BIOLOGY 101-01 (CRN#20098) **SPRING 2019 SYLLABUS**

Instructor: Dr. Andy Shedlock, Biology Department
Class Time / Location: MWF 10:00-10:50AM RITA 101
Office Hours: 11am-12pm M & F, RITA lobby or TBA
Email = shedlockbiol@gmail.com (DO NOT USE shedlockam@cofc.edu)
Textbook: The official textbook for the BIOL101/L-BIOL102/L two-semester course series is Biology: Concepts and Applications (currently - 8th Ed.) by Starr, Evers & Starr. However, we will not use it in our 101-01 lecture. You will need to use WiFi internet access via laptop and a smartphone to function in our section of the class.
OAKS: All course material will be managed on OAKS, including quizzes and attendance.
Attendance Policy: Required

SCHEDULE: There are 13 full MWF weeks of classes scheduled in Spring 2019
Establish "Theme Teams" based on Random.org assignments into 13 working groups
WEEKLY THEMES (Week 1 begins Monday 1.15.19; Week 13 ends Friday 4.19.19)

1. Science as a way of exploring the unknown. Method, yes. Theory, yes. Mythology, no.
2. Evolution as a force of nature – how it works. Theory, yes. Belief system, no.
3. Origins of life on earth - water, carbon, and the RNA world.
4. Cosmic evolution and extraterrestrial life - exoplanets, life on Mars, the numbers game.
5. DNA, genes, cells, and the Central Dogma.
6. Gene Control, epigenomics, genotype-phenotype frontiers.
7. Genomic editing, cloning, bioengineering, bioethics and the law
8. Biodiversity - what is it, where does it come from, why should we care?
9. Ecosystem health, pollution, population growth, epidemiology.
10. The enterpri$e of human medicine, personal and public health.
11. Plants! Agriculture, water, and food security, natural vs. artificial production.
12. Climate change, carbon cycle, notes from the fossil record and oceanography.
13. Green economy, sustainability literacy, environmental problem solving.
14. Earth Day is the last day of class: Just say "NO" to The Third Great Extinction!
15. Final Exam Period: Symposium of 13 QEP video presentations.

Experiential Active Learning Pedagogical Statement
Biology 101 section 01 is built upon major themes of public interest that are relevant to sustainable human welfare and rooted in concepts of evolutionary, molecular, and cellular biology. We will strengthen our scientific literacy and apply it to think critically, collaborate productively, communicate effectively, and solve problems creatively. This method of discovery requires curiosity and imagination and a sense of pride in ownership of your original course material. For this reason our syllabus is a process-oriented, student-driven, multi-disciplinary vehicle based on a highly successful active learning strategy that integrates the STEAM fields (**S**cience, **T**echnology, **E**ngineering, **A**rt, and **M**ath). This shared experiential approach to education contrasts with the traditional content-heavy fact-oriented didactic lecture model (which has proven to be much less effective for teaching science over the past 100 years and is especially outdated in the age of the internet). This means YOU are going to drive the course forward week by week as a

diverse group of active explorers, not passive consumers. And best of all, we can have FUN sharing ideas and learning together peer-to-peer as colleagues without all the top-down constraints and dogma of a more traditional teacher-student relationship.

Format Overview
-Class attendance is required. Weekly quizzes on Friday. No exams. No make-ups.
-Weekly theme teams will edit a >10<15-min video to be presented in class on Friday
-We will discuss the video in class in working groups immediately after viewing it.
-A 5-question T/F quiz written by the each theme team will be taken in class on Fri (OAKS)
-We will "grade" the quizzes in class via Q&A discussion.
-An original "QEP" video will be produced as a full-term project by each theme team. This video will be presented in class during the final exam period at the end of the semester.
-Your "homework" for the semester is to work collaboratively to produce this original video which will be published globally online via YouTube to promote broader impacts of sustainability literacy beyond the classroom.

PART OF THE TOTAL GRADE FOR THIS FULL-TERM ASSIGNMENT IS TO SUBMIT AS A TEAM TWO WORKING DRAFTS OF YOUR PROJECT: (1) AT AN EARLY STAGE OF DEVELOPMENT (DUE END OF FEBRUARY); AND (2) AT A LATER MORE COMPLETE STAGE OF DEVELOPMENT (DUE END OF MARCH). These drafts will be the basis for interactive group discussions about designing you final project presentations due during the final exam period.

