I. INTRODUCTION

A. This course will provide a survey of biological principles with an emphasis on humans, including evolution, ecology, plant and animal diversity, and physiology.

B. This course may satisfy the Biology requirement in some curricula. Please check your degree plan to determine the status of this course in your program of study.

C. In support of the objectives of the Texas core curriculum, the course provides significant exercise of a student’s critical thinking skills, communication skills, teamwork, and empirical and quantitative skills. These objectives form a foundation of intellectual and practical skills that are essential for all learning.
   * Critical thinking skills include creative thinking, analysis, evaluation, and synthesis of information.
   * Communication skills include effective development, interpretation, and expression of ideas through written, oral, and visual means.
   * Teamwork includes the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.
   * Empirical and quantitative skills include the ability to manipulate and analyze numerical data or observable facts to reach informed conclusions.

D. Prerequisite: None. However students are strongly encouraged to complete all developmental courses prior to any science course. Biol 1408 is not a prerequisite to this course, but it would certainly be very helpful to students lacking background in basic biology and basic chemistry.

II. LEARNING OUTCOMES—From the Texas Academic Course Guide Manual (ACGM)

Upon successful completion of the lab component of Biology for Non-Science Majors II, the student will:

A. Apply scientific reasoning to investigate questions and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data.

B. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory.

C. Communicate effectively the results of scientific investigations.

D. Define modern evolutionary synthesis, natural selection, population genetics, micro and macroevolution, and speciation.

E. Illustrate the relationship between major geologic change, extinctions, and evolutionary trends.
F. Explain phylogenetic relationships and classification schemes.
G. Compare different sexual and asexual life cycles noting their adaptive advantages.
H. Identify the major phyla of life with an emphasis on plants and animals, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance.
I. Describe basic animal physiology and homeostasis as maintained by organ systems.

III. INSTRUCTIONAL MATERIALS

A. The instructional materials identified for this course are viewable through www.ctcd.edu/books

IV. COURSE REQUIREMENTS:

A. Lots of Reading:
Specific chapters from the textbook will be required reading. There will also be reading and preparation or homework assignments in the lab manual.

B. Completion of lab materials
This course includes a lecture and a lab component in a single course. You must complete the lab materials to be successful in the course

C. Attendance and participation in both lecture and lab:
Attendance is measured differently in on-line and in-face classes. However, your participation in the course material is essential to your success.

D. Integrity and scholarship
All students are required to maintain the highest standards of scholastic honesty in the preparation of all coursework and examinations. Examples of scholastic dishonesty include plagiarism, collusion, and cheating, copying homework or lab work. This is not a comprehensive list. Students guilty of scholastic dishonesty will be administratively dropped from the course with a grade of “F” and subject to disciplinary action, which may include suspension or expulsion from the school.

E. Checking blackboard
It is the student’s responsibility to check blackboard on a regular basis. It would be best to check every day, but you should check at minimum every other day.

V. EXAMINATIONS:
Unit tests will be given via the McMillian Lauchpad approximately every two chapters. There will be a total of seven tests. There will also be a midterm and a final each worth roughly 20 to 25% of the course grade. Lab material will be covered on these exams.
VI. SEMESTER GRADE COMPUTATIONS

Sample semester grade computation—you specific course may vary depending on instructor and delivery system (in-face or on-line).

Use of Flashcards 5% (0% or 100%) 5
Use of Learning curve 5 % (0% or 100%) 20
Chapter quizzes 5 % (scores earned) 30
Chapter Tests 7 x 5% each = 35% (scores earned) 350
Midterm 20 to 25% 200
Final 20 to 25% 200
Labs and additional assignments 260

1065 (includes 65 extra credit points)

Chapter quizzes include only text-book/lecture material.
Tests include lecture and lab material
Midterm and Final include lecture and lab material

Grade Scale (1000 points)
A 900-1000
B 800-899
C 700-799
D 600-699
F 0- 599

VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. Course Withdrawal: It is the student’s responsibility to officially drop/withdraw from a class if circumstances prevent attendance or if the student decides not to continue with the course and this must be done before the withdrawal date. An instructor cannot initiate a withdrawal based on the student’s request. GoArmyEd students should contact their ACES counselor before withdrawing and withdraw through the GoArmyEd portal. All other students who desire to or must officially withdraw from a course on or after the first scheduled class meeting must file an Application for Withdrawal with the local CTC representative by the last date to withdraw. Students enrolled in distance learning courses and who do not have access to a local CTC representative should submit a withdrawal form to EaglesOnCall@ctcd.edu or the CTC Records Office in Killeen, Texas.

