

Microbiology 200A•General Microbiology• Winter 2004

Lec MW 12:40– 1:55 pm, BS 244 • Lab MW 2:05 am- 4:35pm, BS111

Instructor

Dr. Edith Porter; Office: BS 302; Office Hours: MW 10:00 - 11:45 am

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Prerequisites

BIOL 102 OR BIOL 200B, CHEM 102 OR CHEM 152

Scope

- To introduce to microbial (and smaller) life forms with particular focus on bacteria and viruses
- To recognize the wide impact of Microbiology in our society
- To train laboratory skills and scientific data recording, analysis and presentation

Attendance

Laboratory attendance is mandatory!

Lecture attendance strongly recommended since lecture examinations will be based on material presented in lecture.

Performance evaluation: 750 points total

Lecture : 400 points

100 Examination 1

100 Examination 2

200 Final (comprehensive) Examination

Note: Each examination will **include** 10 points for a recent report from the general news (news paper, web etc). Students will bring to class the report, a prepared type written summary and explanation how the chosen article relates to the class material.

Laboratory: 350 points

30 Quizzes 1, 2

10 Gram stain

10 Pure culture streak (quadrant isolation)

50 Reports 1, 2

100 Laboratory Midterm

100 Comprehensive Test with Practical Component

50 Laboratory Notebook (Instructions for maintaining a good notebook will be given in the laboratory)

Repeated failure to follow laboratory rules will result in point deductions. All reports **must** be type written in Times New Roman, 12 points, double spaced with 1 inch borders, 5 – 7 pages and contain the sections Introduction, Material and Methods, Results, Discussion and Conclusions, References. Deviations from required format and poor language will result in point deductions!

Grades: based on % of achievable points obtained

Points (lecture + laboratory) / 750 points x 100 = % achieved

In borderline cases (passing/ non-passing or grade levels) active participation in lecture and laboratory may be considered for the final outcome.

A : $\geq 92\%$	B+ : 88 – 89%	C+ : 78 – 79%	D+ : 68 – 69%
A - : 90 – 91%	B : 82 – 87%	C : 72 – 77%	D : 62 – 67%
	B- : 80 – 81%	C- : 70 – 71%	D- : 60 – 61%

General Information

No make-up examination/test/quiz/report. Missed events will be set as " 0 points" unless satisfactorily justified (e.g. doctors slip). No make-up laboratory sessions. Laboratory absence needs to be satisfactorily justified and a written report describing the exercises missed must be presented. Students must provide their own **laboratory coat, safety glasses, gloves, glass slides, grease pen, pencil and colored markers**. The University Academic Honesty Policy and the Drop/Incomplete Policy explained in the University General Catalogue will be strictly followed. Only the lecture instructor can issue Drops and Incompletes. Students are responsible for the prerequisites for this course and are encouraged to discuss any questions regarding the policies and prerequisites with the lecture instructor. Students with disabilities: Please contact the instructor to arrange appropriate accommodations.

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Unit	Date	Lecture Topic Text: Microbiology, Prescott- Harley-Klein, 5 th edition	Suggested Reading	Laboratory Exercises Text: Microbiological Applications, H. J. Benson, 8 th edition (complete version)
1	Mon Jan 5	Introduction, Aspects of History, Techniques in Microscopy	Chap. 1,2	Check in, Discuss Laboratory Rules <u>MICROSCOPY</u> Ex. 1 General Discussion of Bright-Field Microscopy Ex. 5 Discussion of Microscopic Measurements and Dimensions Ex. 87 Blood Cell Types
2	Wed Jan 7	Overview of Microbes, Microbial Taxonomy	Chap. 3,4,19	<u>SMEAR PRPERATION/ SIMPLE STAINING</u> Ex. 12 Smear Preparation Ex. 13 Simple Stain and Bacterial Morphology With slants and broths of <i>S. aureus</i> , <i>M. luteus</i> , <i>B. subtilis</i> and <i>E. coli</i> Demo slides for bacterial shapes: 4124 (oral smear); 4126 (rectal swab); 470 (<i>E. coli</i>); 4130 (Treponema); 44266 (Bacillus/Clostridia); 486b (staphylococci); 488 (streptococci); 4102; 4102b; 4100
3	Mon Jan 12	Bacteria- Structure and Function	Chap.3	Quiz 1 (10 points) <u>SPECIAL STAINING/ MICROSCOPY, CULTURE MORPHOLOGY</u> Environmental Sampling: Air, Soil, Personal, Fomite (Report 1, 25 points, due Jan 26th 2004) using Sabouraud-dextrose, nutrient agar, blood, MSA, EMB, and TSA -Rodac plates Ex. 15 Gram Stain with slants and broths of <i>S. aureus</i> , <i>M. luteus</i> , <i>B. subtilis</i> and <i>E. coli</i> Demo-slides: 470 (<i>E. coli</i>); 4130 (Treponema); 44266 (Bacillus/Clostridia); 486b (staphylococci); 488 (streptococci)
4	Wed Jan 14	Bacteria- Structure and Function	Chap.3	<u>SPECIAL STAINING/MICROSCOPY, CULTURE MORPHOLOGY</u> Observation of Environmental Isolates (Keep isolates for mycology in locker) Ex. 15 Repeat Gram Stain with Environmental Isolates Ex. 11 Negative Stain with Environmental Isolates Ex. 14 Capsule Stain (Manevals stain) with <i>K. pneumoniae</i> and <i>E. aerogenes</i> Demo slides: 4104; 462; 441Sp
5	Mon Jan 19	Martin Luther Kind Day <i>University Closed</i>		
6	Wed Jan 21	Mycoplasma, Rickettsia and Chlamydia	pp. 518-521, 477-478, 488-490 Chap. 39	<u>SPECIAL STAINING/MICROSCOPY</u> Ex. 16 Endospore Stain with <i>B. subtilis</i> and Demo slides (4112a-c) Ex. 17 Acid Fast Stain with <i>M. smegmatis</i> , <i>E. coli</i> and <i>S. aureus</i> and Demo slides (476sp) Demo slide: Metachromatic granules (4108)

