

<b>Course Code &amp; No. - Section:</b>	BIOL 341/345 - Section 1
<b>Course Title (Credits):</b>	Microbiology (3) and Lab (1)
<b>Term &amp; Year:</b>	Spring / 2014
<b>Course Ref. No. (CRN):</b>	10168 (BIOL 341) and 10169 (BIOL 345)
<b>Instructor:</b>	Dr. Suzanne Gollery
<b>Phone(s):</b>	775-831-1314 ext7456 or 775-813-4215 (8 a.m. – 9 p.m.)
<b>Email:</b>	<a href="mailto:sgollery@sierranevada.edu">sgollery@sierranevada.edu</a>
<b>Office:</b>	TCES, room 223
<b>Office Hours:</b>	M 2:30 – 3:45 p.m., F 11:30 a.m. – 12:45 p.m. or by appointment
<b>Class Meeting Time:</b>	WF 1:00 – 3:45 p.m. (lab and lecture activities will be distributed throughout this time each class day)
<b>Location:</b>	TCES 204
<b>Prerequisites:</b>	BIOL 101 and 102
<b>Corequisites:</b>	BIOL 341 and BIOL 345 are co-requisites

### Course Descriptions:

**BIOL 341: Microbiology (3) [AY]** Prerequisites: BIOL 101, BIOL 102. Corequisite: BIOL 345.

Study of the phylogeny, physiology, identification, and ecology of microbes, including fungi, bacteria, algae, and protists. Applications include medicine, industry, brewing, and agriculture.

**BIOL 345: Microbiology Lab (1) [AY]** Corequisite: BIOL 341.

Identification, physiology, and ecology of microbes.

### Required Texts and Materials

1. Madigan MT, Martinko JM, Stahl DA, and Clark DP. Brock Biology of Microorganisms, 13<sup>th</sup> ed, a la Carte edition (unbound, 3-hole punched). San Francisco (CA): Benjamin Cummings/Pearson; 2012. ISBN-10: 0321726731. Students may also elect to purchase a new or used bound text, paper or hard.
2. 2-inch or larger D-ring binder to hold the loose-leaf Madigan text and/or course materials.
3. Ben-Barak, I. The invisible kingdom: from the tips of our fingers to the tops of our trash, inside the curious world of microbes. New York (NY): Basic Books; 2009. ISBN: 978-0-465-01887-1. New or used copy is ok. Published in Australia as Small wonders: how microbes rule our world. Scribe Publications; 2008. This version is also ok, although page numbers may be different.
4. Sachs, JS. Good germs, bad germs: health and survival in a bacterial world. New York (NY): Hill and Wang/Farrar, Strauss, and Giroux; 2007. ISBN: 978-0-8090-1642-6 (paper). Paperback or hardback, new or used is ok.
5. Chess, B. Laboratory applications in microbiology: a case study approach, 2<sup>nd</sup> ed. New York (NY): McGraw-Hill; 2009. ISBN: 9780077755492. This is the a la carte (loose-leaf) edition. A spiral bound edition is also ok. Be careful about buying used copies, as this is a workbook with space on pages to fill in answers. The best lab exercises (those we are likely to do) may be written on or missing.
6. A spiral- or hard-bound laboratory notebook (carbon copy duplicate pages are not necessary).
7. Access to a computer (one that meets the published SNC Computer Requirements) and internet.

**Student Outcomes for BIOL 341/345:** Upon completion of Microbiology and Lab, students will

1. have a sufficient understanding of the diversity, physiology, genetics, and ecology of microbes to successfully answer related questions on pre-professional exams, such as the MCAT and GRE.
2. have a sufficient understanding of the diversity, physiology, genetics, and ecology of microbes to undertake related graduate courses.
3. understand and appreciate the significant roles of microbes in present day ecosystems, and in the evolution of all life on Earth.
4. demonstrate skill at reading and comprehending science texts and peer-reviewed science research articles.
5. demonstrate skill at critical analysis, logic, and problem solving involving facts and concepts of biochemistry, biology, and experimental data.
6. demonstrate competence at researching a science topic using library and internet sources, evaluating information obtained, and organizing the research into a written term paper with referenced sources.
7. demonstrate competence in laboratory techniques used to study microbes, including brightfield microscopy, microbial culture techniques, staining techniques, and assays of microbes metabolic capabilities.
8. demonstrate competence at producing a professional poster and writing a scientific paper summarizing original inquiry-based research in microbiology.

