COLBY COMMUNITY COLLEGE

Syllabus

Course Number/Title:	BI208 Prin. of Microbiology w/ Lab	**Semester:**	Fall 2012
Department:	Biology (Math & Science)	**Credit Hours:**	5
Required Text:	See Below	**Course Placement:**	Freshman/Sophomore
Class Days:	M/W 10:50-12:05 R 12:15-1:30	**Room Number:**	Lecture: 410 Lab: 405
Instructor:	Heidi Bulfer	**Email:**	heidi.bulfer@colbycc.edu
Office:	Thomas Hall – Faculty Complex	**Phone #:**	(785) 460-5422
Office Hours:	See Office Schedule	**Pre-requisite:**	BI177 & CH177

Rationale:

This course attempts to focus on the understanding of life processes using microorganisms as the prototype of living things. Students will also build on their knowledge of scientific method application by identifying bacterial unknowns via the accumulation of knowledge gleaned from reactions associated with the routine identification of bacteria in medical laboratories. The interactions of microorganisms with the environment will also be stressed concerning the global community of plants and animals as related to disease spread and the discovery of new diseases in plants and animals associated with human environmental practices. Since microorganisms are the basis of numerous pathological situations in plants and animals the most common bacteria, protozoans and viruses will be associated with their diseases and related to sequelee of these conditions. An understanding of the role of microorganisms in the environment as related to human overpopulation and the rise of pollution will also be emphasized.

Course Description:

Prerequisite: BI177 (Principles of Biology). Three hours of lecture and three hours of laboratory per week are included. This is a survey of the major characteristics and life functions of the bacteria, fungi and viruses with emphasis upon the disease-producing effects of microorganisms. Major emphasis in lecture and laboratory is placed upon bacteria. Laboratory work involves microscope techniques, identification of microorganisms and methods involved in handling, culturing and controlling microorganisms. (Offered each semester)

CCC Student Outcomes:

1. Effective written communication skills
2. A higher level of critical and creative thinking processes
3. Ability to solve problems using a variety of techniques and methods
4. Ability to utilize the technology relevant to the learner's discipline
5. An awareness of personal wellness

Course Outcomes:

1. Demonstrate an understanding of the history of microbiology as well as cell biology relating to microbial organisms and their abilities to cause disease.
2. Demonstrate an understanding of microbial genetics and its significance in nature and genetic engineering/biotechnology for today's society.
3. Demonstrating an understanding of the interactions of microbes and humans.
4. Demonstrate an understanding of the interactions and impact microorganisms have on the environment.

Course Outline/Course Competencies

A. Discovering the Microbial World and the Scope of Microbiology
   a. Discuss the fact that microbiology is the study of organisms that are usually too small to be seen by the unaided eye.
   b. Describe the utilization of sterilization and the use of culture media to grow and isolate microorganisms.
   c. Spontaneous generation does not apply to microorganisms as living entities. Restate this concept in relation to the reproduction of microorganisms from other microorganisms.
   d. Explain the concept of a pure culture and apply the meaning to everyday practices in animal/human medical practice.
   e. Discuss the relationship between the germ theory of fermentation and the germ theory of disease.
   f. Review and report why the period of 1880-1900 was significant for the emergence of microbiology as a science.
   g. Numerous researchers in the biological sciences use microorganisms as a model system to explore life processes. Explain why this is so.
   h. List some of the applied fields of microbiology and make a general statement of the importance of microorganisms in each field.
   i. Prior to the 1930's universities and colleges had departments of bacteriology. Since that time there has been a shift toward a change in name to departments of microbiology. What is the explanation for this change?
   j. Translate Pasteur's work with the wine industry to modern day techniques for the preservation of "food" items.
   k. Recall the contribution of Spallanzani, Pasteur, and Tyndall in relation to the development of microorganisms by spontaneous generation.
   l. Name the individual responsible for the development of solid media for the isolation of axenic cultures.
   m. Name the individual that assisted Dr. Koch in his research and was honored by having a culture dish named after him.
   n. Develop Koch's postulates and ascertain how they are used to indicate the direct relationship between a suspected pathogen and a disease.
   o. Explain in which pathological situations of microorganism etiology that Koch's postulates would not apply.
   p. Recall who utilized the microscope to reveal the world of microorganisms and was the first to record his observation.

q. Summarize the major differences between the Whittaker and Woese systems of classification.
r. Distinguish between eubacteria and archaebacteria.
s. Relate Protista, Helminths and Platyhelminths to the field of microbiology and human disease.
t. Relate viruses to human disease.

