# MICROBIOLOGY LABORATORY (BIOL 310L) SCHEDULE

## Fall 2015

- **Lecture Professor:** Dr. Susan Morrison
- **Lab Instructors:** Ms. Tracy Hirsch (Sec. 1-4 & 6), Dr. Susan Morrison (Sec. 5)

## Required:
1. Pearson Custom Laboratory Manual for BIOL 310L Microbiology, College of Charleston
2. Coursepack for BIOL310
3. Sharpie marker, Safety Glasses, Lab Coat; Ms. Hirsch also requires a *bound* composition notebook.

Experiment numbers are given on pages I—IV of the Pearson Manual. For convenience, transfer those numbers to the orange blocks on the first page and results page of your Pearson Manual.

## LAB Ex. # & DATE SUMMARY OF LAB ACTIVITIES EXERCISES & READINGS

**SOURCE**

"Pack" pages refer to the BIOL 310 coursepack from SAS-E-Ink.

Everything that is listed must be read before coming to class.

Unless otherwise indicated, you should answer **ALL** questions in exercises that we do or read or discuss or see demonstrated. That includes questions with a light bulb, and questions in both the lab manual and the coursepack.

## August 31-Sept 2 INTRODUCTION; SAFETY; ASEPTIC TECHNIQUE; USE OF MICROSCOPES; EPIDEMICS; OBSERVATION OF PREPARED SLIDES; ENVIRONMENTAL SAMPLE

- **pp. 1-4; Pack 206-227** Laboratory Safety & Protocol
- **pp. 5-10** Microbiological Equipment & Basic Laboratory Techniques
- **Ex. 1** Culture Transfer Techniques (answer all questions)
- **Ex. 2 +** Techniques for Isolation of Pure Cultures:
  - & Pack 260-261 + Part A. Isolation of discrete colonies from a mixed culture
  - Part B. Isolation of pure cultures from a streak plate preparation
- **pp. 33-34** Microscopy
- **Ex. 4** Microscopic Examination of Stained Cell Preparations (*Q 1-3*)
- **Appendix p 327** Scientific notation (be able to use)
- **Pack 240-241** An Artificial Epidemic
- **Pack 243-246 +** Distribution of Microorganisms in the Environment (*Q 1-6*)

## Notes:

+ indicates exercise for which follow-up will be necessary. The time in brackets [] indicates the approximate time span at which follow-up should be done.


Appendix = an appendix in the lab manual. You should familiarize yourself with it, but do NOT memorize it. It is for reference only.

**NOTE:** In addition to the questions for exercises which you do, you are also responsible (on tests and in your notebooks) for questions in exercises requiring only reading and for results and questions for exercises done as demonstration. You are also responsible for all parts of the exercises done from the coursepack or handouts, as well as from the lab book.
II  September 7-9  ASEPTIC TECHNIQUE (continued); PREPARATION OF SLIDES & OBSERVATION OF SIMPLE STAINS & NEGATIVE STAINS

Ex. 1  Review Culture Transfer Techniques (pp. 11-16) (Q 1-3)
Ex. 2  +  Techniques for Isolation of Pure Cultures:
      & Pack 260-261  Part A. Isolation of discrete colonies from a mixed culture
                      Part B. Isolation of pure culture from a streak plate preparation (Q 1-4)
pp. 53-55  Bacterial Staining
Appendix p 341  Staining Reagents (for reference only)
Ex. 9  Negative Staining (Q 1-3)
Ex. 7  Preparation of Bacterial Smears (Q 1-4)
Ex. 8  Simple Staining (Q 1-3)
Pack 247-253  +  Distribution of Microorganisms in the Environment ---complete using
“Cultural Characteristics of Microorganisms

III  September 14-16  PREPARATION OF CULTURE MEDIA; THE AUTOCLAVE; PATHOGEN POSTER PROJECT INTRODUCTION GRAM STAIN; USE OF SPECIAL PURPOSE MEDIA (SELECTIVE & DIFFERENTIAL); ISOLATION OF PURE CULTURES; BEGIN IDENTIFICATION OF “UNKNOWN” BACTERIAL CULTURE;

