MARION TECHNICAL COLLEGE
COURSE SYLLABUS

Course No.: SCI 1300 Course Title: Microbiology

Term: Spring Semester 2014 Department: Arts and Sciences

Credit Hours: 4 Lecture Hours: 3 Lab Hours: 1

Recommended Prerequisite(s): SCI 1250 (required prerequisite); taken concurrently or department approval.

Day/Time: T/R, 11:00 a.m. – 12:20 p.m. and T/R 2 p.m. - 3:20 p.m. - Labs
T/R, 12:30 p.m. – 1:50 p.m. Lecture

Instructor: Theresa Calip Building/Office: TEC 169L

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In case of emergency: Dial 9-911 from any office or courtesy phone on campus.

Course Description: This is an introductory course designed to give the student an understanding of microorganisms which have a relation to the health sciences. Principles of infection and resistance will be included. The laboratory component allows the student to become proficient in basic microbiological techniques.

Textbooks:

Required: Alexander and Strete. ***Microbiology: A Photographic Atlas for the Laboratory***, 2001.
Tortora, Funke, and Case. ***Microbiology: An Introduction***, 11th Ed., 2013.
Mastering Micro
Publisher: Pearson

Optional: Tortora, Funke, and Case. ***Study Guide to Microbiology***, 2013.
Publisher: Pearson

MAJOR COURSE LEARNING OBJECTIVES

A student successfully completing this class will be able to:

Chapter 1:

1. Compare the theories of spontaneous generation.
2. Identify the contributions to microbiology made by Pasteur.
3. Identify the importance of Koch's Postulates.
4. Recognize genus and specific epithet names.
5. List the five kingdoms of living organisms and the major characteristics of each kingdom.
6. Differentiate among the major groups of organisms studied in microbiology.

Chapter 2:

1. Discuss the structure of an atom and its relation to the chemical properties of elements.
2. Define ionic bond, covalent bond, hydrogen bond, molecular weights, and mole.
3. Diagram three basic types of chemical reactions.
4. Identify the role of enzymes in chemical reactions.
5. List several properties of water that are important to living systems.
6. Define acid, base, salt, and pH.
7. Distinguish between organic and inorganic compounds.
8. identify the building blocks of carbohydrates, simple lipids, phospholipids, proteins, and nucleic acids.
9. Identify the role of ATP in cellular activities.

Chapter 3:

1. List the metric units of measurement used for microorganisms, and know their equivalents.
2. Diagram the path of light through a compound microscope.
3. Define total magnification and resolution.
4. Explain how electron microscopy differs from light microscopy.
5. Differentiate between an acidic dye and a basic dye.
6. Compare simple, differential, and special stains.
7. List the steps in preparing a Gram stain, and describe the appearance of gram-positive and gram-negative cells after each step.
8. Explain why each of the following is used: capsule stain, endospore stain, flagella stain.

Chapter 4:

1. Compare and contrast the overall cell structure of procaryotes and eucaryotes.
2. Identify the three basic shapes of bacteria.
3. Describe the structure and function of the glycocalyx, flagella, axial filaments, fimbriae, and pili.
4. Compare and contrast the cell walls of gram-positive bacteria, gram-negative bacteria, archaeobacteria, and mycoplasmas.
5. Describe the structure, chemistry, and functions of the procaryotic plasma membrane.
6. Define simple diffusion, osmosis, facilitated diffusion, active transport, and group translocation.
7. Identify the functions of the nuclear area, ribosomes, and inclusions.
8. Describe the functions of endospores, sporulation, and endospore germination.
9. Define organelle.
10. Describe the functions of endoplasmic reticulum, ribosomes, Golgi complex, mitochondria, chloroplasts, lysosomes, and centrioles.

Chapter 5:

1. Define metabolism, and describe the fundamental differences between anabolism and catabolism.
2. Describe the mechanism of enzymatic action
3. Explain what is meant by oxidation-reduction.
4. Explain the overall function of biochemical pathways.
5. Describe the chemical reactions of glycolysis.
6. Explain the products of the Krebs cycle.
7. Compare and contrast aerobic and anaerobic respiration.
8. Describe the chemical reactions of and list some products of fermentation.
9. Compare and contrast the light and dark reactions of photosynthesis.
10. Compare and contrast oxidative phosphorylation and photophosphorylation.
11. Categorize the various nutritional patterns among organisms according to carbon source and mechanisms of carbohydrate catabolism and ATP generation.