B. Characterization of Microorganisms
a. Illustrate an understanding of microorganism taxonomic classification at the taxon level by knowing that bacteria are in the Domain Bacteria; Kingdom Eubacteria; Division Gracilicutes, Firmicutes, Tenericutes and Mendosicutes (notice the –cutes ending at the division level; Class (there are numerous classes that all have the ending –bacteria); Order (at present a rather loose taxonomic level for bacteria due to their diversity but this taxon level does have the ending –ales; family has the ending –aceae; Genus –every name is unique; Species –every name is unique.
b. Relate the reproduction of asexual and sexual species to the fact that asexual species are a collection of strains that have many stable properties in common and differ significantly from other groups of strains.
c. Recall that microorganisms are named according to the binomial system of nomenclature and that the rules of writing scientific names apply to all microorganismic names.
d. Identify how bacteria are classified according to phylogenetic relationships.
e. Explain the difference between a dichotomous key and an Adansonian method of bacterial identification.
f. Identify and give examples of honorary, descriptive and aboriginal scientific names.
g. Review the "Chicken Flop" research and explain why this scientific "failure" may have been the most important event in your life.
h. Contrast the terms antiseptic and asepsis.
i. Define sterile and contrast it with sepsis.
j. Relate attenuated microorganisms to their value in animal/human medicine.
k. Contrast taxonomic and non-taxonomic classification of microorganisms and give the value of each to the field of microbiology.
l. Relate cultural, antigenic, anatomical and biochemical characteristics to the classification of bacteria and other microorganisms.
m. Locate diseases that are specific to your major for the microorganisms that follow and know a disease for each one for organisms in your related field; animal/human.

-Treponema sp.	*Boretella sp.*	*Campylobacter sp.*
-Pseudomonas sp.	*Brucella sp.*	*Francisella sp.*
-Leptospira sp.	*Borrelia sp.*	*Spirillum sp.*
-Trichophyton sp.	*Candida sp.*	*Moraxella sp.*
-Alcaligenes sp.	*Gardnerella sp.*	*Cryptococcus sp.*
-Salmonella sp.	*Shigella sp.*	*Escherichia sp.*
-Klebsiella sp.	*Serratia sp.*	*Enterobacter sp.*
-Proteus sp.	*Yersinia sp.*	*Vibrio sp.*

-*Haemophilus sp.*	*Pasteurella sp.*	*Actinobacillus sp.*
-*Streptobacillus sp.*	*Epidermophyton sp.*	*Blastomyces sp.*
-*Bacteroides sp.*	*Neisseria sp.*	*Fusobacterium sp.*
-*Acinetobacter sp.*	*Staphylococcus sp.*	*Streptococcus sp.*
-*Bacillus sp.*	*Clostridium sp.*	*Microsporum sp.*
-*Pneumocystis sp.*	*Citrobacter sp.*	*Histoplasma sp.*
-*Sporothrix sp.*	*Veillonella sp.*	*Listeria sp.*
-*Erysipelothrix sp.*	*Corynebacterium sp.*	*Actinomyces sp.*
-*Mycobacterium sp.*	*Nocardia sp.*	*Coxiella sp.*
-*Rickettsia sp.*	*Chlamydia sp.*	*Mycoplasma sp.*
-*Legionella sp.*	*Propionibacterium sp.*	*Eikenella sp.*
-*Coccidioides sp.*	*Aspergillus sp.*	