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7	Mon Jan 26	Archaea	Chap.20	<p>Report 1 "Environmental sampling" due (25 points)</p> <p>Staining unknowns (10 points)</p> <p><u>STAINING/MICROSCOPY</u></p> <p>Repeat Ex. 16, 17</p> <p>Ex. 15 with known broth cultures (<i>S. aureus</i>, <i>M. luteus</i>, <i>E. faecalis</i>, <i>B. subtilis</i>, <i>E. coli</i>) and unknown broth cultures</p>
8	Wed Jan 28	Examination 1 (100 points)		<p><u>ASEPTIC TECHNIQUE/ MOTILITY</u></p> <p>Ex. 19 Hanging Drop Slide and wet mount with <i>E. coli</i>, <i>K. pneumoniae</i> and <i>P. aeruginosa</i></p> <p>Motility agar with <i>E. coli</i>, <i>K. pneumoniae</i>, <i>P. aeruginosa</i></p> <p>Observation of Proteus Swarming, simple stain</p> <p>Demo slides (4-56b, 4-106a, 4-106b)</p>
9	Mon Feb 2	Viruses	Chap. 16-18, 38	<p><u>BACTERIAL POPULATION ASSESSMENT/ DILUTIONS</u></p> <p>Ex. 21 Pure Culture Methods (4 quadrant streak plate, method B) with <i>M. luteus</i>, <i>E. coli</i> and <i>S. marcescens</i></p> <p>Ex. 23 Bacterial Population Assessment: Discussion of Dilutions and Spectrophotometry, Standard Plate Counts with <i>E. coli</i></p>
10	Wed Feb 4	Viruses, Prions	Chap. 16-18, Chap. 38 pp.416-417	<p><u>BACTERIAL POPULATION ASSESSMENT/ DILUTIONS</u></p> <p>Summarize results Ex. 21, 23</p> <p>Ex. 21 continue to incubate</p> <p>Ex. 69 Plate Count of Food (brought in by Students: ground meat, chips, lettuce etc)</p>
11	Mon Feb 9	Cyanobacteria/ Algae	Chap. 21, 26	<p><u>BACTERIAL POPULATION ASSESSMENT/ DILUTIONS</u></p> <p>Ex. 21 continue: re-isolate one colony onto TSA with 4 quadrant streak and subculture 1 colony onto slant</p> <p>Summarize results Ex. 69</p> <p>Laboratory Midterm (100 points)</p>
12	Wed Feb 11	Fungi	Chap. 25	<p><u>BACTERIAL POPULATION ASSESSMENT/ DILUTIONS (10 points for 4 quadrant streak)</u></p> <p>Ex. 21 continue: perform gram-stain from slant to verify purity; re-isolate one colony from slant with 4 quadrant streak (10 points)</p> <p><u>VIRUSES</u></p> <p>Demo viral plaques (from Dr. McQueen's lab)</p> <p>Overheads for cytopathic effects</p> <p><u>CYANOBACTERIA/ ALGAE</u></p> <p>Exp. 6, Pond water: hanging drop, gram stain</p> <p>Demo slides: stagnant water (4-132); "mixed blue green algae"(91W0146); euglena (92W0116), mixed dinoflagellates (91W0270), chlamydomonas (91W0270), diatoms (91W1000)</p>