**Methods of Assessing Student Outcomes:** Student outcomes will be assessed using the following:

1. Homework sets will assess student comprehension of reading assignments and discussions.
2. Four unit exams and one final exam will assess the ability of students to remember, apply, and synthesize key facts and concepts of course content.
3. A term paper and related assignments will assess the ability of students to research a science topic, evaluate information, write, and revise a research paper.
4. Students will demonstrate skills with microbiology techniques while isolating and identifying microbes from some environmental niche and in a microbiology lab skills practical exam.
5. Each student will develop a research poster summarizing their data, analysis, and conclusions.
6. Each student will write a scientific research report on their unknown microbe identification.

### **Instructional Strategies**

Students will prepare for class by reading assigned materials and writing draft answers to questions provided by the instructor. Class time will be spent on 1) clarifying questions about reading or homework assignments, 2) small group and individual activities, discussions, and case studies, 3) some lectures to help explain particularly dense concepts, and 4) a semester-long guided analysis and identification of microbial species isolated by each student. Students will spend additional time outside of class writing and revising a term paper on an infectious disease and writing a scientific research paper and poster. The *Moodle* course management system will be used for posting materials, course communication, and student assignment scores.

### **Course policies:**

- 1) **Lab safety when working with microbes:** Microbiology is among the riskiest courses a student can take at SNC, because many of the microbes we work with are opportunistic human pathogens, that is, they can infect immunocompromised people and cause disease. Thus, it is extremely important that students comply with lab safety regulations, including stowing personal belongings away from work areas, cleaning microscopes after use, and disinfecting work areas before leaving class. Students who must be repeatedly reminded to follow safety precautions may be dropped from the course in order to ensure the safety of other people using the classroom.

**2) Food and drinks:**

Food and beverages, even drinking water, are FORBIDDEN by state and federal safety regulations in TCES 204, the biology lab. Students must leave food and beverages outside of the lab room. Students are free to remove gloves and lab coat, wash their hands, and exit the classroom to get a drink while individuals or teams are working independently, such as during lab activities.

**3) Electronic devices:**

Students are not permitted to use MP3 players in class at any time, including during exams. Cell phones, tablets, and laptops may be used to access online resources or take notes in class. Students have permission to tape classes for later study. Students will be asked to stow phones, tablets, and laptops if used for non-class-related activities and while lab work is underway.

**4) Attendance:**

Success in Microbiology and Lab is significantly influenced by participation in class and lab activities. Lab assignments and late homework will NOT be accepted from students who skipped class on the due date. The instructor MAY choose to excuse an absence and accept work due, but absences related to travel for weekends or holidays and employment will NOT be excused.

**5) Late work:**

Homework and lab assignments are due at the beginning of the class period on the due date unless the instructor permits students to hold them while asking questions. Late work will be accepted, but students will lose 10% of the possible points for each calendar day that work is late. For example, students will earn 20% fewer points for work due on Wednesday if it is turned in on the following Friday. Work more than seven days late and late extra credit will NOT be accepted.

**6) E-mailed work:**

All work may be submitted by e-mail or in hard copy. Students may e-mail files generated on a computer or hardcopy work scanned to pdf files. Please include your name or initials in the file name. The instructor will reply to verify that e-mailed work was received. It is the student's responsibility to follow up if the instructor does not reply about e-mailed work. Mac users are advised to save work to pdf files before submitting it electronically, as formatting and visuals may be lost otherwise.

**7) Citing sources:**

Cite sources using the CSE *citation-sequence* (number) system, which is similar to that used by most scientific journals, as specified here: [http://bcs.bedfordstmartins.com/resdoc5e/RES5e\\_ch11\\_s1-0003.html](http://bcs.bedfordstmartins.com/resdoc5e/RES5e_ch11_s1-0003.html). Scientists routinely cite original sources for factual information that is not widely known. For example, one would not have to cite a source when stating that bacteria live in the human gut, but one would cite a source when stating that gut microbiota varies between obese and normal weight individuals<sup>1</sup>. When you are writing a scientific argument in response to a homework question or as part of a lab or class assignment, get in the habit of citing facts when you find them in a source.

1. Ley RE, Turnbaugh PJ, Klein SM, Gordon JI. Microbial ecology: human gut microbes associated with obesity. *Nature*; 2006; 444(7122):1022-1023.

**8) Extra credit:**

The instructor will offer extra credit for additional work with instructional value regularly throughout the semester. A list of extra credit options available throughout the semester will be posted on Moodle and these are due by 11:59 p.m. on Sunday, April 20. Other extra credit options will be posted on Moodle periodically and will have shorter-range due dates. A student may earn up to 60 extra credit points, 5% of the total number of points possible for the class.