C. Procaryotic and Eucaryotic Cell Structure and Morphology
   a. Define the characteristic shapes that bacteria can assume; their gross morphologies.
   b. Describe the patterns in which bacterial cells cluster together to constitute submorphologies.
   c. Draw a bacterial cell and label all structures discussed in lecture.
   d. Briefly describe the nature and function of the cytoplasmic matrix and the ribosome.
   e. Differentiate between a protoplast and a spheroplast.
   f. Characterize the nucleoid with respect to its structure and function.
   g. Define a plasmid and relate it to the genome of a bacterium.
   h. Describe in detail the composition and structure of peptidoglycan and its deposition in gram-positive vs. gram-negative cell walls.
   i. Define the following: outer membrane, periplasmic space, envelope, teichoic acid, and lipopolysaccharide.
   j. Explain the role of the cell wall in protecting against lysis.
   k. Differentiate between slime layers and capsules.
   l. Relate capsules to pathogenecity/virulence of bacteria.
   m. Define pleomorphic and relate this phenomenon to the possible misidentification of a bacterial unknown.
   n. Relate binary fission to bacterial reproduction.
   o. Contrast and give examples of simple and differential stains.
   p. Recall and give examples of staining terminology associated with differential stains.
   q. Arrange bacterial flagella according to their position and number.
   r. Name the cellular antigen designation for the common bacterial anatomical antigens.
   s. Relate a bacterial sex pilus to its function.
   t. Discuss how bacterial pilli are associated with virulence.
   u. Name the organic composition of bacterial capsules most often associated with animal/human diseases.
   v. Define axial filament and indicate what type of bacterial gross morphology this structure would most likely be associated with.

w. Describe the Fluid Mosaic Model as related to the cell membrane of bacteria.
x. Relate mesosomes to their function.
y. Discuss the function of bacterial ribosomes and differentiate eucaryotic from procaryotic ribosomes.
z. Relate inclusion bodies to bacterial anatomy and give an example of their diagnostic importance concerning bacterial identification.
aa. Discuss the production of an endospore by a bacterium and relate the spore to bacterial adaptation and the significance of spores to the medical field.

D. Nutritional Requirements and Microbiological Media: Cultivation and Growth of Microorganisms
   a. Define autotroph, heterotroph, prototroph and auxotroph.
   b. Discuss the ways in which microorganisms are classified on the basis of their requirements for energy, hydrogen, and electrons.
   c. Describe the nutritional requirements of the four major nutritional groups and give some microbial examples of each.
   d. Explain the nutritional requirements of a mixotroph.
   e. Describe the following types of media and their uses in microbiology:
      1. synthetic, 2. complex, 3. general purpose, 4. enriched, 5. selective, and 6. differential
   f. Review the organic composition of peptones, yeast extract, beef extract and agar and discuss why they are usually found in bacterial media.
   g. Define the term pure culture and describe its importance in the animal/human health field.
   h. Identify how spread plates, streak plates and pour plates are prepared and discuss their advantages and disadvantages in isolating pure/axenic colonies.
   i. Differentiate chemically defined from raw media and give the general purpose of each.
   j. Discuss bacterial classification according to temperature, atmospheric oxygen levels and pH and be able to recall the classification of pathogens for animals/humans among the following terminology: Thermophile, Mesophile, Psychrophile; Microaerophile, Facultative Anaerobe, Aerobe, Anaerobe; Acidophile, Neutrophile, Alkalinophile.
   k. Explain the significance of maintaining stock cultures.
   l. Define the term lyophilization and explain how this process is used to maintain microorganisms in stock culture for an extended period of time.
   m. Explain the phases of the growth curve and relate each phase to bacterial population characteristics and disease progression.
   n. Describe the effect of an antibiotic on the growth curve of bacteria.
   o. Discuss the Plate Count Technique, Pour Plate, Filtration, MPN (Most Probable Number), Filtration, Petroff Houser slide, Coulter Counter and Spectronic 20 in relation to the determination of number of bacteria per ml of “food”.

E. Microbial Metabolism: Enzymes

a. Define the following terms: Oxidoreductase, Transferase, Hydrolase, Lyase, Isomerase and Ligase and give an example of each type of reaction these enzymes would catalyze.
b. Define the following terms: apoenzume, holoenzyme, coenzyme, cofactor and biochemical pathway.
c. Describe the two most striking characteristics of enzymes.
d. Explain what is meant by an enzyme system.
e. Discuss the conditions that affect the activity of an enzyme.
f. Distinguish between the following types of inhibition of enzyme action: competitive and noncompetitive.
g. Explain what is meant by the term allosteric enzyme and give examples.
h. Describe feedback inhibition, precursor activation, allosteric transition and energy link control as related to enzyme function.
i. Discuss the characteristics of enzymes including, specificity, nomenclature, efficiency, composition (protein or conjugated).
j. Review the Lac Operon and discuss the significance of gene control of enzyme action as related to the presence of glucose, the absence of glucose and the presence of lactose in a culture of *E. coli*.
k. Relate the affect of pH, substrate concentration and temperature to enzyme action.

