

MIBO8610 Microbial diversity.

Fall, 2009

September 1-October 1:

Tuesday and Thursday, 2:00-3:15 room 216 of Biological Sciences
3:15-4:00 room 201 of Biological Sciences

October 6-December 3:

Tuesday and Thursday, 2:00-3:15 room 216 of Biological Sciences

Instructors: Barny Whitman, 541 Biological Sciences Building
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Course objectives:

To examine the physiological basis of prokaryotic diversity, the extent of prokaryotic diversity, and other major concepts related to prokaryotic diversity; to develop key quantitative skills.

Format:

Unless noted differently below, lectures will be given during the Tuesday sessions. During the Thursday sessions, students will present and discuss assigned papers or present overview of specific taxa. For the papers, all students should be able to present and discuss in detail each paper.

For **Whitman**, the class notes and pdf of the papers are on his website

(<http://www.arches.uga.edu/~whitman/>).

For **Wiegel**, the class notes are on web-CT including the papers and questions to be discussed (*web-CT will shut down after December 31st so please print out what you need and want to keep*).

Grading policy:

1. Grades will be based upon three (3) quizzes (30 %); classroom participation, discussion of papers, and pop quizzes (20 %); oral presentations (10 %); and a research proposal (40%).
2. The quizzes will be:
 - Chemical structures (20 min.), 10 %
 - Energetic calculations (75 min.), 10 %
 - Fermentation balance (75 min.), 10 %
3. Classroom participation will be judged by attendance, presentations of papers, participation in discussions, and pop quizzes. Pop quizzes will be less than 5 minutes in

length and cover lecture material. If you must be absent from the class, please see the instructors. No legitimate excuse will be disallowed.

4. Oral presentations. Each student will be required to provide at least one (normally 2) oral description of one of the various prokaryotic groups discussed in the course. Descriptions should be no longer than 10 minutes and should provide a general overview of the biological properties of the group, focusing on the systematics, 16S rDNA phylogeny, taxonomic properties, G+C-values, medical and/or industrial applications, BUT NOT on topics discussed in the lectures such as the fermentation pathways (if you do => deduction of points). Handouts for the class members (with the essential INFO) are expected to be e-mailed to them in advance or provided as a hardcopy at the beginning of the class. Overheads or PP presentations are possible.. Covered material will be part of quizzes.

5. The research proposal will constitute a major part of the grade (40 %).

Proposal topics should be chosen in consultation with the instructors during the first three weeks of class. In class on **September 3**, submit a tentative title and one paragraph description of the proposed research

The proposal should follow closely the proposal guidelines that are provided. Two copies of the first draft (polished) is due at the beginning of class on **November 19**. If the paper is late, 10 % of the grade will be deducted for every portion of a day it is late (i.e., 1 hour late, -10 %; 23 hours late, -10 %; 25 hours late, -20 %; etc.). The papers will then be graded and returned with comments by **Dec. 1**.

You will then have the opportunity to revise the paper. If you chose not to revise the paper, your grade for this portion of the course will be determined by your grade on the first draft. Two copies of the revised paper are due by **4 pm** in the office of Dr. Whitman on **December 10**. If the paper is late, 10 % of the grade will be deducted for every portion of a day it is late. If you revise the paper, your course grade will be based upon the higher grade for the initial and revised drafts minus whatever late penalties you incurred on both drafts.

For both the initial and final drafts, submit 2 copies. In addition, for the final draft, return both marked up copies (if any) of the first draft. If you chose not to submit a second draft, just return both marked up copies of the first draft.

Fall 2009 Calendar: MIBO 8610: 2:00-3:15 or 4:00 pm, Biological Sciences 216

	Tuesdays	Thursdays
Aug	18 NO CLASS	20 NO CLASS
	25 NO CLASS	27 NO CLASS
Sep	1 INTRODUCTION. Study guides for structures and proposals. Overview of bioenergetics, sample quizzes	3 QUIZ (20 min) on structures. Definitions of prokaryotic species Whitman papers 1 (proposal topic due)
	8 Prokaryotic evolution Whitman papers 2	10 Archaea Whitman papers 3
	15 Methanogenesis Whitman papers 4	17 Autotrophy Whitman papers 5
	22 Methanotrophs Whitman papers 6	24 Photosynthesis Whitman papers 7
Sep /Oct	29 sulfur/sulfide oxidizing prokaryotes Whitman papers 8	1 QUIZ on bioenergetics
Oct	6 <u>Wiegel</u>: Lecture - Glycolysis Principle of SLP	8 Pyruvate metabolism principle of SLP fermentation pathways Ethanol / Homolactic
	13 Heterolactics	15 Wiegel paper A-5 + B-7 (students explain conti-cult principles + problems)
	20 Fermentation balance	22 cont. Fermentation balance: Y_{ATP} , maintenance energy, etc
	27 Wiegel paper E-1 + E-2 incl. E2-1	29 Wiegel paper D-6 + D-8
Nov	3 Propionibacteria (Acrylate & Succinate pathways).	5 Wiegel paper E-6 + E-8
	10 FERMENTATION BALANCE QUIZ (75 MIN)	12 Mixed acid, butandiol and clostridial fermentations
	17 Wiegel paper F-1 + G-5	19 PROPOSAL DUE (1st draft) Specials: Purinolytics; Stickland Reaction; <i>C. kluyveri</i> ; Energy yield of homoacetogenic fermentation
	25 THANKSGIVING BREAK	27 THANKSGIVING BREAK

Dec	1 RETURN OF MARKED PROPOSALS FOR IMPROVEMENT Discussion: Fermentation quiz + SLP-overview scheme	3 last class: Whitman papers 9 Class evaluation
	8 No class (Friday-schedule) (Polishing your proposals)	10 PROPOSAL DUE (final draft at WHITMAN's office not later than 4:00 PM sharp)

List of Bacterial groups to present and discuss
MIB 8610 Fall 2008 on Thursday, at the beginning of class

Pres. #	Microbial Group	Presenting Student	Date
1	Green sulfur bacteria		Sept. 8
2	Sulfate-reducing bacteria		Sept. 8
3	Haloarchaea		Sept. 10
4	Methane-producing archaea		Sept. 15
5	acetogenic bacteria (homoacetogenic fermenter)		Sept. 17
6	Methanotrophs		Sept. 22
7	Cyanobacteria		Sept. 24
8	Sulfur/sulfide-oxidizing prokaryotes		Sept 29
9 /10	1) Yeast 2)) ED-pathway utilizers (bacteria, mesophiles)	_____	Oct. 8
11/12	Lactic acid bacteria: 1) Phylogeny & general properties 2) Diversity of Industrial applications	_____	Oct. 15
13	Anaerobic hyperthermophiles,		Oct. 22
14	Propionic acid producer		Tuesday! Oct. 27
15	Proteobacteria / Enterics		Oct. 29
16	Anaerobic Firmicutes:Clostridia and related		Nov. 5
17	Rumen microbiota		Nov. 12
18	Purinolytics		Nov. 19