Chapter 6:

1. Classify microbes into five groups on the basis of preferred temperature range.
2. Identify how and why the pH of culture media is controlled.
3. Explain the importance of osmotic pressure to microbial growth.
4. Explain how microbes are classified on the basis of oxygen requirements.
5. Identify ways in which aerobes avoid damage by toxic forms of oxygen.
6. Distinguish between each of the following: anaerobic techniques, selective and differential media, and enrichment media.
7. Define colony and clone.
8. Describe how pure cultures can be isolated by using streak plates.
9. Define bacterial growth, including binary fission.
10. Compare the phases of microbial growth and describe their relation to generation time.

Chapter 7:

1. Define the key terms related to microbial control: sterilization, disinfection, antisepsis, germicide, bacteriostasis, asepsis, degerming, and sanitation.
2. Explain how microbial growth is affected by the type of microbe, its physiologic state, and the ambient environmental conditions.
3. Describe the effects of microbial control agents on cellular structures.
4. Describe the patterns of microbial death caused by treatments with microbial control agents.
5. Compare the effectiveness of moist heat (boiling, autoclaving, pasteurization) and dry heat.
6. Describe how filtration, cold, desiccation, and osmotic pressure suppress microbial growth.
7. Explain how radiation kills cells.
8. Describe effective disinfection.
9. Identify the methods of action and preferred uses of chemical disinfectants.
10. Differentiate between halogens used as antiseptics and as disinfectants.
11. Identify the appropriate uses for surface-active agents.
12. Identify the method of sterilizing plastic labware.

Chapter 8:

1. Define genetics, chromosome, gene, genetic code, genotype, and phenotype.
2. Describe how DNA serves as genetic information.
3. Describe DNA replication.
4. Describe protein synthesis, including transcription, RNA processing, and translation.
5. Explain the regulation of gene expression in bacteria by induction.
6. Define mutagen.
7. Classify mutations by type, and describe how mutations are prevented and repaired.
8. Identify the purpose and outline the procedure for the Ames test.
9. Compare mechanisms of genetic recombination in bacteria.
10. Define plasmid and discuss its function.
11. Discuss how genetic mutation and recombination provide material for natural selection to act on.

Chapter 9:

1. Compare and contrast genetic engineering, recombinant DNA, and biotechnology.
2. Define restriction enzymes, and outline how they are used to make recombinant DNA.
3. Describe the use of plasmid and viral vectors.
4. Describe ways of getting DNA into a cell.
5. List at least five applications of genetic engineering.
6. Make lists of the advantages and problems associated with genetic engineering.

Chapter 10:

1. Define taxonomy.
2. Discuss the limitations of a two-kingdom classification system.
3. List the characteristics of the Kingdom Procaryotae that differentiate it from other kingdoms.
4. List the major characteristics used to differentiate among kingdoms in the five-kingdom system and in the proposed three-kingdom system.
5. Explain why scientific names are used.
6. List the major taxa.
7. Define a bacterial species.
8. Compare and contrast classification and identification.
9. Describe how staining and biochemical tests are used to identify bacteria.

Chapter 11:

1. List the distinguishing features of each unusual procaryote.

Chapter 12:

1. List the defining characteristics of fungi and differentiate fungi from bacteria.
2. Differentiate between asexual and sexual reproduction and use as examples the processes in a fungus.
3. List the defining characteristics of algae.
4. List the defining characteristics of protozoa.
5. Define arthropod vector.
6. Differentiate between a tick and a mosquito, and name a disease transmitted by each.

Chapter 13:

1. Differentiate between a virus and a bacterium.
2. Describe the chemical composition and physical structure of an enveloped and a nonenveloped virus.
3. Define viral species.
4. Give an example of a family and genus for a virus.
5. Describe how bacteriophages are cultured.
6. Describe how animal viruses are cultured.
7. Identify a technique that is used to identify viruses.
8. Describe the lytic cycle of bacteriophages.
9. Describe the lysogenic cycle of bacteriophages.
10. Compare and contrast replication of DNA- and RNA-containing animal viruses.
11. Define oncogene.
12. Explain methods of activating oncogenes.
13. Discuss the relationship of DNA- and RNA-containing viruses to cancer.
14. Differentiate between slow viral infections and latent viral infections.
15. Differentiate between virus and viroid.
16. Name a virus that causes a plant disease.