**9) Modifications to the BIOL 341/345 course syllabus:**

This syllabus and schedule is intended to provide students with a clear and accurate outline of course content, student outcomes, class topics, assignments and due dates, and exam dates. Students should keep and refer to the syllabus regularly, and learn how to access it on the course Moodle page. The instructor reserves the right to make announced changes to the syllabus and class schedule at her discretion if it is in the best interest of the students to do so. Major changes, such as changes to exam dates or coverage and permanent changes to the schedule, will be posted on the Moodle site and students will be e-mailed about such postings.

**Prim Library Resources**

Using the library's resources effectively (not just internet resources) contributes to developing each of SNC's core themes by exposing students to high quality academic resources, diverse opinions, new ideas, and a future that includes building on a liberal arts education. In this course, you will be expected to utilize the library's resources (either on-site or remotely) as you complete your assignments. SNC students are also eligible (with verification of current registration) to check out books and use electronic resources from the Washoe County Library, Incline Branch, on Alder Ave and at <http://www.washoecounty.us/library/>.

Prim Library Resources for Microbiology and Lab include, but are not limited to:

1. Books (can be checked out):
  - a. In general, books related to biology have Library of Congress Classification numbers ranging from QH through RC. Books about biotechnology have LCC numbers beginning with TP. However, you will find books related to our course with other LCC numbers, so search the Prim Library Catalog using key words related to the topic that you are researching.
  - b. Pechenik JA. A short guide to writing about biology. 7<sup>th</sup> ed. New York: Longman; 2010. LCC number QH 304. P43 2010
  - c. Lipson C. Cite Right: a Quick Guide to Citation Styles. Chicago: University of Chicago Press; 2006. LCC number PN171. F56L55 2006. Includes a section on CSE style.
2. Electronic databases (for peer-reviewed primary source research articles, secondary source reviews, newspaper magazine articles, and online books): Electronic databases most likely to include articles on biology topics are EBSCO: Academic Search Premier, Annual Reviews, Environment Complete, General Science Collection, GreenFILE, Health Source, Newspaper Source, and TOPICsearch; BioOne; and GREENR.
3. Hardcopy periodicals: Prim Library has current subscriptions for Science, New Scientist, Science News, Scientific American, and National Geographic Magazine. Any of these are likely to have secondary source articles about biology topics written for educated people who are not necessarily scientists. You will find these easy to read and articles will include references to primary source articles. Full-text articles from many more periodicals are available through the electronic databases.
4. Lib Guides: <http://Libguides.sierranevada.edu> These web pages contain instructions about how to use resources available at Prim Library, Prim Library resources for biology topics, how to evaluate the appropriateness of information from the internet for a research paper, how to cite sources, and other topics related to finding and using information.

## Sanctions for Cheating and/or Plagiarism

### The Honor Code

The faculty of SNC believes students must be held to high standards of integrity in all aspects of college life in order to promote the educational mission of the College and to encourage respect for the rights of others. Each student brings to the SNC community unique skills, talents, values and experiences which, when expressed within the community, contribute to the quality of the educational environment and the growth and development of the individual. Students share with members of the faculty, administration and staff the responsibility for creating and maintaining an environment conducive to learning and personal development, where actions are guided by mutual respect, integrity, responsibility and trust. The faculty and students alike must make diligent efforts to ensure high standards are upheld by their colleagues and peers as well as themselves. Therefore faculty and students accept responsibility for maintaining these standards at Sierra Nevada College and are obligated to comply with its regulations and procedures, which they are expected to read and understand.

### Consequences of Violating the Student Honor Code

SNC students and faculty share the responsibility for maintaining an environment of academic honesty. Thus, all are responsible for knowing and abiding by the SNC Faculty/Student Honor Code published in the current SNC Catalog. Faculty are responsible for presenting the Honor Code and the consequences of violating it to students at the start of their classes AND for reporting all incidences of academic dishonesty to the Provost. Students are responsible for knowing what constitutes CHEATING, PLAGIARISM and FABRICATION and for refraining from these and other forms of academic dishonesty. Violations of the Honor Code become part of a student's academic record.

1<sup>st</sup> Offense: Student receives a zero for assignment/exam and counseling with faculty on the honor code, consequences for violating the honor code, and the value of academic honesty in learning.

