

MARION TECHNICAL COLLEGE
Course Syllabus
Principles of Biology and Chemistry

Course No.: SCI 1050

Course Title: Principles of Biology and Chemistry

Term: Spring 2014

Department: Arts & Sciences

Credit Hours: 3

Lecture Hours: 3

Lab Hours: 0

Recommended Prerequisite(s): None

Day/Time: Section 01: MW 12:30 – 1:50

Section 02 TR: 2:00 – 3:20

Section 21 MW 5:00 – 6:20

Instructor: Sue Conklin, DC

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

Course Description: This introductory science course covers basic concepts in chemistry and biology. The chemistry includes atomic structure, periodic table, chemical formulas, chemical bonds, organic compounds, acids/bases, and nuclear chemistry. The biology includes cell structure, mitosis and an overview of the following body systems: skeletal, muscular, nervous, digestive, respiratory, and circulatory.

Texts:

Text: *Campbell Biology Concepts and Connections*
Custom Edition for Marion Technical College

ISBN: 1-269-52794-0 (This is the ISBN for the Custom Edition that they sell at the bookstore)

Authors: Reece, Taylor, Simon, Dickey

Publisher: Pearson Publishing

You may use one of the older editions previously used in this course (5th, 6th, or 7th editions)

Overall Evaluation Procedures:

Attendance/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.

The students are required to adhere to the following rules:

1. Complete exams and quizzes on specified dates.
2. An exam or quiz may be made up if prior notification is given. In emergency situations, the instructor must be notified as soon as possible. The make-up exam or quiz must be taken within one week of the scheduled exam or quiz. If there is a pattern of missed exams, essay exams may be given at the discretion of the instructor.
3. Attendance and participation in both lecture and laboratory is required.

Grading Procedures:

1. Exams (3)	15% each	<u>Grading Scale</u>
2. Lecture Quizzes	15% total	900 – 1000 = A
3. Lab Quizzes	15% total	800 - 899 = B
4. Assignments	5%	700 - 799 = C
5. Final Exam	20%	600 - 699 = D
		Below 600 = F

Major Course Learning Objectives:

1. Describe the sequence of steps used in developing a hypothesis.
2. Describe the physical and chemical characteristics of matter.
3. Describe the structure and function of the cell.
4. Describe the types of cell division (mitosis and meiosis).
5. Describe the structure and function of the respiratory system.
6. Describe the structure and function of the nervous system.
7. Describe the structure and function of the skeletal and muscular systems.
8. Describe the structure and function of the digestive system.
9. Describe the structure and function of the circulatory system.

Measurable Learning Objectives

A student successfully completing this class will be able to:

Objectives for Chapter 1

1. Define the levels of biological organization from molecules to the ecosystem, noting the relationship each level has to the others.
2. Explain how cells are the structural and functional units of life.
3. Describe the goals and limits of scientific investigations. Compare discovery science and hypothesis-based science.
4. Define a hypothesis, and compare inductive and deductive reasoning.
5. Explain how deductive reasoning is part of hypothesis-based science.
6. Define a control, and describe an example.

Objectives for Chapter 2

1. Define matter, an element, and a trace element.
2. Define a compound and explain how compounds in living organisms are different from compounds in nonbiological materials.
3. Describe the structure of an atom.
4. Define the atomic number and mass number of an atom.
5. Explain what is meant by a period and group in the periodic table.
6. Describe and locate the various element groups in the periodic table.
7. Define an isotope and explain what makes some isotopes radioactive.
8. Explain why radioactive isotopes are important to biologists.
9. Explain how the electron configuration of an atom influences its chemical behavior.
10. Distinguish among nonpolar covalent bonds, polar covalent bonds, ionic bonds, and hydrogen bonds, noting their relative strengths and how and where they form.
11. Describe the special properties of water that make it vital to living systems. Explain how these properties are related to hydrogen bonding.
12. Define and distinguish between cohesion and surface tension.
13. Define and distinguish between heat and temperature.

14. Define a solute, a solvent, and a solution.
15. Explain how acids and bases directly or indirectly affect the hydrogen ion concentration of a solution.
16. Explain the basis for the pH scale.
17. Explain how buffers work.
18. Describe the causes of acid precipitation, and explain how it adversely affects the fitness of the environment.
19. Define a chemical reaction, and distinguish between the reactants and products.

Objectives for Chapter 3

1. Explain why carbon is unparalleled in its ability to form large, diverse molecules.
2. Define organic compounds, hydrocarbons, a carbon skeleton, and an isomer.
3. Describe the properties of and distinguish among the five functional groups of organic molecules.
4. List the four classes of macromolecules, explain the relationship between monomers and polymers, and compare the processes of dehydration synthesis and hydrolysis.
5. Describe the structures, functions, properties, and types of carbohydrate molecules.
6. Describe the structures, functions, properties, and types of lipid molecules.
7. Describe the structures, functions, properties, and types of proteins.
8. Compare the structures and functions of DNA and RNA.

Objectives for Chapter 4

1. Compare the designs of and images produced by a light microscope, a scanning electron microscope, and a transmission electron microscope. Distinguish between magnification and resolving power.
2. Describe the structure and functions of the nucleus, ribosomes, endomembrane system, smooth and rough endoplasmic reticulum, Golgi apparatus, lysosomes, vacuoles, and mitochondria.
3. Compare the structures and functions of microfilaments, intermediate filaments, and microtubules.
4. Explain how the structure of cilia and flagella relate to their functions.
5. Compare the structures and functions of cell surfaces and intercellular junctions of animal cells.
6. Describe the four functional categories of eukaryotic organelles, noting which organelles are in each group.