Pack 280-285  Begin pathogen poster project ---Organize teams of 4 students, select pathogen &
normal microbiota
Pack 253-254  Preparation of Culture Media  [read and understand; we will not be able to carry this
out because our temporary lab is not adequately equipped.]
Appendix p 331  Culture Media (for reference only)
pp. 95-96  Cultivation of Microorganisms: Nutritional & Physical Requirements, and
Enumeration of Microbial Populations
Ex. 13  Nutritional requirements: Media for the routine cultivation of bacteria
Discussion of Enrichment Cultures
Ex. 33  Physical agents of control: Moist Heat (Read pp. 221-222)  (Answer Q 1-6 as if you
had done all procedures)
Pack 216-217  Taring a balance; use of a pipette bulb (read and understand)

Ex. 10  Gram Stain (Q1-5)
Ex. 14  +  Use of Differential & Selective Media (Q a-g & Q 1-2)
Pack 263-278 &  Identification of Unknown Bacterial Cultures (next lab is deadline for having pure
Ex. 32  +  working culture of your unknown)
Pack 246-252 &  Cultural Characteristics of Microbes [use this information to evaluate "Distribution
Ex. 3  +  of Microorganisms in the Environment" & all other observations of microbial
growth during semester]
Pack 258-259  Dichotomous key practice—begin today (& continue in subsequent weeks)
IV September 21-23  DETERMINATION OF OXYGEN REQUIREMENT; METHODS FOR GROWING ANAEROBES; SPORE STAIN; CONTROL OF MICROBIAL GROWTH---with ULTRAVIOLET LIGHT; 2 BIOCHEMICAL TESTS

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DEADLINE: for pure working cultures of your unknown
pp. 219-220 Physical & Chemical Agents for the Control of Microbial Growth
Ex. 17 + Physical Factors: Atmospheric Oxygen Requirements
Ex. 12 Part A Staining for Visualization of Cell Structures: A. Spore Stain (Schaeffer-Fulton Method)(Q1-4)
[We will do a modification of this method without heat.]
Ex. 35 + Physical agents: Electromagnetic radiations (resistance of spores to UV) (Q2-5)
Ex. 18 + Techniques for the Cultivation of Anaerobic Microorganisms (Q1, 3-5)
Ex. 29 Biochem: Catalase Test (Q1-4)
----- Continue or complete ongoing exercises & identification of unknown cultures
Pack 258-259 Continue Dichotomous Key practice
Pack 280-285 Continue group work on Pathogen Poster & Normal Microbiota

V September 28-30  ACID-FAST STAIN; BIOCHEMICAL TESTS—SUGAR FERMENTATIONS; EXTRACELLULAR ENZYMES; REVIEW

pp. 95-96 Cultivation of Microorganisms: Nutritional and Physical Requirements
Ex. 11 Acid Fast Stain (Ziehl-Neelsen Method) (Q 1-5) --- demonstration slides
pp. 151-152 Biochemical Activities
Ex. 21 + Biochem: Extracellular Enzymatic Activities of Microorganisms (Q 1,3)
Ex. 22 + Biochem: Carbohydrate Fermentation [24hr] (Q 1-4)
Ex. 23 + Biochem: Triple Sugar Iron Agar Test **[18-24hr]**
Ex. 28 + Biochem: Nitrate Reduction Test [24-48 hr](Q1-4)
Pack 258-259 Continue Dichotomous Key practice
Pack 280-285 Continue or complete ongoing exercises & identification of unknown cultures

IMPORTANT SCHEDULE NOTE: For this set of exercises, you will need to return to the lab the next day (ideal) or the day after to read these test results. If reading of the results is delayed, they won't be accurate.