2<sup>nd</sup> Offense: Student fails course and receives counseling with faculty on the honor code, consequences for violating the honor code, and the value of academic honesty in learning.

3<sup>rd</sup> Offense: Student is expelled.

Cutting and pasting or copying phrases or sentences from internet sources, books, articles, or other students is a violation of the student honor code. If you consistently write using your own words, you will avoid plagiarizing or cheating.

### The SNC Email System

The SNC email system is the official communication vehicle among students, faculty members and administrative staff and is designed to protect the confidentiality of student information as required by the Family Educational Rights and Privacy Act of 1974 Act (FERPA). Students should check their college email accounts daily during the school year.

Students have a right to forward their SNC e-mail to another e-mail account, for example, @hotmail or @gmail ([instructions here](#)). However, confidentiality of student information protected by FERPA cannot be guaranteed for SNC e-mail forwarded to an outside vendor. Having email redirected does not absolve a student from the responsibilities associated with official communication sent to his or her SNC email account.

### ADA Accommodations

In accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, students with a documented disability are eligible for support services and accommodations. If a student wishes to request an accommodation, please contact the Director of Academic Support Services, Henry Conover, at (775) 831-1314 x7534, [hconover@sierranevada.edu](mailto:hconover@sierranevada.edu), office in Prim Library: PL-304.

### The Sierra Nevada College Mission Statement:

Sierra Nevada College graduates will be educated to be scholars of and contributors to a sustainable world. Sierra Nevada College combines the liberal arts and professional preparedness through an interdisciplinary curriculum that emphasizes entrepreneurial thinking and environmental, social, economic and educational sustainability.

**The Core Themes:** Four core themes from the SNC mission are woven through all courses and the life of the community at SNC.

Liberal Arts

Sustainability

Entrepreneurial Thinking

Professional Preparedness

### Tips for Success in Microbiology and Lab

You will learn the most from this class (and no doubt, earn a better grade) if you are an active participant. That means doing the assigned reading and keeping notes on what you don't understand so that you can research it later and ask questions for clarification. Do your best to answer homework questions after reading the assigned chapter or articles. Then search the internet, use Wikipedia, consult your study group, send an e-mail to Suzanne, or go to office hours for help with questions you still can't answer. But, don't search the internet or use Wikipedia to answer questions instead of doing the assigned reading, as the homework questions don't query all of the content you should get from the reading assignments. When you come to class prepared with questions about reading topics that you find confusing, you will be able to direct the class discussion to give you the most help. After class, revise and finalize your homework answers before turning it in. You should be confident your answer are correct and complete when you turn in the homework, or you are not taking full advantage of opportunities for clarification. Earn 3 points extra credit now by e-mailing Suzanne before class on Jan 24 and describing your personal strategy for succeeding in Microbiology and Lab.

When you work with other students in class (or outside of class), do your best to contribute. Don't wait passively for others to find the answers. You're unlikely to remember material that you experienced passively, but you are likely to remember material that you figured out and explained to others. When working in teams, leaders tend to learn the most, then contributors, participants, and observers. Teams don't like to work with detractors, so you will lose your peer help if you detract.

*Leader –*

does all that is asked

plus extra

plus helps someone else

*Contributor –*

does all that is asked

plus extra

*Participant –*

does all that is asked

nothing more

*Observer –*

does something,

but less than is asked

*Detractor –*

does less than is asked

keeps someone else from doing what they are supposed to do



## Grading Policy

Since BIOL 341 and 345 are corequisites, and the material of each is so integral to the other, assignments from each will contribute to an overall point total and the same letter grade will be awarded to both courses. The grading curve is based on a 1200-point scale, with 72% of points from BIOL 341 and 28% from BIOL 345. Sierra Nevada College awards half grades (e.g., A- or B+), so a student with a point total within 1.5% of the cutoff for the letter grade will earn the appropriate half grade.

Grading Curve			BIOL 341 (72%):	
			Homework – 12 best at 20 points each	240 points
			Infectious disease paper:	
A	90 – 100%	1080 – 1200 points	Annotated bibliography	30 points
B	80 – 89.9 %	960 – 1079 points	Draft/Peer review	30 points
C	68 – 79.9%	816 – 959 points	Final paper	40 points
D	58 – 67.9%	696 – 815 points	Exams – 4 at 80 points each	320 points
F	<58%	<696 points	Comprehensive Final Exam	200 points
Students may earn points in the following ways:			BIOL 345 (28%):	
			Lab assignments – best 15 at 10 points each	150 points
			Lab skills practical exam	80 points
			Lab notebook	50 points
			Unknown paper	30 points
			Unknown poster	<u>30 points</u>
			<b>Total</b>	<b>1200 points</b>

## Assignment details:

Homework: Students will answer several questions while reading assigned material prior to its being discussed in class. Homework is due the next week, so students have an opportunity to revise their answers after material is discussed in class.