Chapter 14:

1. Define pathogen, infection, host, and disease.
2. Define normal microbiota.
3. Compare and contrast normal, transient, and opportunistic microbes.
4. Compare commensalism, mutualism, and parasitism, and give an example of each.
5. Differentiate between a communicable and a noncommunicable disease.
6. Categorize diseases according to incidence and according to severity.
7. Define reservoir of infection; contrast human, animal, and nonliving reservoirs, and give one example of each.
8. Explain four methods of disease transmission.
9. Define nosocomial infections and explain their importance.
10. Provide an example of a compromised host.
11. Identify predisposing factors for disease.
12. Define epidemiology, and describe three types of epidemiologic investigation.

Chapter 15:

1. Define portal of entry, pathogenicity, and virulence.
2. Identify a microbe that enters the human body via (1) the mucous membranes, (2) the skin, and (3) the parenteral route.
3. Using examples, explain how microbes adhere to host cells.
4. Explain how capsules, cell wall components, and enzymes contribute to pathogenicity.
5. Compare the effects of hemolysins, coagulase, kinases, hyaluronidase, and collagenase.
6. Contrast the nature and effects of exotoxins and endotoxins.
7. Outline the mechanisms of action of botulinum toxin and tetanus toxin.
8. Using examples, describe the role of plasmids in pathogenicity.
9. Discuss the causes of symptoms in fungal diseases.

Chapter 16:

1. Define resistance and susceptibility.
2. Define nonspecific resistance.
3. Describe the role of the skin and mucous membranes in nonspecific resistance, and differentiate between mechanical and chemical factors.
4. Define phagocytosis, and include the stages of adherence and ingestion.
5. Classify phagocytic cells, and describe the roles of granulocytes and monocytes.
6. Describe the stages of inflammation and their relation to nonspecific resistance.
7. Discuss the role of fever in nonspecific resistance.
8. Discuss the function of complement.
9. Discuss the role of interferon.

Chapter 17:

1. Define specific defenses, innate resistance, and immunity.
2. Contrast the four types of acquired immunity.
3. Differentiate between humoral and cell-mediated immunity.
4. Explain what an antigen is.
5. Explain what an antibody is, and describe the structural and chemical characteristics of antibodies.
6. Describe at least one function for each of the five classes of antibodies.
7. Explain how an antibody reacts with an antigen; identify the consequences of the reaction.
8. Distinguish between a primary and secondary response.
9. Describe the molecular mechanisms for antibody diversity.
10. Describe at least one function for T cells, memory cells, and natural killer cells.

Chapter 18:

1. Define vaccination and attenuated vaccine.
2. Explain why vaccination works.
3. Differentiate between whole-agent vaccines and subunit vaccines.

Chapter 19:

1. Define hypersensitivity.
2. Describe the mechanism of anaphylaxis.
3. Describe the basis of human blood group systems and their relationship to blood transfusions and hemolytic disease of the newborn.
4. Describe the mechanism of immune complex reactions.
5. Describe the mechanism for cell-mediated reactions.
6. Describe a mechanism for self-tolerance.
7. Explain how rejection of a transplant occurs and how rejection is prevented.
8. Discuss the causes and effects of immune deficiencies.
9. Describe the effects of HIV on the immune system.
10. Describe how HIV can be transmitted.
11. Discuss current and possible future treatment and prevention of HIV infection.
12. Describe the immune responses to cancer and immunotherapy.

Chapter 20:

1. Define the following terms: spectrum of activity and broad spectrum.
2. Describe the problems of chemotherapy for viral and fungal infections.
3. Identify five methods of action of antimicrobial agents.
4. Describe the methods of action of each of the commonly used antibacterial drugs.
5. Describe tests of microbial susceptibility to chemotherapeutic agents.
6. Describe the mechanisms of drug resistance.
7. Compare and contrast synergism and antagonism.

Chapter 21:

1. Describe the structure of the skin and mucous membranes and the ways pathogens can invade the skin.
2. Provide examples of normal skin microbiota, and state their locations and ecological roles.
3. Differentiate between staphylococci and streptococci, and list several skin infections caused by each.
4. List the etiologic agent, method of transmission, and clinical symptoms of the following skin infections: acne, smallpox, chickenpox, measles, and rubella.
5. Differentiate between cutaneous and subcutaneous mycoses.
6. List the etiologic agent, method of transmission, and clinical symptoms of the following eye infections: conjunctivitis and trachoma.
7. Describe the epidemiologies of neonatal gonorrheal ophthalmia and inclusion conjunctivitis.