*Applications for Withdrawal will be accepted at any time before the completion of the 12th week of classes for 16-week courses, the sixth week of classes for eight-week courses, or the fourth week of classes for six-week courses.
*For non-GoArmyEd active military students, the effective date of withdrawal is the filing date with the Education Center. For all other students, the effective date of withdrawal is the date that the withdrawal application is received by the Central Texas College representative.
*Students who used financial aid, military tuition assistance, VA benefits, or other non-personal funds may be required to repay tuition and fees to the funding agency. For specific repayment requirements, contact the Office of Student Financial Aid or Veterans Services Office before withdrawing. Military tuition assistance students should visit their military Education Center or Navy College Office.
*Students may not withdraw from a class for which the instructor has previously issued a grade of “F.”

B. **Administrative Withdrawal:** A student may be administratively withdrawn by a designated member of the administrative staff of the College under the following conditions:
The student has been placed on Academic Suspension or Disciplinary Suspension;
The student has an outstanding financial obligation owed to the college; or
The student registered for a course without the required prerequisite or departmental permission.

The college is under no obligation to refund tuition and fees, or other costs associated with a student who is administratively withdrawn.

C. **Incomplete Grade:** Incomplete, Course in Progress (for non-developmental courses): An “IP” grade may be assigned by an instructor if a student has made satisfactory progress in a course with the exception of a major quiz, final exam, or other project. The “IP” grade may also be assigned for extenuating circumstances beyond a student’s control such as personal illness, death in the immediate family, military orders, or in the case of distance learning courses, institutional technology failures and mail delays. Notice of absences with supporting documentation may be required by the instructor. The instructor makes the final decision concerning the granting of the incomplete grade. The instructor may set a deadline for completing the remaining course requirements. In no case will the deadline exceed 110 days after the scheduled end of the course. An “IP” grade cannot be replaced by the grade of “W.” If a student elects to repeat the course, the student must register, pay full tuition and fees and repeat the entire course.

At the end of the 110 calendar days if the student has not completed the remaining coursework as required by the instructor, the “IP” will be converted to an “FI” and appear as an “F” on the student’s official transcript. A student who merely fails to show for the final examination will receive a zero for the final and a “F” for the course.

E. **Americans With Disabilities Act (ADA):** Disability Support Services (DSS) provides support services for students who have appropriate documentation of a disability. Students requiring classroom, academic or other accommodations are responsible for contacting DSS located on the central campus, Building 111, Room 207, (254) 526-1291. This service is available to all students, regardless of location. Reasonable accommodations will be given
through DSS in accordance with American with Disabilities Act (ADA) and Section 504 Rehabilitation Act. Additional information from DSS is available at http://www.ctcd.edu/disability-support

F. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements and alterations of grading scale.

G. **Civility:** Individuals are expected to be cognizant of what a Constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result a disciplinary action up to and including expulsion.

   Civil behavior includes, but is not limited to, refraining from use of cell phones or electronic devices in an inappropriate manner, positive and friendly interaction with other students and instructor during class; refraining from use of inappropriate language, or hostile behavior. **Decisions regarding civility are the instructor's prerogative.**

VIII. **COURSE OUTLINE**

A. **The process of science**  
   (Relates to ACGM objectives A, B and C)
   1. **Learning Outcomes:**  
      Upon successful completion of this section, the student will:
      a. Discuss how the scientific method is used to test hypotheses.
      b. Evaluate the factors that influence the strength of scientific studies and whether the results of the study are applicable to a particular population.
      c. Evaluate the evidence in media reports of scientific studies.
      d. Explain how the scientific method applies to clinical trials designed to investigate important issues in human health.
   2. **Learning Activities:**  
      Lab exercises related to the topics

   3. **Equipment and Materials:**  
      Textbook Assignments and Lab assignments

B. **Natural Selection and adaptation**
   1. **Learning Outcomes:**  
      (Relates to ACGM objective D)
      a. Discuss the prevalence of Staph bacteria both in cases of infection and in cases where no infection is occurring.
      b. Explain how bacteria resist the effects of antibiotics.
      c. Explain how populations evolve, and the role of evolution in antibiotic resistance.
      d. Discuss the observations Charles Darwin made about nature that helped
shape his thinking about evolution.
e. Describe the research done by other scientists which shaped Darwin’s thoughts on evolution.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

C. **Non-adaptive evolution and speciation**
   (Relates to ACGM objective D)

1. **Learning Outcomes:**
   a. Define the term gene pool and explain how it relates to populations and species rather than to individuals.
   b. What evolutionary mechanisms influence the gene pool and how may each mechanism alter it.
   c. Explain the difference between an evolving gene pool and a non-evolving gene pool over the course of generations.
   d. Discuss the most common mechanisms by which new species arise and how we can differentiate between related species.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