Objectives for Chapter 8

1. Explain why cell division is essential for eukaryotic life.
2. Describe the structure of eukaryotic chromosomes.
3. Describe the stages and significance of the cell cycle.
4. List the phases of mitosis, and describe the events characteristic of each phase.
5. Recognize the phases of mitosis from diagrams and micrographs.
6. Explain cytokinesis in animals.
7. Describe the functions of mitosis.
8. Explain how chromosomes are paired. Distinguish between autosomes and sex chromosomes.
9. Distinguish between (a) somatic cells and gametes and (b) diploid cells and haploid cells.
10. List the phases of meiosis I and meiosis II, and describe the events characteristic of each phase.
11. Recognize the phases of meiosis from diagrams or micrographs.
12. Describe key differences between mitosis and meiosis. Explain how the result of meiosis differs from the result of mitosis.

Objectives for Chapter 20

1. Define a tissue, and list the four animal tissue types.
2. Describe the four main animal tissues, noting their structures and their functions.

Objectives for Chapter 21

1. Define and distinguish among carnivores, herbivores, and omnivores.
2. Describe the four stages of food processing.
3. Describe the main components of the human alimentary canal and the associated digestive glands.
4. Describe the functional components of saliva and the types and functions of the teeth in humans.
5. Explain how swallowing occurs and how food is directed away from the trachea.
6. Explain how the structure of the esophagus functions to propel food.
7. Relate the structure of the stomach to its functions. Describe the functions of the secretions of the stomach.
8. Describe the different types of chemical digestion that occur in the small intestine. Explain how the structure of the small intestine promotes nutrient absorption. Describe the roles of the liver and gall bladder in these processes.
9. Describe the structure and functions of the colon and rectum. Note the causes of diarrhea and constipation.

Objectives for Chapter 22

1. Describe the three main phases of gas exchange in a human.
2. Describe the properties of respiratory surfaces.
3. Describe the structures and corresponding functions of a mammalian respiratory system.
4. Describe the mechanisms and efficiencies of lung ventilation in humans.
5. Explain how blood transports gases between the lungs and tissues of the body.
6. Describe the functions of hemoglobin and explain how carbon dioxide is transported in the blood.

Objectives for Chapter 23

1. Describe the pathway of blood through the mammalian cardiovascular system. Note the names of all blood vessels and heart chambers.
2. Relate the structure of blood vessels to their functions.
3. Explain how blood flow through capillaries is regulated.
4. Explain how the structure of a capillary is related to its functions.
5. Describe the components of blood and their functions.
6. Describe the structure and functions of red blood cells and white blood cells.

Objectives for Chapter 28

1. Describe the structure and functions of neurons.
2. Describe the structure and functions of neuroglia.
3. Explain how an action potential is produced.
4. Compare the structures, functions and locations of electrical and chemical synapses.
5. Describe the structures and functions of the two divisions of the nervous system.

Objectives for Chapter 30

1. Distinguish between the axial and appendicular skeletons.
2. Describe the complex structure of a bone, noting the major tissues that contribute to bones and their functions.

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.

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.

**MARION TECHNICAL COLLEGE
SCI1050 - PRINCIPLES OF BIOLOGY & CHEMISTRY
TENTATIVE LECTURE SCHEDULE – Spring 2014**

Week #	Dates	Topic	Text & Handouts
1	1/6-7 1/8-9	Introduction, Syllabus Organization, Process of Science, Matter and Elements	Chapter 1 (Adv. St. 1 & 2)
2	1/13-14 1/15-16	Atomic Structure Atomic Structure cont., Periodic Table	Chapter 2 (Adv. St. 3) Periodic Table Handout
3	1/20-21 1/22-23	Martin Luther King Jr. Holiday – No Class Module 1 - Quiz 1 (Adv. St. 1-3), Lecture – Periodic Table	Periodic Table Handout
4	1/27-28 1/29-30	Ionic Bonds & Covalent Bonds Water and Polar Molecules, Acids and Bases	Chapter 2 (Adv. St. 4) “ (Adv. St. 5 & 6)
5	2/3-4 2/5-6	Review for Quiz 2 and Exam I Module 1 – Quiz 2	Covers Adv. St. 1-6
6	2/10-11 2/12-13	Module 1 Exam Carbon and Functional Groups	and Periodic Table Chapter 3 (Adv. St. 7 & 8)
7	2/17-18 2/19-20	Monomers and Polymers, Chemical Reactions Carbohydrates and Lipids	“ (Adv. St. 9) “ “
8	2/24-25 2/26-27	Proteins and Nucleic Acids Review for Module 2 Quiz and Exam	“ “ “ “
9	3/3-4 3/5-6	Module 2 Quiz – Review for Exam II Module 2 Exam	Covers Adv. St. 7-9
10	3/10-11 3/12-13	Microscopy, Cells Mitosis and Meiosis	Chapter 4 (Adv. St. 10 & 11) Chapter 8 (Adv. St. 12)
11	3/17-18 3/19-20	Tissues (Epithelial and Connective, Bone and Blood) Tissues cont. (Muscular, Nervous,)	Chapters 20, 28, 30 (Adv. St. 13)

	3/24-29	Spring Break All Week - No Classes	
12	3/31-4/1 4/2-3	Review For Module 3 Quiz and Exam Module 3 Quiz	Covers Adv. St. 10-13
13	4/7-8 4/9-10	Module 3 Exam Respiration	“ Chapter 22 (Adv. St. 14)
14	4/14-15 4/16-17	Circulation Digestion	Chapter 23 (Adv. St. 14) Chapter 21 (Adv. St. 16)
15	4/21-22 4/23-24	Review for Quizzes and Final Exam Module 4 Quizzes (2) – Respiratory/Circulatory & Digestive	Covers Adv. St. 14-16
16	4/28-5/2	Final Exams (Date and Time to be Announced)	Final is Comprehensive

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.