Chapter 22:

1. Define the following term: central nervous system.
2. Differentiate between meningitis and encephalitis.
3. Discuss the epidemiology of meningitis caused by H. influenzae and S. pneumoniae.
4. Discuss the epidemiology of tetanus and leprosy, including method of transmission, etiology, disease symptoms, and preventive measures.
5. Provide the etiologic agent, symptoms, suspect foods, and treatment for botulism.
6. Discuss the epidemiology of poliomyelitis, rabies, Creutzfeldt-Jakob disease, encephalitis and West Nile virus, including method of transmission, etiology, disease symptoms, and preventive measures.
7. Compare the Salk and Sabin vaccines.
8. Define post-exposure treatment for rabies.

Chapter 23:

1. Identify the role of the cardiovascular system in spreading infections and in eliminating infections.
2. Identify the role of the lymphatic system in spreading infections; in eliminating infections.
3. List the cause of and treatment and preventive measures for rheumatic fever.
4. Discuss the epidemiologies of brucellosis, anthrax, and gas gangrene.
5. List four diseases acquired by animal bites.
6. Compare and contrast the causative agents, vectors, reservoirs, symptoms, treatments, and preventive measures for plague, Lyme disease, and typhus.
7. Describe the epidemiologies of Burkitt's lymphoma and infectious mononucleosis.
8. Compare and contrast the causative agents, vectors, reservoirs, symptoms, and treatments for yellow fever and dengue.
9. Compare and contrast the causative agents, methods of transmission, reservoirs, symptoms, and treatments for malaria.

Chapter 24:

1. Describe how microorganisms are prevented from entering the respiratory system.
2. Characterize the normal microbiota of the upper and lower respiratory systems.
3. List the etiologic agent, symptoms, prevention, preferred treatment, and laboratory identification tests for streptococcal infection, scarlet fever, diphtheria, and the common cold.
4. List the etiologic agent, symptoms, prevention, preferred treatment, and laboratory identification tests for pertussis and tuberculosis.
5. Compare and contrast bacterial pneumonias discussed in this chapter.
6. List the etiologic agent, symptoms, prevention, and preferred treatment for viral pneumonia and influenza.

Chapter 25:

1. List the structures of the digestive system.
2. List the examples of microbiota for each part of the gastrointestinal tract.
3. List the etiologic agents, suspect foods, signs and symptoms, and treatments for staphylococcal food poisoning, salmonellosis, typhoid fever, bacillary dysentery, and cholera.

Chapter 25 (continued)**:**

4. List the etiologic agents, methods of transmission, sites of infection, and symptoms for mumps.
5. Differentiate between hepatitis A and hepatitis B.
6. List etiologic agent, methods of transmission, symptoms, and treatment for cryptosporidiosis.

Chapter 26:

1. List the antimicrobial features of the urinary system.
2. Identify the portals of entry for microbes into the reproductive system.
3. Describe the normal microbiota of the upper urinary tract, the male urethra, and the female urethra and vagina.
4. Describe methods of transmission for urinary and reproductive system infections.
5. List the microorganisms that cause cystitis/urethritis.
6. List the etiologic agents, symptoms, methods for diagnosis, and treatments for gonorrhea, syphilis, and NGU.

Chapter 27:

1. Explain how the components of soil affect soil microbiota.
2. Discuss the causes and effects of eutrophication.
3. Explain how water is tested for bacteriologic quality.
4. Compare primary, secondary, and tertiary sewage treatments.
5. List some of the biochemical activities that take place in an anaerobic sludge digester.
6. Define oxidation pond and activated sludge.

Chapter 28:

1. Provide a brief history of the development of food preservation.
2. Describe how canning, pasteurization, low temperature, aseptic packaging, and radiation are used to preserve foods.
3. Provide examples of chemical food preservatives, and explain why they are used.
4. Outline beneficial activities of microorganisms in food production.

