Syllabus BIMM 120 Bacteriology FALL 2013

Last Modified September 24, 2013

CONTACT INFORMATION

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TEACHING ASSISTANTS AND SECTIONS

Section	Day and Time	Location	ТА	EMAIL
A06	W: 5:00-5:50PM	HSS 2154	Thomas Belknap	tbelknap@ucsd.edu
A07	W: 6:00-7:00PM	HSS 2154	Thomas Belknap	دد
A08	W: 7:00-7:50PM	HSS 2154	Anika Tamarazian	atamrazi@ucsd.edu
A11	Th: 7:00-7:500	YORK 4080	Anika Tamarazian	دد
A09	Th; 5:00-5:50	YORK 4080	Jason Munguia	jmunguia@ucsd.edu
A10	Th; 6:00-6:50	YORK 4080	Jason Munguia	دد

Sections are not required but strongly recommended. Sections will start the week of Monday September 30, Week 1.

EXAMS ASSIGNMENTS AND GRADING

Midterm: 200 Points Final: 200 Points Journal Entries (3 @ 20 Points each) = 60 points Paper: 40 points TOTAL= 500 points

All inquiries regarding the grading of midterm exam questions must be made within a week following the exam. Inquiries regarding the final must be made within 24 hours.

Make up exams given only in extremely rare circumstances

DESCRIPTION OF JOURNAL ENTRIES

These entries will consist of your observations and reflections related to microbes in the environment, exciting research developments, application of microbes, food, sanitation, human habits, personal or families illnesses. Length: one to two paragraphs

Enter your entries to the Journal section of the course website.

Useful references: Science Daily, New York Times, Huffington Post, Medscape, Mayo Clinic, Center for Disease Control,

PAPER

GUIDELINES FOR PAPER

A good way to approach the paper is to reflect on the concepts that this course triggered that help you understand more about the roles of microbes in daily life. It's all right to focus on a particular disease or organism – maybe because of an illness that affected you or a family member, but what does it mean to you? How much better do you understand it now, and why? You might want to focus on issues such as drug side effects, food or water poisoning, microbial implications of daily practices such as hand washing, food preparation, environmental issues, disease prevention strategies such as use of disinfectants, etc. Or the application of microbes, microbes and technology, etc. You might want to read and evaluate a research paper. In this case, you should summarize (in your own words) the objectives, methods, and results. Then, comment on what attracted your attention to this paper and its significance such as advancing science, preventing or treating diseases, or a useful application. You might want to focus on how the course has helped you preview the biological sciences in terms of the interrelations and overlap between courses you will take. Or, at this point, you might have a clearer idea of what career options you might look into. Your options are unlimited here. Just make sure that you are following up on something that interests you, not necessarily the Professor. Be sure to include references to any outside references cited. The web program will check for plagiarism automatically. Beware! Your paper will not be accepted if strong evidence of plagiarism is indicated.

Length of paper: two to three pages. Please submit the paper to "turnitin" on the course website

Assignment	Date
	(Not later than 12:00 midnite, no exceptions)
Journal 1	October 12
Journal 2	November 9
Journal 3	November 23
Paper	December 6

DEADLINES FOR ASSIGNMENTS

COURSE WEBSITE

This course is registered on TED (Blackboard Learn). It will be the location for the syllabus, section assignments, lecture highlights, turning in assignments and other important course related matters to be determined.

EXPECTED CLASSROOM BEHAVIOR

- 1) Arrive on Time
- 2) Stay focused
- 3) Avoiding distracting behavior
- 4) Avoid common electronic additions
- 5) Stay alert and focused on classroom activities related to microbiology
- 6) Turn off you beeper/cell phone alarms, etc
- 7) Stay until the class is over