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13	Mon Feb 16	Protozoa	Chap. 27	<p><u>FUNGI</u> Ex. 10 Fungi Observe colony morphology of environmental isolates and cultures of aspergillus, penicillium, mucor, rhizopus, geotrichum, candida spec. Prepare gram stain with <i>S. epidermidis</i> and <i>C. albicans</i> Mycomount with environmental isolates and mold cultures Demo slides for fungi (91W2480, 91W2410, 91W2500, 91W2471, 91W2114)</p>
14	Wed Feb 18	Metazoa	Handout	<p><u>PROTOZOA/ METAZOA</u> Ex. 6 Protozoa: demo slides for ciliates (92 W 0305, <i>Balantidium coli</i>, <i>Entamoeba histolytica</i> (ZA1-321, ZA-1-322), foraminiferans (92W0063), <i>Trypanosoma gambiense</i>, <i>Plasmodium vivax</i>) Exp. 87 normal blood smear for comparison Metazoa: demo material (preserved worms etc) demo slides for taenia proglottide, clonorchis, ascaris eggs, enterobius</p>
15	Mon Feb 23	Examination 2 (100 points)		<p><u>Quiz 2 (20 points)</u> <u>BACTERIAL PHYSIOLOGY</u> Ex. 22 Cultivation at different atmospheres (<i>C. sporogenes</i>, <i>S. aureus</i>, <i>S. pyogenes</i>, <i>E. coli</i> and <i>P. aeruginosa</i> in thioglycollate and on blood agar at air and enhanced CO₂) Ex. 34 Temperature: Effect on growth (<i>B. stearothermophilus</i>, <i>E. coli</i>, <i>S. marcescens</i>) Ex. 36 pH and Growth with <i>S. aureus</i>, <i>E. coli</i>, <i>A. viscolatis</i> and <i>S. cerevisia</i> at pH 5, 7, 9, 10 Ex. 37 Osmotic Pressure: Effect on growth with <i>S. aureus</i>, and <i>E. coli</i> at 0.85%, 2%, 6%, and 20% NaCl</p>
16	Wed Feb 25	Growth and Cultivation of Bacteria	Chap. 5, 6	<p>Summarize experiments Physiology <u>ANTIMICROBIAL AGENTS</u> Ex. 39 Ultra Violet Light and its Lethal Effects with <i>S. aureus</i>, <i>B. subtilis</i>, <i>E. coli</i> and <i>S. marcescens</i> for 2 sec, 10 sec, 30 sec, 1 min, 10min and 20 min Ex. 40 Evaluation of Disinfectants (amphyll, bleach, formaldehyde) with <i>S. aureus</i>, <i>B. subtilis</i>, <i>E. coli</i> Ex. 42 Evaluation of Antiseptics (mouthwash, soap) with <i>S. aureus</i>, <i>B. subtilis</i>, <i>E. coli</i> Ex. 43 Antimicrobial Sensitivity Testing (Kirby Bauer) with <i>S. aureus</i>, <i>E. coli</i> and <i>P. aeruginosa</i></p>
17	Mon Mar 1	Bacterial Physiology	Chap. 9, 10	<p>Summarize experiment antimicrobial agents <u>IDENTIFICATION OF BACTERIAL ISOLATES (Exp. 46-50, 78, 79)</u> Gram +: <i>S. epidermidis</i>, <i>S. aureus</i>, <i>M. luteus</i>, <i>E. faecalis</i> Gram -: <i>E. coli</i>, <i>K. pneumoniae</i>, <i>E. aerogenes</i>, <i>P. aeruginosa</i> Gram Stain, primary isolation onto NA, BA, MSA, EMB</p>

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18	Wed Mar 3	Bacterial Genetics	Chap. 11-13	<u>IDENTIFICATION OF BACTERIAL ISOLATES (Exp. 46-50, 78, 79)</u> Catalase and Oxidase for all isolates Gram+: coagulase, bile esculin Gram-: IMViC (indol, methyl red, Voges-Proskauer, citrate), motility <u>UNKNOWN 1 AND 2 (Report 25 points due March 17th 2004)</u> Each student will obtain one coded gram positive and one coded gram negative isolate in broth Gram-stain and Primary isolation
19	Mon Mar 8	Sterilization, Disinfection, Antimicrobial therapy	Chap. 7, 35	<u>IDENTIFICATION OF BACTERIAL ISOLATES (Exp. 46-50, 78, 79)</u> Read results <u>UNKNOWN 1 AND 2</u> Catalase and Oxidase for all isolates Gram+: coagulase, bile esculin Gram-: IMViC (indol, methyl red, Voges-Proskauer, citrate), motility
20	Wed Mar 10	Basic mechanisms of host defense, Antibodies	Chap. 31-33	<u>UNKNOWN 1 AND 2 (Report 25 points due 3/17/04)</u> Read results Laboratory Comprehensive Test including practical component (100 points) Turn in Notebook (50 points) Check out

FINAL (200 points) and Report Unknowns (25 points): Wednesday, Mar 17th, 10:45am - 1:15pm