*Learning goals for the assignment*: Scientific studies on how people learn have shown repeatedly that we learn and remember more when we are active learners. This means that students will remember and be able to apply more facts and concepts of microbiology for a much longer time if they learn them by reading and writing about them, communicate about them with other people, and apply them to solve problems in different contexts, than if the same students come to class and passively listen to an instructor lecture about the facts and concepts while taking notes. The homework assignments give microbiology students a chance to learn actively by reading and answering questions related to the reading. Students are also encouraged to write other questions asking for clarification of confusing material from the reading assignment and bring them up in class. Class activities will provide time to address student questions work in pairs or small groups to communicate about course content, and apply challenging and important concepts and facts to new situations. Students will gain much more from class activities if they come to class prepared, already having read the text, attempted to answer the questions, and figured out what they understand and what they find confusing.

*How to do the assignment:* Homework questions can be downloaded from the BIOL 341/345 Moodle site as an MS Word or pdf file (Mac users may have better success with pdf files, because formatting and pictures will be maintained). Students may write answers by hand or type on a computer and print or e-mail the answer file. Students should expect to spend up to twice as much time outside of class on reading assignments, homework, and papers as they spend in class. Due dates are given on the schedule and homework assignment file.

*Collaboration and individual work:* Students are encouraged to work with classmates to understand concepts and facts presented in reading assignments and queried by homework questions. **However, each student must write answers to questions in his/her own words.** Students with homework prose that is identical to or paraphrased from other students work, the text, Wikipedia, or other published or internet sources will receive a ZERO GRADE for the assignment and consequences for violating the academic honesty policy may apply. Cheaters never learn! [More here.](#)

*Scoring and feedback from the assignment:* Because students have time after the material is covered in class to correct answers, homework will be scored for correctness, that is, all parts of each question must be answered correctly for full credit. Suzanne will give students written feedback on some answers, but not all. Students should keep their evolving homework answers in a course binder or file.

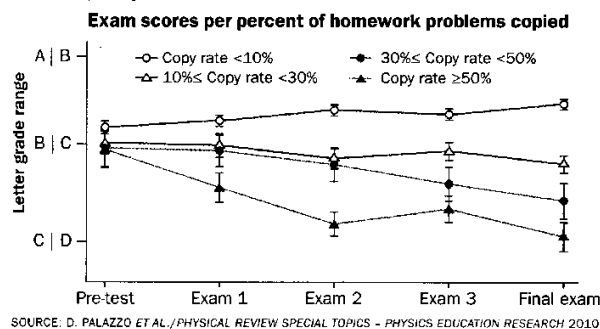
Student questions: While completing assigned reading, homework, or other assignments, students are encouraged to write questions for clarification of confusing or difficult concepts or facts and e-mail these questions to the instructor or bring them to class. Please use a subject heading for your e-mail that states it is a question for class. Questions may be submitted prior to any class, not just classes with homework or other assignment due dates. Your questions will also help direct the class discussion to help you understand what you find most difficult. Submitting meaningful questions by email before class will earn a student 2 points extra credit per class.

Exams: Four exams worth 80 points each will cover material since the previous exam or start of class, although students will be asked to apply concepts assessed on previous exams when these are related to current content. The theory behind lab techniques is also fair game for exams. Exams include multiple choice questions, since this format is used on standardized exams, such the GRE and MCAT. Other questions may include short answer, essay, or true-false formats. Many exam questions will ask students to apply concepts and facts to solve problems or analyze a scenario. Students will have hard copy exams.

Lab Assignments: Students are expected to read the lab and answer prelab questions before each class. Students who arrive without having completed prelab questions will be asked to leave the class. Many lab activities will have associated assignments that may be turned in at the end of the lab period, or may require additional work out of class and will be due at a later date. Lab assignment due dates are given on the schedule of classes. All students will turn separate lab assignments with answers to prelab and postlab questions written in their own words, even when lab work is done as a team.

### Science Stats | CHEATERS NEVER LEARN

A study of MIT students found that those who copied others' homework more frequently did worse on exams over the course of a semester.



