problems, questions and concerns about the course will be resolved by professionally communicating with the instructor or the TAs.

The University of Florida believes strongly in the ability of students to express concerns regarding their experiences at the University. The University encourages its students who wish to file a written complaint to submit that complaint directly to the department that manages that policy.

If a problem really cannot be resolved by communicating with the instructor or the TAs you can contact

- Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>.

University of Florida U Matter

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Re: Archaea and Biotechnology Course

Wayne,Marta L

Mon 3/21/2016 12:50 PM

To:Maupin,Julie A <jmaupin@ufl.edu>;

Cc:Pharies,David A <pharies@ufl.edu>; Oli,Monika <moli@ufl.edu>; Triplett,Eric <ewt@ufl.edu>; Davis, Ellen Christine <christine.davis@ufl.edu>;

Hi there,

This sounds like a great class. One I'd enjoy taking in all my free time! No conflicts.

Thank you for consulting us,
Marta

Marta L. Wayne, Ph. D.
Professor and Chair
P.O. Box 118525
Department of Biology
University of Florida
Gainesville, FL 32611-8525
(courier: 876 Newell Drive)
vox: 352-392-9925
fax: 352-392-3704
<http://people.biology.ufl.edu/mlwayne/>

On Mar 21, 2016, at 9:28 AM, Maupin,Julie A <jmaupin@ufl.edu> wrote:

Dear Marta/David,

Hope all is well. This email is just a followup on the email I sent last week regarding the need for the Department of Biology to address potential overlap with the course I propose entitled "Archaea and Biotechnology". Attached is the syllabus. Please note that my research expertise is in the Biochemistry, Genetics and Molecular Biology of Archaea - which will provide a nice perspective for the undergraduate/graduate students enrolled in this course.

Thanks for your help on this matter.

With best regards,
Julie

Julie A. Maupin-Furlow, Ph.D. Professor University of Florida Department of Microbiology and Cell Science PO Box 110700 Bldg 981, Museum Rd. Gainesville, FL 32611-0700 Tel: (352) 392-4095
Fax: (352) 392-5922 email: jmaupin@ufl.edu



From: Maupin,Julie A
Sent: Thursday, March 17, 2016 2:30 PM
To: Wayne,Marta L
Cc: Triplett,Eric
Subject: Archaea and Biotechnology Course

Dear Marta,

Hope all is well for you. Attached please find a syllabus for the course "Archaea and Biotechnology" that is proposed to be offered through the Department of Microbiology and Cell Science. Concern was raised at the recent CALS curriculum committee that there could be overlap in content with courses offered in the Department of Biology. The course is focused on the physiology and biochemistry of Archaea which is not offered at UF to my knowledge. Can you please address this concern by way of a letter or email of response to me? I will modify the course accordingly to prevent overlap if needed and update the committee.

Thanks,
Julie

Julie A. Maupin-Furlow, Ph.D. Professor University of Florida Department of Microbiology and Cell Science PO Box 110700 Bldg 981, Museum Rd. Gainesville, FL 32611-0700 Tel: (352) 392-4095
Fax: (352) 392-5922 email: jmaupin@ufl.edu



<Archaea and Biotechnology_syllabus using template_2-18-16.docx>