F. Microbial Metabolism: Energy-Yielding Biochemical Processes
a. Discuss the general aspects of metabolism as related to energy releasing biochemical pathways as related to catabolic metabolism of organic compounds.
b. Relate catabolic metabolism to anabolic metabolism and discuss these biochemical pathways from a net energy flow standpoint.
c. Indicate the evolutionary significance associated with the fact that procaryotic cells and eucaryotic cells have almost identical biochemical energy releasing pathways.
d. Define and give an example of an amphibolic pathway.
e. Summarize the major features of the glycolytic pathway, the pentose phosphate pathway, the Kreb's Cycle, the Entner-Doudoroff pathway, the Cytochrome System and the Glyoxylate Pathway.
f. Differentiate substrate-level phosphorylation from oxidative phosphorylation.
g. Identify the substrates (initiator molecules) and products of the Kreb's Cycle.
h. Describe the tricarboxylic acid cycle in general terms and give its two major functions.
i. Briefly describe the structure of the electron transport chain and its role in ATP formation.
j. Define exergonic and endergonic reactions and give examples of each.
k. Draw an exergonic or endergonic energy hill and label all component areas on the curve.
l. Calculate delta H for an exergonic or endergonic reaction given energy levels of reaction reactants and products.
m. Explain the significance of (T delta S) to energy loss from biochemical reactions.
n. Demonstrate a knowledge of the coupling of exergonic and endergonic reactions by ADP.

o. Describe delta G as related to biochemical reactions.
p. Relate total ATP mole production in microorganisms that have a P/O ratio of 1,2, or 3 in the Cytochrome System.
q. Differentiate fermentation (incomplete degradation) from complete degradation and give the end products of each type of degradation.
r. Given 1 mole of Glucose to be oxidized via Glycolysis, Kreb's Cycle and the Cytochrome System (P/O = 3) calculate the total moles of ADP phosphorylated.
s. Given the following parameters calculate the most limiting factor for and answer the questions as indicated (Glycolysis, Kreb's Cycle, and Cytochrome System are in situ.)

1. 44 moles glucose
2. 380 moles NAD^+
3. 586 moles O_2
4. 690 moles COA^*
5. 410 moles FAD^+

____ moles NAD^+ reduced
____ moles HOH produced, Glycolysis
____ moles FAD^+ reduced
____ moles ATP hydrolyzed
____ moles ADP phosporylated, Glycolysis
____ KCal produced (Kreb's Cycle)
____ moles HOH produced (total)
____ moles ATP produced, Kreb's
____ moles Pyruvic Acid produced
____ HOH produced, Cytochrome System
____ moles ATP from $FADH_2$ oxidation
____ moles Oxaloacetic Acid Produced
____ moles ATP from $NADH^+H^+$ oxidation
____ moles ½ O_2 reduced
____ KCal liberated (total)

t. Relate the 1st law of thermodynamics to catabolic metabolism.
u. Relate the 2nd law of thermodynamics to catabolic metabolism.
v. Interpret the coupling of exergonic and endergonic reactions by calculating the delta G of coupled reactions.

$A \rightarrow B$ delta G = 12.4 KCal. Reaction type? Exergonic or Endergonic
$C \rightarrow D$ delta G = 7.5 KCal. Reaction type? Exergonic or Endergonic

$A + X \rightarrow B + Y$ delta G = _____
$C + Y \rightarrow D + X$ delta G = _____
X = ADP and Y = ATP

w. Explain the reason for the significant difference in energy production between aerobic and fermentative biochemical pathways.
x. Briefly describe lactic acid and alcoholic fermentations.
y. Explain how fermentative end products are used to identify bacterial species.
z. Briefly describe Beta Oxidation of lipids to produce Acetyl CoA.
aa. Describe the digestion of lipids and identify their end products.
bb. Explain how proteins are used by microorganisms for energy yielding biochemical pathways.
cc. Briefly describe Gluconeogenesis and relate it to catabolic metabolism.