4 | SCIENCE NEWS | May 8, 2010



Lab Notebook: Each student will keep a working lab notebook in which they record all observations and data about their unknowns, any modifications to procedures in the lab manual or other lab handouts, and questions, thoughts, and conclusions about their experiments. Records should be kept in enough detail that classmates could use the lab notebook, lab text, and handouts to repeat the experiments or write a detailed lab report about them. The appearance of cultures and slides should be sketched or photographed and secured in the lab notebook promptly. Photos can be stapled or taped into the bound notebook. Lab notebooks will be checked by the instructor periodically to give students feedback on how well they are keeping records and lab notebook check scores will count toward the lab notebook grade. Lab notebooks will be submitted at the end of the course for an additional score and returned to students at the time of the final exam.

Unknown Lab Reports: Each student is responsible for writing one lab report about characterizing their *microbial* unknown. This assignment gives students practice communicating about their research in writing in the format scientists use for primary research articles.

Lab Poster: Students will each construct a research poster demonstrating key evidence that they used in identifying their unknown microbes. This assignment gives students practice communicating about their research in a format used at scientific meetings.

Lab Skills Practical Exam: Students will demonstrate microbiology lab skills, such as focusing on bacteria with a compound microscope, streaking a plate to get isolated colonies, performing a Gram stain, measuring accurate volumes with serological pipette and micropipette, diluting a liquid culture and plating to calculate the numbers of bacteria per ml... in a practical exam during the last week of class. Since you will have practiced these skills many times throughout the semester, it should be an easy 80 points!

Midterm Grades: Midterm grades will be calculated using all work due through Wednesday, March 12, 2014. There will not be a comprehensive midterm exam, although Exam 2 falls on Wednesday of midterm exam week.

Final Exam: A comprehensive final exam with a format similar to the four exams will be given at the end of the semester. **The BIOL 341/345 final exam is scheduled for Monday, December 12, 3:00 – 6:00 p.m.**

The schedule of classes for Microbiology and Lab begins on page 10.

## Schedule of classes for Microbiology and Lab

Week/dates	Reading assignments	Topics	Work due
<b>Week 1</b>			
Jan 22	Syllabus Chess <sup>1</sup> : Case 1	Overview of BIOL 341/345 Laboratory Safety	Case 1: Lab safety
Jan 24	IK <sup>2</sup> : Prologue, Ch 1, and pp 24-27 (Slime city) & 64-68 (Conjugal matters) Brock <sup>3</sup> : Ch 1 pp 2-10 and Ch 2 pp 31-46 Chess: Cases 7 and 8 (read and complete pre-labs <u>before</u> class)	What are microorganisms and what do they do?  Aseptic technique and Pure culture techniques, part I	Case 7: Aseptic technique
<b>Week 2</b>			
Jan 29	M <sup>4</sup> : Ultimate Social Network GG,BG <sup>5</sup> : pp 3-12, 71-87 M: Microbial unknown experiment handout	The human microbiome and the hygiene hypothesis Pure culture techniques, part II Microbial unknown experiment planning	Week 1 homework
Jan 31	Brock: Ch 28 pp 817-825, 30.1 on pp 860-862, and Ch 29 pp 839-842 Brock: Ch 4 pp 86-92 M: Winogradsky column	Innate immunity and intro to adaptive immunity Pure culture techniques, part III Request media for unknown experiment Set up Winogradsky column	Case 8: Pure culture techniques
<b>Week 3</b>			
Feb 5	Brock: Ch 29 pp 843-858, and 30.8 on pp 871-872 IK: Masters of... pp 79-81 & Jumping... pp 94-100	Adaptive immunity  Inoculate for unknown experiment	Week 2 homework  Protocol design for growing unknown cultures
Feb 7	Brock: Ch 28 pp 830-835 M: Readings on allergy and autoimmunity GG,BG: Part II pp 71-102 Chess: Case 2 (read and complete prelab) Brock: Ch 2 pp 25-31	Allergy, autoimmunity, and the microbiome  Microscopy and measurement	Case 2: Microscopy and measurement

<sup>1</sup> Reading assignments preceded by "Chess:" are found in Chess B. Laboratory applications in microbiology. New York (NY): McGraw-Hill; 2012.

<sup>2</sup> Reading assignments preceded by "IK:" are found in Ben-Barak I. The invisible kingdom. New York (NY): Basic Books; 2009.

<sup>3</sup> Reading assignments preceded by "Brock:" are found in Madigan MT, Martinko JM, Stahl DA, Clark DP. Brock biology of microorganisms, 13<sup>th</sup> ed., San Francisco (CA); Pearson/Benjamin Cummings; 2012.