D. **Evidence for evolution**
   (Relates to ACGM objective D)

1. **Learning Outcomes:**
   Upon successful completion of this chapter, the student will:
   a. Explain how the fossil record reveals information about evolutionary change.
   b. Explain what is meant by the term transitional fossil, and the role transitional fossils play in our understanding of the fossil record.
   c. Discuss how modern anatomical features and DNA reveal information about evolution.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

E. **History of life on Earth**
   (Relates to ACGM objective D and E)
1. **Learning Outcomes:**
Upon successful completion of this chapter, the student will:

a. Explain major evidence that reveals the history of life on Earth.
   Discuss some key things we know about this history.

b. Discuss the evidence which helps explain the modern distribution of species on Earth.

c. Discuss the modern classification system for major groups of organisms and the basis on which they are classified.

2. **Learning Activities:**
Lab exercises related to the topics

3. **Equipment and Materials:**
Textbook Assignments and Lab assignments

**F. Prokaryotic diversity**
*(Relates to ACGM objectives F and G)*

1. **Learning Outcomes:**
Upon successful completion of this chapter, the student will:

a. Identify the domains of life that include prokaryotic organisms.

b. Compare and contrast the major features of bacteria and archaea.

c. Describe the challenges faced by organisms living around deep ocean vents and explain how they are able to survive these challenges.

2. **Learning Activities:**
Lab exercises related to the topics

3. **Equipment and Materials:**
Textbook Assignments and Lab assignments

**G. Eukaryotic diversity**
*(Relates to ACGM objectives F, G and H)*

1. **Learning Outcomes:**
Upon successful completion of this chapter, the student will:

   a. Name the major groups of Eukaryotic organisms and the factors that influence their diversity.

   b. Discuss the features which distinguish plants from animals and fungi, and the major factors influencing plant diversity.

   c. Discuss the features which distinguish animals from plants and fungi, and the major factors influencing animal diversity.

   d. Discuss the features which distinguish fungi from plants and animals, and the major factors influencing fungal diversity.

   e. Explain what makes the group called Protists different from the other Eukaryotic kingdoms of organisms. What are the major factors influencing protist diversity?
f. Identify members of the major subdivisions of each of these groups.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

H. **Human Evolution**
   *(Relates to ACGM objectives F, G, H)*
   1. **Learning Outcomes:**
      Upon successful completion of this chapter, the student will:
      a. Discuss the genetics of human skin color and explain why there is so much variability found among different human populations.
      b. What is the evidence for the location of the earliest evolution of humans and where are they thought to have evolved?
      c. Explain how the fossil record has shaped our understanding of human evolutionary history.
      d. Identify skin structures, tissue layers and functions.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

I. **Population Ecology**
   *(Relates to ACGM objectives B, C and H)*
   1. **Learning Outcomes:**
      Upon successful completion of this chapter, the student will:
      a. Define ecologists and discuss the major questions ecologists study.
      b. Discuss common patterns on population growth and characterize them in relation to life history of some common organisms, including humans.
      c. Explain how population growth and population size are influenced by biotic and abiotic factors.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments
(Relates to ACGM objectives B, C and H)

1. **Learning Outcomes:**
   Upon successful completion of this chapter, the student will:
   a. Define ecologists and discuss the major questions ecologists study.
   b. Discuss common patterns on population growth and characterize them in relation to life history of some common organisms, including humans.
   c. Explain how population growth and population size are influenced by biotic and abiotic factors.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

**J. Community Ecology**

(Relates to ACGM objectives B, C and H)

1. **Learning Outcomes:**
   Upon successful completion of this chapter, the student will:
   a. Define a keystone species and give examples of several keystone species in different ecosystems. Why are pollinators keystone species in many land ecosystems?
   b. Compare and contrast food chains, food webs and energy pyramids and discuss how they relate to flow of energy and nutrients through ecosystems.
   c. Describe the major positive and negative interactions which occur among members of communities.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

**K. Ecosystem Ecology**

(Relates to ACGM objectives B, C and H)