Lecture Schedule (Approximate Dates) Fall 2013

Lecture	Week	Month	Date	Day	Topics Covered (Approximate)
1	0	Sep	26	Thu	Introduction
2	1	Oct	1	Tu	Introduction (cont'd)
3	l	Oct	3	Thu	Introduction (cont'd)
4	γ	Oct	8	Tu	Structure/Function of Eukaryotic Cells
5		Oct	10	Th	Structure and Function of Prokaryotic Cells (cont'd)
6	3	Oct	15	Tu	Structure and Function of Prokaryotic Cells (cont'd)
7	5	Oct	17	Th	Structure and Function of Prokaryotic Cells (cont'd)
8	Λ	Oct	22	Tu	Structure and Function of Prokaryotic Cells (cont'd)
9	4	Oct	24	Th	Structure and Function (concl)/Microbial Growth
10	5	Oct	29	Tu	Growth of Bacteria
11		Oct	31	Th	Midterm
12	6	Nov	5	Tu	Growth of Bacteria
13	0	Nov	7	Th	Growth of Bacteria
14	7	Nov	12	Tu	Growth of Bacteria
15	/	Nov	14	Th	Metabolism
16	8	Nov	19	Tu	Genetics
	0	Nov	21	Th	Overview of Medical Microbiology
17	0	Nov	26	Tu	Overview of Medical Microbiology
18	フ	Nov	28	Thu	THANKSGIVING HOLIDAY
19	10	Dec	3	Tu	Bacterial Diversity (Selected examples)
20	10	Dec	5	Th	Bacterial Diversity (Selected examples)

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COURSE REQUIREMENTS AND READING ASSIGNMENTS

TEXT: Brock Biology of Microorganisms, 13E, Custom Edition for BIMM 120 for UCSD

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INTRODUCTION						
TOPICS	CHAPTER	PAGES(S)				
Administrative Details and Course Requirements	Lecture					
Scope and Relevance of Microbiology	Lecture					
Evolution of Microbes and Extent of Microbial Life	1	5-7				
History of Microbiology and Key Developments in the Field "11-20						
Microbial Cell Structures						
Basic Features	2	34				
Prokaryotes and Eukaryotes	2	34-35				
Acellular Agents (Viruses, Viroids, Virusoids and Prions)	2	35; Lecture				
Metabolic Diversity	2	38-39				
Microbial Diversity						
Bacteria	2	40-43				
Archaea	2	43-44				
Eukarya (Protists and Fungi)	2	45-46				
Acellular Agents (Viruses, Viroids, Virusoids and Prions)	Lecture					

Structure and Function of Eukaryotic Cells

TOPICS	CHAPTER	PAGES
Introduction	14	433
Nucleus	دد	433-434
Mitochondria and Hydrogenosome	دد	435-435
Chloroplasts	دد	435-436
Relationship of Mitochondria and Chloraplasts to Bacteria		436-437
Endoplasmic Reticulum, Ribosomes and the Golgi Complex	دد	437
Lysosomes and Peroxisomes	دد	438
Proteasomes	Lecture	
Cytoskeletal Elements (microtubules, microfilaments, intermediate	دد	438-439
filaments		
Flagella and Cilia		438
The Cell Wall and Extracellular Matrix		439

STRUCTURE AND FUNCTION	OF PROKARYOTIC CELLS	
TOPICS	CHAPTER	PAGE(S)
Morphological Properties of Bacteria	3	50-53
The Gram Stain and its Significance		28-29
External Structures		
Glycocalyx		66-67
Pili and Fimbriae		67-68
Flagella, Motility, and Taxis		75-83
Cell Envelope and Cell Walls		60-65
Biosynthesis of Peptidoglycan		123-125
Autolysins		123(b); Lecture
Cell Envelopes of Archaea species		65-66
Internal Structures and Processes		
Membrane Structure and Function		53-60
Cytoskeletal Apparatus		122-123
Cell Inclusions		66-68
Protein Secretion		59-60
Endospores	↓	71-75

GROWTH TOPICS CHAPTER PAGE(S) **Bacterial Cell Division** 120 Cell Growth and Binary Fission FTS Proteins and Cell Division 120-121 **Population Growth** Exponential Growth 125-126 The Mathematics of Growth 126-127 The Growth Cycle 127-128 Continuous Growth 128-130 Synchronous Growth Lecture Measurement of Growth 130-134 **Growth in Nature Biofilms** 135 **Factors Influencing Growth** Nutrient Factors 88-90 Nutrient Requirements Complex and Synthetic Media 88-91 90--93 Culture Media Environmental Factors 143-144 Solutes and Water Activity 136-142 Temperature 145-149 Oxygen Acidity and Alkalinity 142-143 Pressure Lecture **Control and Destruction of Microorganisms** Introduction 462 Physical Agents Temperature 462-464 Filtration 466 Radiation 465-466 468-471 Chemical Agents 465-484 Antimicrobial Chemotherapy Introduction and Basic Concepts Mechanism of Action of Selected Antimicrobial Agents 484-487 Resistance to Chemical and Chemotherapeutic Agents 488-490 The Search of New Antimicrobial Drugs