COURSE OUTLINE

Tentative Lecture Schedule and Assignments

Week 1 — Introduction to Microbiology
Chapters 1, 2, 3, and 4

Week 2 — Introduction to Microbiology
Chapters 1, 2, 3, and 4

Week 3 — **Monday, January 20 – Holiday: Martin Luther King, Jr. Day**
Enzymes, Metabolism, and Nutrition
Chapters 5, 6, and 7

Week 4 — Enzymes, Metabolism, and Nutrition
Chapters 5, 6, and 7
EXAM I – January 30

Week 5 — Bacterial Genetics, Protein Synthesis, Genetic Transfer
Chapters 8, 9, and 10

Week 6 Bacterial Genetics, Protein Synthesis, Genetic Transfer
Chapters 8, 9, and 10

Week 7 Unusual Procaryotes, Eucaryotes, Viruses
Chapters 11, 12, and 13

Week 8 Unusual Procaryotes, Eucaryotes, Viruses
Chapters 11, 12, and 13

EXAM II – February 27

Week 9 Infection, Bacterial Invasiveness, and Nonspecific Resistance
Chapters 14, 15, and 16

Week 10 Antigens, Antibodies, and Cellular Immunity
Chapter 17

Week 11 Immunity, Hypersensitivity, Antisera, Vaccines, Intro to Pathogens
Chapters 18 and 19

EXAM III – March 20

Spring Break: March 24 - March 30

Week 12 Normal Flora, Infections of Skin, Arthropod Bites, Microbiology of the Air, Infections of the Respiratory Tract
Chapters 20, 21, 22, 23, and 24

Week 13 Unusual Infections of the Respiratory Tract
Chapter 24

Week 14 Infections of the Digestive, Urinary and Reproductive Tracts
Chapters 25, 26

Week 15 Microbiology of Water, Sewage, Milk, and Food
Chapters 7, 27, 28

Week 16 **FINAL EXAM – Date TBA**

NOTE: This is a tentative schedule and subject to change at the discretion of the instructor.

If there is a need for reasonable accommodation or assistance because of mental, physical or learning disability, the student is requested to contact the instructor or if preferred, the Student Services counselor within the first two weeks of class.

ADDITIONAL INFORMATION: Eating and drinking is not permitted in any computer classroom or lab.
All copyright laws will be observed.
It is illegal to copy software.

EVALUATION PROCEDURES

ATTENDANCE AND PARTICIPATION: Consistent with class attendance Policy #721, the student is responsible for attending every class and for the material presented. If a student will not be attending a class, he or she is responsible to contact the instructor and to make sure all assignments are completed.

GRADING PROCEDURES:

1.	Exams (3)	15.0% each	Grading Scale
2.	Lab Quizzes	15.0%	900 - 1000 = A
3.	Lab Practical	15.0%	800 - 899 = B
4.	Final Exam	20.0%	700 - 799 = C
5.	Relevance Writings	2.5%	600 - 699 = D
6.	Homework	2.5%	Below 600 = F

MAKE-UP AND LATE POLICY:

Make-up exams will be given only for excused absences as determined by the instructor. The instructor must be notified of the prospective absence prior to the time scheduled for the examination. The make-up exam may be a different exam than the exam given during the scheduled exam time.

LAB ATTENDANCE:

- ✓ Laboratory attendance is **MANDATORY**. You must attend **22 out of 28 labs (80%)** in the semester. If you miss more than **6** labs, you will receive a failing grade for the course.
- ✓ **Absent**: Not coming to class for any reason, leaving after a quiz, leaving after showing the advanced study, leaving before one hour of lab time is completed.

COLLEGE GRADUATE COMPETENCIES

Assessment begins with a clear understanding of what students are expected to learn. College Graduate Competencies (CGC's) are common to all areas of study and apply to all students. The individual sub-skills defined in each CGC are taught, reinforced, and/or periodically measured in various courses throughout the curriculum. The six CGC areas and statements are:

1. **Communications:** Communicate effectively both written and orally.
2. **Mathematics:** Solve problems using mathematics.
3. **Problem-Solving:** Solve problems through analysis, creativity, and synthesis to make informed decisions.
4. **Professionalism:** Demonstrate good work habits, effective interpersonal and teamwork skills, and a high level of professionalism.
5. **Technology:** Use technology tools efficiently and effectively to perform personal and professional tasks.
6. **Diversity:** Exhibit respect and sensitivity for individual and institutional differences.

Core Competencies:

1. Describe physiological interactions between microorganisms and their hosts (human viral replication).
2. Describe the precise sequence of steps in a microbiology laboratory procedure (Gram stain procedure).

Course Goals:

1. Describe the process for staining specimens.
2. Distinguish procaryotes from eucaryotes.
3. Describe bacterial growth requirement.
4. Identify factors used to control bacterial growth.
5. Describe bacterial genetics.
6. Describe viral genetics.
7. Identify the different types of immunity.
8. Identify factors creating allergic reactions.
9. Describe factors contributing to pathogen infectivity.
10. Describe factors contributing to pathogen virulence.