G. Microbial Metabolism: Energy – Requiring Biochemical Processes
   a. Define biosynthesis or anabolism.
   b. Define purine, pyrimidine, nucleoside and nucleotide.
   c. Describe the molecular composition of a nucleotide and name the five different types.
   d. Define nucleic acids and list all types found in microorganisms.
   e. Differentiate DNA from RNA at the nucleotide level.
   f. Describe the DNA molecule in detail from the following standpoints:
      1. diameter, 2. nucleotide composition,
      3. complementary base pairing, 4. helix configuration
   g. Define the following terms: replication, transcription, messenger RNA, translation, and replication.
   h. Explain the nature and functions of the following replication components and intermediates: DNA Polymerases I and III, helicase, single-stranded DNA binding protein, Okazaki fragment, DNA ligase, leading and lagging strand.
   i. Relate the following terms to their function: leader, trailer, spacer region, polygenic mRNA, RNA polymerase, codon, anticodon, and stop (terminator) codon.
   j. Discuss mRNA synthesis via complementary base pairing and polarity.
   k. Briefly describe the structure of tRNA including anticodon, looping, CCA end and polarity.
   l. Discuss the significance of polyribosomes.
   m. Describe the significance of fmet-tRNA, Shine Delgarno Sequence and initiator codon.
   n. Recall the function of RF proteins in protein synthesis reactions.
   o. Define the Ori-C region of the *E. coli* chromosome and discuss its function.
   p. Review DNA replication and discuss the importance of the replisome.
   q. Explain the significance and the rationale for the need of an RNA primer to initiate DNA replication.
   r. Differentiate discontinuous and continuous DNA replication.
   s. Draw a stick model of the DNA molecule showing polarity and base pair complementation.
   t. Inspect a molecular structure of the DNA molecule and be able to label a 3′, 5′ phosphodiester bond, nucleoside, nucleotide, pyrimidine and purine.
   u. Recall the molecular building blocks of a DNA nucleotide and a RNA nucleotide.
   v. Translate anticodons to codons and be able to indicate the amino acid that will be attached to the tRNA molecule whose anticodon was translated.
   w. Discuss the Wobble Hypothesis as it is related to protein synthesis.
   x. Explain what is meant by genetic code degeneracy.
   y. Explain the significance of genetic engineering to human health.

H. Inheritance, Variability, Microbes and Genetic Engineering
   a. Summarize Griffith's research with *Streptococcus pneumoniae* and indicate the significance of this research to the development of microbial genetics.

b. Define or describe the following: mutation, spontaneous mutation, induced mutation, frame shift, base analog, intercalating agent, thymine dimer, mispairing, point mutation, missense and nonsense mutation and frame shift mutation.
c. List three ways in which spontaneous mutations might arise.
d. Describe how mutagens such as 5-bromouracil, proflavin and UV radiation induce mutations.
e. Define or describe the following : genome, chromosome, gene, allele, locus, genotype, phenotype, mutation, plasmid and episome.
f. Differentiate mutation from modification from the standpoint of changes in the bacterial genome.
g. Discuss the effect of additions, deletions, transpositions, and inversions on the possible sequence of amino acids in a protein coded by DNA with any of these genetic abnormalities.
h. Draw a lysogenic life cycle involving Lambda phage.
i. Draw a lytic life cycle involving Lambda phage.
j. Define bacterial transduction and relate this phenomenon to the rise in antibiotic resistance in bacteria.
k. Discuss bacterial sex including F^+, F^-, HfR, and F′ cells.
l. Relate bacterial sex to bacterial chromosome mapping and explain the significance and application of this technique to human genetics.

I. Host-Parasite Relationships
a. Differentiate primary pathogen from opportunistic pathogen.
b. Define exotoxin and endotoxin and give characteristics (general) and examples of each.
c. Discuss predisposing factors of host resistance.
d. Explain species specific diseases.
e. Recall the body's vanguard of defense against invading microorganisms.
f. Discuss how the skin and the mucous membrane form effective barriers to infectious agents.
g. Differentiate between monocytes and fixed macrophages.
h. Briefly discuss the role of complement fixation in the process of Opsonization.
i. Recall how an increase in body temperature can be a positive mechanism for fighting infectious disease.
j. Define lysozyme and discuss where it is located in animal tissues.
k. Discuss the hemolytic reactions of bacteria.
l. List the most frequent portals of entry for infectious agents.
m. Relate toxoid administration to the development of immunity.
n. Discuss the mechanism of antibiotics in the control of bacteria.