Weekly Class Format
Class attendance is self-registered on OAKS and is graded for participation.

Mondays: Instructor will introduce and "anchor" the weekly theme based on application of fundamental concepts to understanding modern real-word issues that depend on scientific literacy and critical thinking in biology. Weekly theme teams will begin organizing their presentation.

Wednesdays: Instructor will emphasize fundamental concepts in evolutionary, cell, and molecular biology that are relevant to the weekly themes. Weekly theme teams will continue preparing for their Friday presentation and quiz. Other working groups will focus on researching and producing their final project videos. Instructor will work interactively with multiple groups in process.

Fridays: Weekly theme team video introductions, video presentations, group discussions, quizzes, in class quiz grading via Q&A.

Final Grade Percentages are 75% lecture 101-01 + 25% laboratory 101L
Note 25% of your final course grade is imported from the 101L laboratory section.
Your lab grade is completely independent of your 75% grade for the lecture section.

Your grade in the lecture section will be based on the following:

25% attendance & participation (you cannot get a good grade unless you show up and do our creative synthetic work in class actively, collaboratively, and conscientiously)
25% quiz scores (total percentage of correct answers for a 10-week total of 100%; you are allowed to miss 3 quizzes; quiz points for additional 3 weeks will be used as extra credit)
25% final project original video presentations (alternative to having a 3-hour final exam)

Earned Letter Grade Scale for the 4-credit 101+101L Course

≥90% Guarantees A- or higher
≥80% Guarantees B- or higher
≥70% Guarantees C- or higher
≥60% Guarantees D- or higher
<60% = F

Other official stuff that is required to be included on this syllabus…

Honor Code and Academic Integrity
http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php
Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved. Students may have the opportunity to meet with the Dean of Students and may be brought before the Honor Board. Depending on the severity, incidents may lead to a written intervention, a XF in the course indicating failure of the course due to academic dishonesty, disciplinary probation, suspension (temporary removal) or expulsion (permanent removal) from the College by the Honor Board.
Students should be aware that unauthorized collaboration--working together without permission-- is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others' exams, fabricating data, and giving unauthorized assistance. Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Parity Statement
Any student eligible for and needing academic adjustments or accommodations through the SNAP program because of a documented disability is requested to speak with the professor in a timely and confidential manner so that your needs can be addressed. Athletes, International or ESL students are encouraged to discuss any concerns with the Instructor in a timely manner.

Official BIOL 101/L – 102/L Course Learning Goals and Objectives (Re, SACS COC Accreditation)

Learning Goals & Objectives
This general education science course provides a background for understanding and evaluating contemporary topics in biology and societal/environmental issues. Students develop a general understanding of core concepts and develop the critical competencies that form the bases for the practice of science and use of scientific knowledge.
Core Concepts
This 2-semester course sequence in general biology addresses fundamental principles in biology which broadly may include:
· Evolution: The diversity of life evolved over time by processes of mutation, selection, and genetic change. The theory of evolution by natural selection allows scientists to understand patterns, processes, and relationships that characterize the diversity of life.

· Structure and Function: Basic units of structure define the function of all living things. Structural complexity, together with the information it provides, is built upon combinations of subunits that drive increasingly diverse and dynamic physiological responses in living organisms. Fundamental structural units and molecular and cellular processes are conserved through evolution and yield the extraordinary diversity of biological systems seen today.
· Information flow, exchange and storage: The growth and behavior of organisms are activated through the expression of genetic information at different levels of biological organization and depend on specific interactions and information transfer.
· Pathways and transformation of energy and matter: Biological systems grow and change by processes based upon chemical transformation pathways and are governed by the laws of thermodynamic and will be explored to understand how living systems operate, how they maintain orderly structure and function, and how physical and chemical processes underlie processes at the cellular level (i.e. metabolic pathways, membrane dynamics), organismal level (i.e. homeostasis) and ecosystem level (i.e. nutrient cycling).
· Biological systems: Living systems are interconnected and interacting and biological phenomena are the result of emergent properties at all levels of organization, from molecules to ecosystems to social systems. The course will explore the dynamic interactions of components at one level of biological organization to the functional properties that emerge at higher organizational levels.