COMMUNICATIONS DEVICE USAGE

All personal communication devices, including cell phones, must be set to vibrate or off while in classrooms, labs and participating in other class-related activities, unless the use of such a device is specified in the official course syllabus. Infractions will result in warnings and, eventually, grade-related penalties. Exceptions must be approved in writing by the instructor.

Additionally, all personal communication devices, including cell phones, must be deactivated (turned completely off) during exams, quizzes or other evaluations. Any student found to be using a communication device during an exam will be given a grade of zero for the exam.

ACADEMIC MISCONDUCT

Examples of dishonest or unacceptable scholarly practice at Marion Technical College include but are not limited to:

A. Work copied verbatim from an original author; work copied practically verbatim with some words altered from the original without proper credit, i.e., reference citations, being given; a copyright explanation and more information is available at www.copyright.com.

B. Copying answers [and/or electronic data] from another's test paper, quizzes, notes, book, etc.

C. Evidence of a deliberate and calculated plan to engage in a dishonest academic practice, such as gaining access to examinations prior to the time the exam was to be given or the extraction of information regarding an examination from other students.

D. Falsification of clinical, practicum, or laboratory records.

E. Plagiarism – using someone else's ideas or words as your own. In an educational setting you can avoid plagiarism by providing appropriate source documentation. For more information on plagiarism, visit www.plagiarism.org.

FINANCIAL AID ATTENDANCE REPORTING

Marion Technical College is required by federal law to verify the enrollment of students who participate in Federal Title IV student aid programs (Federal grants and student loans) and/or who receive educational benefits through the Department of Veterans Affairs. It is the responsibility of the College to identify students who do not commence attendance or who stop attendance in any course for which they are registered and paid. Non-attendance is reported by each instructor, and can result in a student being administratively withdrawn from the class section. Please contact the Financial Aid Office for information regarding the impact of course withdrawals on financial aid eligibility.

ADDENDUM(s)

1. SRC Addendum (attached)

MTC Syllabus Addendum – 2013/14 School Year

The following information is provided to help make you more aware of resources which may aid in your academic success. For additional information on these topics, please refer to the Catalog, the Student Handbook, and/or an MTC staff or faculty member.

Tutoring: Free one-on-one, small group and online tutoring services are available for many of the classes you take at MTC. If you are having difficulties in a course, it is very important to immediately seek out solutions for your academic concerns. Falling behind will create additional problems quickly. For more information about Tutorial Services, please contact Kathy Rice in the Student Resource Center, room 183.

Your instructors want to see you succeed and are available to answer questions before, during and after class. Your study skills may also be enhanced by forming a study group, becoming friends with a classmate, preparing assignments early, managing your time using a weekly planner, and prioritizing "to do" lists.

Students with Disabilities: If you believe yourself to have a physical, learning or mental disability preventing you from being successful in your class, contact Mike Stuckey in the Student Resource Center. Students with certain disabilities may qualify for specific academic accommodations. Academic accommodations are considered and approved through the **Office of Students with Disabilities.**

You should inform your instructor the first week of classes of any medical or learning conditions that might impact the classroom or your ability to learn.

Drug/Alcohol & Mental Health Concerns: The SRC has a licensed mental health counselor on staff to guide you on getting help with personal matters that may distract you from performing well in your studies. Contact the SRC if you believe a counselor can be of assistance regarding topics such as persistent sadness, feeling overwhelmed, difficulties making a decision, anxiety, or substance abuse.

Academic Advising: It is in your very best interest to get to know your academic advisor. Not only is your advisor available to guide you in course selection, registration, and career planning, he/she can be helpful in discussing academic difficulties and personal goals. Communicate with your advisor on a regular basis. Your advisor needs to be considered a significant part of your life for the years ahead. If you are not sure of your advisor's name or office location, check with your academic department's dean or secretary.

MAPS (My Advising Plan for Success) is a "My MTC" online software tool that is also available to assist you in course planning and completion.

Financial Aid: Regularly attending class is critical in achieving academic success. If you receive some form of financial aid, such as the Pell Grant and/or the Federal Direct Student Loan, ***federal regulations require you to attend classes.*** In part, this is why your instructor records attendance. Maintaining satisfactory academic progress (SAP) is important in preserving your future eligibility for financial resources. If you ever have questions or concerns, please contact the Office of Financial Aid.