1. **Learning Outcomes:**
   Upon successful completion of this chapter, the student will:
   a. Define the term ecosystem and explain how different ecosystems are being affected by climate change.
   b. Relate the terms greenhouse effect, climate change and global warming.
   c. Discuss the major patterns by which carbon, nitrogen, oxygen and other chemicals move through ecosystems.
   d. What evidence exists which permits scientists to compare present-day carbon dioxide levels with past levels?
e. Why should citizens of this planet concern themselves about greenhouse gases and climate change?
f. Discuss how policy designed to help society conversely cause great harm instead? Give examples.
g. Define biomagnification and explain its relationship to energy flow in the ecosystem.
h. Describe the key properties of DDT that permit it to negatively affect organisms at many levels of the food chain.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

L. **Sustainability**
   *(Relates to ACGM objectives B, C and H)*
1. **Learning Outcomes:**
   Upon successful completion of this chapter, the student will:
   a. Discuss the human impacts included in an analysis of an ecological footprint. How does population size influence the ecological footprint of humans on this planet?
   b. Discuss the major resources necessary for human life versus those used in modern society but not critical to life. Explain which of these resources are renewable and which are non-renewable.
   c. Discuss the phrase “sustainable living” and evaluate your current lifestyle in terms of sustainability over the next several generations.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

M. **Overview of physiology**
   *(Relates to ACGM objectives A, F and I)*
1. **Learning Outcomes:**
   Upon successful completion of this chapter, the student will:
   a. Describe the basic organization of an animal body from the cellular to organismal level.
   b. Explain the homeostatic regulation of body temperature in humans.
   c. Discuss how homeostatic feedback loops regulate physiological systems.
   d. Describe the major organs and body system functions in humans.
2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

N. **Digestive system**
   *(Relates to ACGM objectives A, F and I)*

   1. **Learning Outcomes:**
      Upon successful completion of this chapter, the student will:
      a. Describe the anatomy of the human digestive system from the point at which food enters, to the points at which feces exit. Include a discussion of the accessory organs of digestion.
      b. Discuss the importance of enzymes and mechanical processes in the breakdown of food as it moves through the digestive system.
      c. Explain the pros and cons of bariatric surgery.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

O. **Cardiovascular system**
   *(Relates to ACGM objectives A, F and I)*

   1. **Learning Outcomes:**
      Upon successful completion of this chapter, the student will:
      a. List the components of the cardiovascular system and explain how, and in what pathway, blood is moved through this system.
      b. Compare the structure of the atria and ventricles of the heart with the structure of the major types of blood vessels. Include a discussion of the location and function of valves, both in the heart and in the blood vessels.
      c. Describe the major risk factors for developing cardiovascular disease and the process by which it develops.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

P. **Respiratory system**
   *(Relates to ACGM objectives A, F and I)*

   1. **Learning Outcomes:**
      Upon successful completion of this chapter, the student will:
      a. List the major structures of the respiratory system in the order that air
passes through them. Explain the mechanisms of pressure change in the respiratory system and how these changes are used to drive air movement.
b. The respiratory and cardiovascular systems cooperate to deliver oxygen to body tissues and remove carbon dioxide from body tissues. Discuss this cooperative process.
c. Explain how oxygen-carrying capacity and breathing rate are related. Describe the factors that affect oxygen carrying capacity and breathing rate.
d. Explain how scientific knowledge of the respiratory system is used to develop training regimens for elite athletes.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

Q. **Central Nervous System**
   *(Relates to ACGM objectives A, F and I)*
   1. **Learning Outcomes:**
      Upon successful completion of this chapter, the student will:
      a. Describe the organization of the central and peripheral nervous system.
      b. Discuss the structure of a neuron and explain how neurons transmit signals both from one end of a neuron to the other end, and from one neuron to another.
      c. Explain how drug addiction and behavioral addiction are related to the physiology of the nervous system.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

R. **Reproductive system**
   *(Relates to ACGM objectives A, F and I)*
   1. **Learning Outcomes:**
      Upon successful completion of this chapter, the student will:
      a. Identify the major organs of the male and female reproductive systems and describe their functions.
      b. Explain how various hormones are involved in the human reproductive system.
      c. Describe several types of assisted reproduction and discuss the pros and cons of various methods.
2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments

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Immune System
*(Relates to ACGM objectives A, F and I)*

1. **Learning Outcomes:**
   Upon successful completion of this chapter, the student will:
   a. Compare and contrast virus structure with bacterial structure and explain how viruses cause disease.
   b. List the major components of innate immunity and explain how each reduces the likelihood that an individual exposed to a virus or bacteria will become infected.
   c. The Influenza virus has caused a number of pandemics and will likely cause pandemics in the future. Explain why this virus is particularly likely to cause world-wide outbreaks.

2. **Learning Activities:**
   Lab exercises related to the topics

3. **Equipment and Materials:**
   Textbook Assignments and Lab assignments