J. Immunity
a. Contrast active and passive immunity.
b. Explain how naturally acquired immunity occurs.
c. Recall the mechanism of vaccine protection from infectious disease.
d. Describe artificially acquired passive immunity.
e. Differentiate antibody light from heavy chains.

f. Name the function of the Fc and the Fab region of an antibody molecule.
g. Identify the five immunoglobulin classes and briefly describe their function.
h. Differentiate T cells from B cells.
i. Discuss the clonal selection theory of T cell and B cell production.
j. Define perforin.
k. Relate the anamnestic response to booster shots for certain infectious diseases.
l. Discuss the role of a macrophage in the cell-mediated immune response.

K. Rickettsia and Chlamydia
a. List the general characteristics of Rickettsia and Chlamydia.
b. Describe the metabolism differences between Rickettsia and other bacteria.
c. Relate the generation time of Rickettsia to the appearance of symptoms.
d. Recall the tissue predilection of Rickettsial organisms.
e. Briefly discuss the reproduction of *Rickettsia* sp. and *Coxellia burnetii.*
f. Discuss the difficulties of diagnosing Rickettsial infections and give examples of current diagnostic tests available to diagnose these infections.
g. List diseases associated with each of the following organisms:
-Rickettsi rickettsii
-Coxiella burnetii
-Rickettsi prowazekii
-Neorickettsia helminthoeca
-Hemobartonella felis
-Chlamydia trachomatis
-Chlamydia pneumoniae
-Chlamydia psittaci
h. Associate Risckettsial diseases with geographic regions of the U.S. where they are most likely to be encountered.
i. Describe the usual antibiotic treatment for Rickettsial and Chlamydial infections.

Lab Outline

Lab 1: Media Prep & Aseptic Technique (1-3 to 1-5)
Lab 2: Colony Morphology & Hemolysis (2-1, 2-2 and 5-21)
Lab 3: Microscope, Simple Stain (3-1; 3-4)
Lab 4: Simple Stain & Gram Stain (3-4; 3-6)
Lab 5: Negative Stain & Gram Stain (3-5; 3-6)
Lab 6: Eukaryotic Organisms (3-3)
Lab 7: Acid Fast & Gram Stain (3-7; 3-6)
Lab 8: Spore Stain & Capsule Stain (3-8; 3-9)
Lab 9: Thioglycollate & Anaerobic Jar (2-6; 2-7)
Lab 10: Flagella Stain & Hanging Drop (3-10; 2-11)
Lab 11: Gram Stain Unknowns (3-12)
Lab 12: Disinfectant, Susceptibility, & Petrifilm (7-2)
Lab 13: Biochemical Identification (9-1)
Lab 14: Biochemical Identification (9-1)
Lab 15: Biochemical Identification (9-1)

Required Text: Talaro KP and Chess B. 2012. Foundations in Microbiology. 8th Ed. McGraw Hill.
Leboffe MJ and Pierce BE. 2012. Microbiology Laboratory Theory & Application. 2nd Brief Ed.

Method of Instruction: Lecture, Laboratory Exercises, and written video analysis.

Method of Evaluation: Homework, exams, laboratory exercises, laboratory quizzes, and a written lab report.

Grade Scale: **Grades are earned by the student. If a student fails lab, the students also fails lecture.** Course grades will be calculated twice during the semester, (1) at "midterm" and (2) after the final. Grades are based on a 60% lecture and 40 % lab weighting.

>= 90% = A
>= 80% = B
>=70% = C
>=60% = D
< 60% = F

Exams, Quizzes: Exams and quizzes will be announced as close to one week prior to the scheduled exam or quiz as possible. An exam or quiz mat be reviewed for part of the class period that immediately precedes the scheduled exam or quiz. Exams and quizzes are generally (but not limited to) true and false, multiple choice, matching and short answer questions.

Final Examination: A comprehensive final exam will be scheduled according to the final schedule and cannot be altered without permission from the Vice President of Academic Affairs and the instructor. The final exam will be composed of one-half of the material covered since the last exam and one-half comprehensive material. Generally the test will be (but not limited to) true and false, multiple choice, matching and short answer.

Course Requirements: Textbook, lab book, access to eCollege, and appropriate clothing for lab exercises.

Assignment Policy: All assignments are due at class time on the due date unless other arrangements are made with the instructor prior to the due date. **A late assignment will be counted off 10% and an additional 5% off per day after the due date.**

Test Policy: **All quizzes and exams must be taken the date scheduled or a zero will be given. Students in CCC activities (excused absence) *must* make arrangements *prior* to missing the exam.**

Attendance Policy: Attendance will be taken at the beginning of each class period. No points are awarded for class attendance. No points are awarded for attendance;

however, students are expected to attend classes. Attendance is highly correlated to performance (grade).