MARION TECHNICAL COLLEGE

MICROBIOLOGY
LABORATORY OBJECTIVES
SPRING SEMESTER

MICROSCOPE

After completing this lab, the student should be able to:

1. Demonstrate the proper use of the microscope.
2. Recognize the various bacterial and protozoan types with the use of the microscope.

TRANSFER TECHNIQUES

After completing this lab, the student should be able to:

1. Perform bacterial inoculations without contamination.

GROWTH REQUIREMENTS

After completing this lab, the student should be able to:

1. Identify the various essential requirements for bacterial growth.

STAINING TECHNIQUES

After completing this lab, the student should be able to:

1. Perform both a simple and gram stain for bacterial identification.

ISOLATION TECHNIQUES

After completing this lab, the student should be able to:

1. Perform isolation techniques that result in pure colonies.

SELECTIVE AND DIFFERENTIAL TECHNIQUES

After completing this lab, the student should be able to:

1. Identify desired groups of bacteria using selective media.
2. Distinguish between two bacterial groups using differential media.

CULTURE CHARACTERISTICS

After completing this lab, the student should be able to:

1. Accurately identify bacterial groups by their characteristic growth patterns.

FUNGI

After completing this lab, the student should be able to:

1. Describe the basic anatomy and physiology of fungi.
2. Describe both sexual and asexual reproduction in fungi.

ENVIRONMENTAL CULTURES

After completing this lab, the student should be able to:

1. Test for the presence of microorganisms in various environments.

ANTIMICROBIAL METHODS

After completing this lab, the student should be able to:

1. Compare and contrast chemical and physical methods of microbial control.
2. Accurately assess hand washing as a physical method of microbial control.

GEL ELECTROPHORESIS

After completing this lab, the student should be able to:

1. Understand electrophoresis theory.
2. Gain “hands-on” familiarity with the procedures involved in horizontal gel electrophoresis to separate different molecules.

SMALLPOX

After completing this lab, the student should be able to:

1. Use a DNA fingerprinting test to detect smallpox.

URINE AND FECES

After completing this lab, the student should be able to:

1. Safely handle a urine and feces sample.
2. Culture microorganisms from urine and feces samples.

ELISA

After completing this lab, the student should be able to:

1. Understand concepts and methodologies of enzyme-linked immunosorbed (ELISA) assays.
2. Use ELISA as a screening of clinical “samples” for HIV.

SENSITIVITY TESTING

After completing this lab, the student should be able to:

1. Determine the effectiveness of antibiotics on previously cultured microorganisms.
2. Define minimal inhibitory concentration.

FOOD MICROBIOLOGY

After completing this lab, the student should be able to:

1. Culture and isolate various microorganisms from food samples.
2. Gain an appreciation for microbes in food (beneficial and detrimental).

ENTERICS

After completing this lab, the student should be able to:

1. Detect and identify enterics in water samples.

MARION TECHNICAL COLLEGE
ANATOMY & PHYSIOLOGY II LAB
SPRING SEMESTER - 2014
LABORATORY SCHEDULE

LABORATORY EXPERIMENTS:	**LABORATORY MANUAL**	**ATLAS OF LABORATORY**
Jan. 7 LAB I	Introduction to Microbiology	
Jan. 9 LAB II	Review of Microscope Protozoa	Ch. 1 (all) Ch. 2, pp. 28-32
Jan. 14 LAB III	Examination of Stained Bacterial Types	Ch. 2, pp. 11-18
Jan. 16 LAB IV	Technique for Transfer of Microorganisms	
Jan. 20/21	**College closed on Jan. 20 for Martin Luther King, Jr. Day <u>No micro lecture/lab</u> on Jan. 21, however, the college will be open and classes will be held.**	
Jan. 23 LAB V	Growth Requirements	Ch. 4 (all)
Jan. 28 LAB VI	Staining Techniques	Ch. 3 (all)
Jan. 30 LAB VII	Isolation Techniques	Ch. 4, pp. 63-68
Feb. 4 LAB VIII	Readouts (from Labs IV, V, and VII)	
Feb. 6 LAB IX	Fungi: Molds and Yeast Environmental Cultures	Ch. 2, pp. 19-27 & Ch. 9, pp. 134-138
Feb. 11 LAB X	Selective and Differential Techniques	Ch. 4, pp. 53-63, & Ch. 5, p. 71
Feb. 13 LAB XI	Selective and Differential Techniques	Ch. 4, pp. 53-63, & Ch. 5, p. 71
Feb. 18 LAB XII	Readouts (from Labs IX, X, XI) Gram Stain	
Feb. 20 LAB XIII	Cultural Characteristics of Bacteria	Ch. 4 and 6 (all)
Feb. 25 LAB XIV	Cultural Characteristics of Bacteria	Ch. 4 and 6 (all)
Feb. 27 LAB XV	Readouts (from Labs XIII, XIV) Gram Stain	