<sup>4</sup> Reading assignments preceded by "M:" are posted on Moodle.

<sup>5</sup> Reading assignments preceded by "GG,BG:" are found in Sachs JS. Good germs, bad germs. New York (NY): Farrar, Strauss, and Giroux; 2007.

Week/dates	Reading assignments	Topics	Work due
<b>Week 4</b> Feb 12       Feb 14	Brock: Ch 25 (all) and Ch 27 pp 788-797 SN issue on microbiota Chess: Exercise 40 Chess: Case 9 (read and do prelab before class)  Chess: Cases 10 and 11 (read and do prelabs) M: Dorner endospore stain Chess: Exercise 41	Microbiomes of plants and animals  Colony morphology of unknowns Simple, negative, and Gram stains Streak unknowns for isolation  Capsule, acid-fast, & endospore stains Inoculate unknown slants & broths	Week 3 homework  Case 9: simple, negative, Gram stains  Cases 10 & 11: differential stains
<b>Week 5</b> Feb 19       Feb 21	<b>Study for Exam 1</b>  Chess: Case 12 (read lab <u>before</u> beginning work) M: Two articles on disease associated w/ & regulat. of raw milk consumption  Brock: Ch 10 (all) IK: pp 64-68, 76-79 M: Infectious disease paper Chess: Case 16 (read and do prelab before class)	<b>Exam 1:</b> microbiomes, hygiene hypothesis, immune system, allergy and autoimmunity, microscopy, aseptic and pure culture techniques, stains Viable plate count Finish Exercise 41 on unknowns Stain and measure unknowns  Genetics of Bacteria and Archaea Infectious disease paper assigned  Viable plate count part II Effects of [solutes] on growth	Week 4 homework  (Answer prelab questions for Case 12 before Feb 21)  Case 12 : viable plate count
<b>Week 6</b> Feb 26       Feb 28	GG,BG: Part I pp 13-32 and Part IV, pp 103-148 IK: pp 100-113 Chess: Cases 14 and 15 (read and do prelab before class)  Brock: Ch 26 (all) IK: pp 18-22 Brock: Ch 5 (all)	Antibiotics eliminated death from infectious disease... or did they?  Effects of temperature and pH on bacterial growth  Microbial growth control  Complete Cases 14, 15, & 16	Week 5 homework  Cases 14, 15, & 16
<b>Week 7</b> Mar 5       Mar 7	GG,BG: Part V pp 147-182, pp 189-202, 212-216 Chess: Case 20 (read and do prelab before class)  Brock: Ch 12 (all) IK: pp 73-76, 158-161  Chess: Case 18: Evaluating disinfectants	Prospects for controlling infectious disease Antibiotic sensitivity testing  Microbial genomics  Finish Case 20: antibiotic testing Evaluating disinfectants: use-dilution method	Week 6 homework  <u><b>Annotated bibliography</b></u>  Case 20: antibiotic sensitivity testing

Week/dates	Reading assignments	Topics	Work due
<b>Week 8</b> Mar 12	<b>Study for Exam 2</b>	<b>Exam 2:</b> prokaryotic genetics, microbial growth, factors affecting growth, growth control, antibiotics & resistance, other infection control methods, microbial genomics	Week 7 homework
	Chess: Case 19 (read before beginning. The first two people finished will be the scrub team)	Finish Case 18: Effectiveness of disinfectants – use dilution method Case 19: Effectiveness of hand scrubbing	Case 18: Effectiveness of disinfectants
Mar 14	Brock: Ch 1 pp 10-21 GG,BG: Part II pp 33-70 IK: pp 143-157	Contagion (if you are absent this date, watch movie over break) Finish Case 19: Hand scrubbing	Case 19: Hand scrubbing
<i>Spring Break</i> Mar 19 Mar 21	Read GG,BG parts VI, VII , and Coda over break for more on bacterial disease treatments beyond antibiotics		
<b>Week 9</b> Mar 26	Brock: Ch 27 pp 798-814, and Ch 32 (all) IK: pp 35-45, 90-100, 148-150, 162-164, 180-185 Chess: Cases 23 and 27 (read and do prelabs before class)	Virulence, pathogenicity, and epidemiology  MMWR and Diagnosis by DNA profiling	Week 8 homework  Case 23 MMWR
Mar 28	Brock: Ch 31 (all)	Diagnostic microbiology DNA profiling Periods 2 & 3 Inoculate unknown cultures for isolating DNA	Case 27 DNA profiling
<b>Week 10</b> Apr 2	Brock: Chs 35 and 36 IK: pp 114-116 M: Bacterial DNA isolation handout (read for class)	Water- and food-borne infections Isolating genomic DNA from unknown bacteria Check DNA concentration and isolate cultures again to repeat if needed	Week 9 homework
Apr 4	Brock: Chs 33 and 34  M: Peer review of infectious disease paper	Infectious diseases transmitted via air, soil, or vectors Peer review on paper drafts Repeat DNA extraction if needed	<b><u>Infectious disease paper good drafts due</u></b>