Class Policy:

You are expected to be courteous to your fellow students and classroom disruption will not be tolerated. Warnings for minor infractions will be given with a loss in points for each warning. Three warnings will result in the expulsion from the classroom and a failing grade given.

Academic Integrity Policy:

Colby Community College defines academic integrity as learning that leads to the development of knowledge and/or skills without any form of cheating or plagiarism. This learning requires respect for Colby's institutional values of quality, service and integrity. All Colby Community College students, faculty, staff, and administrators are responsible for upholding academic integrity.

Cheating is giving, receiving, or using unauthorized help on individual and group academic exercises such as papers, quizzes, tests, and presentations through any delivery system in any learning environment. This includes impersonating another student, sharing content without authorization, fabricating data, and altering academic documents, including records, with or without the use of personal and college electronic devices.

Plagiarism is representing or turning in someone else's work without proper citation of the source. This includes unacknowledged paraphrase, quotation, or complete use of someone else's work in any form. It also includes citing work that is not used and taking credit for a group project without contributing to it.
The following procedure will be used for students who violate the policy:

- First Offense – Student will receive a zero for the assignment and the student will be reported to the Dean of Academic Affairs.
- Second Offense – The student will be reported to the Dean of Academic Affairs and removed from the class.
- Third Offense – The student will be reported to the Dean of Academic Affairs and dismissed from the college.

Any questions about this policy may be referred to the Dean of Academic Affairs.

Syllabus Disclaimer*:*

"I reserve the right to change any information contained in this document, when necessary, with adequate notice given to the student. Notice shall be given in the classroom during class. No other notice is required. It is the students' responsibility to stay current with any changes, modifications, adjustments or amendments that are made to this document."

Students With Disabilities: "According to the Americans with Disabilities Act, it is the responsibility of each student with a disability to notify the college of his/her disability and to request accommodation. If a member of the class has a documented learning disability or a physical disability and needs special accommodations, he/she should contact Student Support Services, which is located in the Student Union."

Equipment: Laboratory equipment will be provided by the Colby Community College Biology Department

Bibliography:

Microbiology; Talaro, Kathleen P., McGraw Hill, 2005.
Microbiology Laboratory Theory and Application; Leboffe, Michael J. and Burton E. Pierce, Morton, 2002
Wesley A. Volk, Wheeler Margaret E. *Basic Microbiology*. New York: Harper and Row, 1999.
Tortora, Funke, Case. *Microbiology an Introduction.* Redwood City, CA, 1998.

Laboratory Sessions: Laboratory sessions meet once a week for the designated 3-hour line schedule period. Each lab exercise is evaluated based on lab quizzes, work done, lab papers and a final unknown.

Extra Credit: No points are awarded for extra work. Any extra credit will be available for all students to take.

Laboratory Policy: Any biological science laboratory is associated with the possibility of exposure to chemical preservatives, disinfectants and potentially pathogenic organisms. Any individual with known allergies to chemical agents or pregnant women should consult the instructor and their physician prior to attending lab. All students are expected to attend all lab sessions. If a lab is missed and make up is not possible the student will do an analysis paper of a scientific journal article which will carry the same number of possible points as the lab missed. Latex gloves are available for purchase in the bookstore or nitrile gloves will be provided. It is suggested that a lab coat and safety glasses be purchased and worn in the laboratory. Anyone doing something that is deemed dangerous to themselves or others will be asked to leave the laboratory immediately and given a failing grade for that session. Permission of the Vice-President of Academic Affairs will be required before admittance back into the laboratory.

Kansas Core Outcomes: The learning outcomes and competencies detailed in this syllabus meet, or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Project for this course, as sanctioned by the Kansas Board of Regents.

CCC Assessment Plan: The CCC assessment plan meets the general education requirements by continually assessing its effectiveness through student outcomes. An example of your work, a paper, some test questions, a presentation, or other work may be selected for assessment. This process will not affect your grade, will not require you do additional work and your evaluation will be confidentially handled. Through your cooperation we are working to improve teaching and learning at Colby Community College.

NO EATING, DRINKING OR SMOKING IN THE BIOLOGY LAB ROOMS AT ANY TIME!