March 4 LAB XVI	Antimicrobial Methods Alcohol Evaluation	Ch. 7 (all)
March 6 LAB XVII	Urine Cultures/Urinalysis Stool Cultures	
March 11 LAB XVIII	Readouts (from Labs XVI and XVII)	
March 13 LAB XIX	Gel Electrophoresis	
March 18 LAB XX	DNA-based Screening for Smallpox	
March 20 LAB XXI	DNA-based Screening for Smallpox -- Staining	
March 24-30	**SPRING BREAK** 	
April 1 LAB XXII	ELISA: HIV Detection	Ch. 12, p. 184
April 3 LAB XXIII	Sensitivity Testing: Antibiotics	Ch. 7, pp. 102-110, and Ch. 9
April 8 LAB XXIV	Readouts (from Lab XXIII) Gram Stain	
April 10 LAB XXV	Food Microbiology	
April 15 LAB XXVI	Enterics in Water Sample	Ch. 5, pp. 69-70, & Ch. 8 (all)
April 17 LAB XXVII	Readouts (from Labs XXIV, XXV)	Ch. 8, pp. 116-120
April 22 LAB XXVIII	Review for Lab Practical	
April 24	**PRACTICAL EXAM**	

SCI 1300

LAB REMINDERS

1. Lab Rules Handout

- Every student must sign, date, and return the "Lab Rules" handout to continue in lab.
- Each student must participate in experiments, dissections, and microscope work.

2. Cell Phones

- Each student must sign, date, and return the "Cell Phone Usage" handout to continue in lab.
- All personal communication devices, including cell phones, must be set to vibrate or off while in classrooms, labs and participating in other class-related activities, unless the use of such a device is specified in the official course syllabus. Infractions will result in warnings and, eventually, grade-related penalties. Exceptions must be approved in writing by the instructor. Any student found to be using a communication device during a quiz will be given a grade of zero for the quiz.

3. Quizzes

- There will be ten quizzes this semester taken during lab for a total of 150 points.
- Each quiz is worth 15 points.
- The quiz with the lowest grade of the semester will be "dropped" and will not count against you. This may be a quiz with a low score or a quiz with a 0 due to nonattendance in lab that day. This leaves a total of nine quizzes. Therefore, the collective grade of your advanced studies will be counted as the tenth quiz.
- Quizzes will consist of multiple choice, matching, T/F, fill-in, short answer. There may or may not be a picture to label.
- Make-up Quizzes:
  - You must contact your **lab instructor** if you need to make up a quiz. Make-up quizzes are not automatically placed in the Student Resource Center.
  - **Only two make-up quizzes are allowed.** You may attend another lab or have the quiz placed in the Student Resource Center. Either option counts as one make-up.
  - **Make-up quizzes must be taken within 24 hours of the missed quiz.** If you take the quiz in the Student Resource Center, you will need to be there in time to complete the quiz before they close.

4. Advanced Studies

✓ Advanced studies will be checked off for one collective quiz grade. (e.g., if all are completed on the due date, the student will be awarded a score of 15.) Therefore, there are guidelines that must be followed:

- Advanced studies are to be done before coming to class.
- All are due on specific days. Advanced studies CANNOT be accepted late for any reason. They can be checked off for credit in lab only on the day they are due.
- If they are only partially completed, only partial credit will be given.
- Answers can be found in the textbook, worksheets, handouts, etc.

5. Lab Practical

- This will be given during the usual lecture time. If you miss the practical for any reason, you must take an essay lab practical.

6. Lab Attendance

✓ Laboratory attendance is **MANDATORY**. You must attend **22 out of 28 labs (80%)** in the semester. If you miss more than **6** labs, you will receive a failing grade for the course.

✓ **Absent**: Not coming to class for any reason, leaving after a quiz, leaving after showing the advanced study, leaving before one hour of lab time is completed.