VI October 5-7

***** **LABORATORY TEST (closed book)**
***** **PRACTICAL TESTS IN ASEPTIC TECHNIQUE & PLATE STREAKING**
----- Continue or complete ongoing exercises & identification of unknown cultures

REMEMBER: Lab books may be collected and graded at ANY time during the semester; this could occur once or more than once and may be announced OR unannounced. You should come to class at all times with your lab book(s) organized, complete and up-to-date.
VII October 12-14  BIOCHEMICAL TESTS; MOTILITY (using WET MOUNTS & a SEMI-SOLID AGAR); BIOCHEMICAL I.D. SYSTEMS; CONTROL OF MICROBIAL- GROWTH—-ANTISEPTICS & DISINFECTANTS

pp. 151-152  Biochemical Activities (continued)
Ex. 24+  Biochem: IMViC Test  A. Indole; B. Methyl Red; C. Voges-Proskauer;
D. Citrate
Ex. 25 +  Biochem: Hydrogen Sulfide Test
Ex. 5  Microscopic Examination of Living Bacterial Preparations
Ex. 48  Identification of Enteric Microorganisms Using Computer-Assisted Multi-Test Microsystems (demonstration) (Q1-5)
L71-74  Pathogen Poster project continued
Pack 280-285  Continue Dichotomous Key practice
Pack 263-278  Continue or complete ongoing exercises & identification of unknown cultures

Continue identification of unknowns  [See hint in next paragraph.]

***Friday October 16—noon—-Deadline for requesting supplemental media for unknown culture identification.***

You may request new media not previously used, and will be advised whether it can be provided. All requests must be in writing or by e-mail to your instructor using the subject line: Special Media Request. Please explain why this medium is of value for identification of your unknown. For previously used media, you should indicate why it is necessary for you to repeat the test now if you did not repeat a test immediately after first reading the results. It may take 3-4 days to get these media prepared. HINT: Request media sooner to permit more time to apply those results.

VIII October 19-21 Fall Break No Labs

IX October 26-28  DILUTIONS & PLATE COUNTS; WATER QUALITY TESTING (MPN); CONTROL OF MICROBIAL GROWTH—-with ANTIBIOTICS, ANTISEPTICS & DISINFECTANTS

pp. 219-220  Physical & Chemical Agents for the Control of Microbial Growth
Ex. 36 +  Chemical Agents: Chemotherapeutic agents—
          Part A. Kirby-Bauer Antimicrobial Sensitivity Test Procedure
          Part B. Synergistic Effect of Drug Combinations
Ex. 38 +  Chemical agents of control: Disinfectants & Antiseptics
Ex. 19 & Pack 286-295  + Serial Dilution—Agar Plating Procedure to Quantitate Viable Cells
Pack 289, 302  Dilution problems (Q1-5, 7 ALL in coursepack)
p. 269  Microbiology of water
Ex. 41 +  Standard Qualitative Analysis of Water (Q 1-4)
          A. Presumptive Test: Determination of the Most Probable Number (Demo);
          B. Confirmed Test
          + C. Completed Test
Appendix p. 329  Methods for Preparation of Dilutions
Handout  Continue exercise on pathogenic bacteria and normal microbiota

Continue or complete ongoing experiments
X November 2-4 PATHOGEN POSTER PRESENTATIONS; MEDICAL MICROBIOLOGY; NORMAL MICROBIOTA; CHECKOUT & CLEANUP
DEADLINE FOR SUBMITTING UNKNOWN REPORTS (submit to your lab instructor during your lab section; 10% penalty for each day late, including each weekend day; reports over 10 days late will not be accepted)

pp. 303-304 Medical Microbiology-Introduction
Ex. 47 Normal Microbiota of the Throat & Skin (read pages 417-418)
Pack 280-285 Completion of exercise/presentations on normal microbiota and on pathogenic bacteria
----- Complete ongoing exercises
----- Laboratory Checkout and Cleanup

XI November 9-11

****** **Cumulative LABORATORY TEST #2 (closed book)**

XII November 16-18 Food Microbiology

page 259-260 Microbiology of Food
pack 296-301 Microbial Production of Food Products
pack 296 ***Advance Assignment***
    Sign up for the food item on sign-up sheets posted in the lab
Ex. 40 Wine production (read p. 265)

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Important Note: If the schedule needs to be shifted because of class cancellation for a hurricane, influenza, or other emergency during the term, the date of the lab final may change.

+ indicates exercise for which follow-up will be necessary. In some cases, this can be done during a scheduled laboratory. In other cases, it will be necessary to do this on days other than Tuesday or Wednesday. The time in brackets [ ] indicates the approximate time at which follow-up should be done.

*Pack course pack laboratory section at end of coursepack (specific pages are changing due to renumbering & will be posted.
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