Week/dates	Reading assignments	Topics	Work due
<b>Week 11</b> Apr 9       Apr 11	<b>Study for Exam 3</b>  IK: 158-161 M: Amplification of 16S rRNA genes  Brock: Ch 13 - part I, 17.2, 18.7, 18.8, 18.15, 18.18, pp 524 Heliobacteria & 561-2 bacteriorhodopsin M: Winogradsky column Chess: Case 39 (read and do prelab <u>during</u> class) M: print handout of tests available for unknowns	<b>Exam 3:</b> Epidemiology, diagnostic and medical microbiology  PCR to amplify 16S rRNA genes of unknowns for DNA sequencing  Bacterial producers I: phototrophy  Evaluate Winogradsky column Plan biochemical tests for testing your unknowns	Week 10 homework       Request media and control cultures from those listed in the handout
<b>Week 12</b> Apr 16       Apr 18	Brock: Ch 13 - part II, 17.3 through 17.6, 17.18, 17.19, and 18.20 IK: pp 122, 135-137 Chess: read exercises describing biochem tests that you will perform on your unknowns  Brock: Ch 13 - part III, 17.9, 25.3 IK: pp 57-60, 119-122	Bacterial producers II: lithotrophy  Set up several biochemical tests on your unknowns. (You will know which ones by end of class 4/11)  Bacterial producers III: carbon- and nitrogen-fixation Evaluate biochem tests set up 4/16 Set up more biochemical tests on your unknowns	Week 11 homework  Winogradsky column analysis
<b>Week 13</b> Apr 23       Apr 25	Brock: Ch 14 - part I, 17.11, 17.12, 18.1, p 523-4 Clostridium, p 527 propionic acid b, 18.12, 18.16, 36.3 IK: 123-124  Brock: Ch 14 - parts II & III, 17.7, 17.13, p 522 Bacillus, 18.3, 18.4, 18.14 IK: pp 81-84, 55-56, 86-87, M: Using BLAST to identify bacteria from 16S rRNA M: Bergey's Manual	Bacterial consumers I: fermentation  Evaluate biochem tests set up 4/18 Set up more biochem tests if needed  Bacterial consumers II: respiration with organic electron donors  Attempt to ID unknown bacteria with morphological, biochemical, and DNA sequence data Work on posters	Week 12 homework  <b><u>Infectious disease papers due – final version for grading</u></b>

Week/dates	Reading assignments	Topics	Work due
<b>Week 14</b> Apr 30	Brock: Ch 17 – part IV, 17.17, 18.6, 18.10, 18.11, Ch 18 – part XII, Ch 19 IK: pp 49-54	Bacteria with unusual morphologies and extremophiles  <b>Microbiology skills practical exam</b>	Week 13 homework
May 2	<b>Study for Exam 4</b>  Print posters <u>before</u> class.	<b>Exam 4:</b> bacterial metabolism, diversity of bacteria and archaea  <b>Unknown microbe research poster session:</b> class votes two microbiology poster presentations to go to Science Research Presentations at 4 p.m.	<b>Unknown posters</b> due
<i>May 2 4:00-7:00 pm</i>	<i>Science Student Research Presentations</i>	<i>Best three projects from this event will represent Science and Tech in the SNC Student Symposium</i>	
<b>Week 15</b> May 7	<i>Reading Day</i>	<i>Final exam review session at class time</i>	Week 14 hw, <b><u>unknown</u></b>
<b>5:00-9:00 pm</b>	<b>SNC Student Symposium 2014</b>	<b>The best of SNC student work from all disciplines in 13-14</b>	<b><u>research report</u>, and <u>lab</u></b>
May 9	<i>Final exam day – no class</i>		<b><u>notebook</u></b> due 5/7
<b>Final exam</b> Dec 12	Monday, 3:00 – 6:00 p.m.	Comprehensive Final Exam  Who wants to go out to Hacienda after the final exam?	