Microbiology 4120
Microbial Physiology and Diversity
Autumn 2013

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M, W, F 1:50pm – 2:45pm
Room: Postle Hall

Recommended Text:

Joan L. Slonczewski & John W. Foster (authors)
Microbiology – An Evolving Science (Second edition, 2011)
W. W. Norton & Company

Grading:

There will be three exams throughout the semester
(Sept. 20th, Oct. 23rd, and Dec. 9th)
that will count 25 % each toward the final grade. The remaining 25 % will be based on in-lecture quizzes (5 out of 7 = 10 %) and three assignments (5 % each = 15 %).

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; phone 292-3307, http://www.ods.ohio-state.edu/.

If you have a special problem that might interfere with taking the exam, please discuss it as soon as possible with me. Please do this before the exam, and do not leave it until the last minute.
There will not be make-ups for unexcused absences on exams.

There **are no make-ups for quizzes** (classes) missed.

Students are advised to review the Ohio State University Code of Student Conduct (http://studentaffairs.osu.edu/resource_csc.asp), section 3335-23-04 which lists examples of **academic misconduct (including plagiarism)**.

Date	Topic

Part I From elements to cellular structures

August 21 (W)	**L1: Introduction** (Definition of Microbial Physiology and Diversity, know your basic Chemistry and Microbiology!)
23 (F)	**L2: Composition of a bacterial cell** (Chemical elements → macromolecules → cellular structures)
26 (M)	**L3: Microbe of the week © PH: *Escherichia coli*** (An enteric Gram-negative γ-proteobacterium)
28 (W)	**L4: Microbial growth I** (Growth phases of populations - batch cultures)
30 (F)	**L5: Microbial growth II** (Growth rate, growth yield)
September 2 (M)	**No class (Labor Day)**
4 (W)	**L6: Microbe of the week: *Bacillus subtilis*** (A soil Gram-positive, spore-forming firmicute)
6 (F)	**L7: Cell envelope** (Overview of a Gram-negative cell envelope)
9 (M)	**L8: Cell envelope biogenesis** (Outer membrane protein transport and assembly, lipopolysaccharide biogenesis)
11 (W)	**L9: Complex I assembly** (Biogenesis and assembly of a cytoplasmic membrane multisubunit complex)
13 (F)	**L10: Physiological function of cytoplasmic membrane,** (Barrier, transport, energy conservation)
16 (M)	**L11: Microbes of the week:** ***Ignicoccus hospitalis/Nanoarchaeum equitans*** (An archaeal symbiosis)
18 (W)	**L12: Review**

September 20th, Friday,
in class midterm I

Date	Topic

Part II Anabolism (Assimilation)

September 23 (M)	**L14: Microbe of the week: *Rhizobium leguminosarum*** (A legume endosymbiont, nitrogen fixation)
25 (W)	**L15: Precursor metabolites I** (Central, intermediary, and peripheral metabolism, basis for flux analyses)
27 (F)	**L15: Precursor metabolites II** (Interconversion of precursor metabolites, anaple(u)rotic reaction sequences)
30 (M)	**L17: Microbe of the week: *Synechococcus* sp.** (Cyanobacteria, CO_2 fixation, autotrophy)
October 2 (W)	**L18: Fatty acid biosynthesis I** (Acetyl-CoA carboxylase (biotin), fatty acid synthase complex)
4 (F)	**L19: Fatty acid biosynthesis II** (Extender unit malonyl-ACP, elongation, saturated versus unsaturated fatty acids)
7 (M)	**L20: Microbe of the week: *Methanosarcina barkeri*** (A methanogenic archeaon, pyrrolysine, O)
9 (W)	**L21: Amino acid biosynthesis** (Glutamate, aspartate, etc. –families, transaminases, regulation by feedback inhibition)
11 (F)	**L22: Sugar biosynthesis** (Gluconeogenesis)
14 (M)	**L23: Microbe of the week: *Streptomyces coelicolor*** (A soil actinomycetes species, antibiotic producer)
16 (W)	**L24: Secondary metabolites I** (Polyketide biosynthesis)
18 (F)	**L25: Secondary metabolites II** (Non-ribosomal peptide synthesis)
21 (M)	**L26: Review**

October 23th, Wednesday
in class midterm II

Date	Topic
Part III Catabolism (energy conservation)	
October 25 (F)	**L28: Background concepts** (Reducing potentials, free energy)
28 (M)	**L29: Microbe of the week: *Rhodobacter sphaeroides*** (Metabolic diversity, -trophies)
30 (W)	**L30: Respiration I** (Electron carriers, aerobic and anaerobic respiration)
November 1 (F)	**L31: Respiration II** (Electron transport phosphorylation, electrochemical gradient, ATP synthase)
4 (M)	**L32: Phototrophy** (Photosynthesis, oxygenic and anoxygenic phototrophy)
6 (W)	**L33: Microbe of the week: *Geobacter metallireducens*** (Anaerobic respiration, metal reduction)
8 (F)	**L34: Lithotrophy** (Chemosynthesis, nitrification, Anammox, nitrogen cycle, sulfur cycle)
11 (M)	**No class (Veteran's Day)**
13 (W)	**L35: Fermentation I** (Overview, oxidation state of carbon, lactic acid-, ethanolic fermentation)
15 (F)	**L36: Fermentation II** (Mixed acid fermentation, substrate level phosphorylation)
18 (M)	**L37: Microbe of the week: *Clostridium acetobutylicum*** (Acetone-butanol-ethanol fermentation)
20 (W)	**L38: Microbial diversity** (Taxonomy, culture-independent approaches)
22 (F)	**L39: Cell to cell signaling** (Quorum sensing → coordinated response (e.g., biofilms, chemoluminescence))
25 (M)	**L40: Life at a hydrothermal vent** (Food chains)
27 (W) 29 (F)	**No classes (Thanksgiving break)**
December 2 (M)	**L41: Review**

December 9th, Monday, 4:00 pm – 5:45 pm
Final exam (Postle Hall)