METABOLISM		
Topics	CHAPTER	PAGES(S)
Energy from Catabolism of Organic Compounds		
From Glucose to Pyruvate		
Glycolysis	4	100-102
Phosphate Pentose Pathway	8	277
Entner-Doudoroff Pathway	8	247
Pyruvate Utilization by Aerobes		
TCA cycle	4	107
Electron Transport System	4	104-107; Lecture
Pyruvate Utilization by Anaerobic and Facultative Heterotrophs		
Fermentation	4	100; Ch.8, 245
Anaerobic Respiration	4	108-109 Ch.8, 255
Aromatic Catabolism	8	273
Chemolithotrophy (Energy form Inorganic Compounds)	4	109
Phototrophy	4	109-110
Sources and Metabolism of Nitrogen	4	88; Ch 8, 256-257
Anabolism		111-113
Aspects of Regulation in Bacteria		
Overview	6	154
The Lac Operon	دد	156-158
The Tryp Operon		Lecture
Signal Transduction	8	162-164
Quorum Sensing	"	165-167

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GENETICS					
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TOPIC	CHAPTER	PAGE(S)			
Creating Genetic Variability					
Plasmids		Lecture			
Transposable Elements	7	204-205			
Bacterial Viruses		Lecture			
Gene Transfer Mechanisms					
Conjugation					
Transformation	7	193-195			
Transduction	7	195-197			
Recombinant DNA Technology (Overview)		Lecture			

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MICROBES	AND	HUMAN	DISEASE
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TOPICS	CHAPTER	PAGES
Introduction to Epidemiology (Sources and Distribution of	18	550-554; 559-560
Disease Agents)		
Body Defense Strategies		
Innate Defenses	17	528
Overview		Lecture
First Line Barriers		Lecture; Ch 15, 491-
		501(Normal Flora)
Second Line Barriers	17	Lecture; 532-533
Adaptive Defenses (Third Line Barriers)	17	529-532
Role of Cytokines		Lecture
B cells and antibodies		Lecture
T cells		Lecture
How Pathogens Cause Disease		
Factors that Affect the Outcome of an Infection	16	514-518
How Bacteria Cause Disease		504-514
How Fungi Cause Disease		Lecture
How Fungi Cause Disease		Lecture
How Viruses Cause Disease		Lecture
How to Keep Microbes Under Control		
Prevention Strategies	17	534
Treatment Strategies		
Chemical and Physical Agents	15	473-484
Vaccines	"	434-439
Mechanism of Resistance to Antimicrobial Agents	"	484-487

BACTERIAL DIVERSITY (As many bacteria presented as time permits)

TOPICS	CHAPTERS	PAGES
Overview	11	320-321
Photrophic Chemolithotropic and Methanotrophic Bacteria	"	520-521
Phototrophic Bacteria	"	321-329
Nitrifying Bacteria	"	325-326
Sulfur Oxidizing Bacteria	"	326-328
Hydrogen Oxidizing Bacteria	"	329-330
Methanogens and Methylotrophs	"	330-332
Aerobic and Facultatively Aerobic Chemoorganotrophic		550 552
Bacteria		
Psudomonas and like bacteria	"	333-334
Acetic Acid Bacteria	"	335
Free Living Aerobic Nitrogen Fixing Bacteria	"	335-337
Neisseria and Related	"	337-
		338
Vibrio	"	340
Rickettsia	"	342
Morphologically Unusual Proteobacteria	"	345
Magnetospirilla	"	345
Bdellovibrio	"	345-346
Caulobacter	"	349-351
Gliding Bacteria (Myxobacteria)	"	351-354
Other Bacteria	12	
Nonsporulating	"	362-365
Staphylococcus	"	"
Streptococcus	"	"
Lactobacillus	"	"
Listeria	"	"
Endosporeforming	"	365-368
Bacillus	"	"
Clostridium	"	"
Heliobacterium	"	"
Wallless Bacteria (Mycoplasma)	"	369-370
Corneform and Propionic Acid Bacteria	"	371
Mycobacterium	"	372-373
Streptomyces	"	373-376
Cyanobacteria	"	376-380
Chlamydia	"	381-383
Spirochetes	"	389-391
Deinococcus	"	392-393