These ideas are explored from the perspective of the following topics in each course:
BIOL 101 & 101L
· Chemical and Physical Properties of Life
· Evolution as a unifying principle in biology
· Cell Form & Function
· Energetics and Metabolism
· The Cell Cycle
  -Meiosis and Sexual Reproduction
  -Mitosis and Cell Reproduction
· Mendelian Genetics
· Patterns of Inherited Traits
· Human Inheritance
· The Molecular Basis of Inheritance
· DNA and protein production
· Regulation of gene expression
· Biotechnology

BIOL 102 & 102 L
· Evolutionary Processes
· Origins of Life
· Biodiversity
  -Viruses, Bacteria and Archaens
  -"Protist" Lineages
  -Plants
  -Fungi
  -Animals
· Plant Form & Function
· Animal Form & Function
· Principles of Ecology

<u>Core Competencies</u>

· Nature of Scientific Knowledge
-Understand the intellectual standards used by scientists to establish the validity of knowledge, evidence, and decisions about hypothesis & theory acceptance? These standards include: 1) science relies on external and naturalistic observations, and not internal convictions. 2) scientific knowledge is based on the outcome of the testing of hypotheses and theories that are under constant scrutiny and subject to revision based on new observations 3) the validity of scientifically generated knowledge is established by the community of scientists through peer review and open publication of work.
-Understand that new ideas in science are limited by the context in which they are conceived; are often rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly, through contributions from many investigators.
-Understand that science operates in the real world as defined by the laws of chemistry and physics.
-Understand the differences between and relations among a scientific theory, hypothesis, fact, law, & opinion.
-Understand the differences between science and technology but also their interrelations.
-Understand the dynamic (tentative) nature of science.
· Scientific Methods of Discovery
-[1]Understand the methods scientists use to understand the natural world (observing; questioning; formulating testable deductive hypotheses; controlled experimentation when possible; observing a wide range of natural occurrences and discerning (inducing) patterns.)
-Apply physical/natural principles to analyze and solve problems.
· Developing a Scientific Attitude
-Develop habits of mind that foster interdisciplinary and integrative thinking (within biology; between biology and other sciences; between science and other disciplines)
-Develop an appreciation for the scientific attitude - a basic curiosity about nature and how it works.
· Developing scientific analysis and communication skills
-Develop quantitative reasoning skills (quantitatively expressing the results of scientific investigations, or patterns in nature and using knowledge of biological concepts to explain quantitatively-expressed data or patterns).
-Understand the probabilistic nature of science and the use/application of inferential statistics to test hypotheses.
-Develop scientific information literacy (library, internet, databases etc…); finding and evaluating the validity of science-related information.
-Communicate scientific knowledge, arguments, ideas in a variety of different contexts (scientific, social, cultural) and utilizing a variety of different media (scientific articles, policy statements, editorials, oral presentations etc…).
-Develop cooperative problem-solving skills (working effectively in teams), but also habits of mind and skills that foster autonomous learning.
· Develop an appreciation for the impact of science on society.
-Develop an appreciation of humans as a part of the biosphere and the [2]impact of biological science on contemporary societal/environmental concerns.
-Knowledge of the history of the biological sciences and the influences of politics, culture, religion, race, and gender on the scientific endeavor.
Signature assignments for measuring learning outcomes

Learning Outcome 1: Students apply physical/natural principles to analyze and solve problems. This learning outcome is assessed using the poster (or scientific article) generated in Biology 102 lab as part of the multi-week student-directed independent research project. In

this project students use ecological data they collect (or which has been collected in actual research investigations) to test an ecological hypothesis of their choosing. This multi-week project begins with students becoming experts in various areas of ecological sampling. Students, working in small research teams, decide on a question they would like to explore. Teams then develop a research proposal to test their hypothesis. Students collect (or use already collected data), summarize and analyze the data, and draw conclusions.

Learning Outcome #2: Students demonstrate an understanding of the impact that science has on society. BIOL 102 lab students produce a written document (examples - policy statement, article, stake-holder professional letter or poster) which requires them to research and apply biological knowledge or evidence to defend or critique a proposed solution to a biologyrelated societal issue. Although the choice of the specific issue or proposed solution is course-section specific, some examples of potential issues include

· exploring environmental/health impacts of genetically modified organisms
· the epidemic of diabetes in the United States
· solutions for mitigating global climate change

[1] This learning goal is measured as part of the general education assessment. The specific learning outcome to be measured is: Students apply physical/natural principles to analyze and solve problems.
[2] This learning goal is measured as part of the general education assessment. The specific learning outcome to be measured is: Students demonstrate an understanding of the impact that science has on society.