

# Biology 1306

## Principles of Biology I

### Spring 2022



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#### Dual Credit Instructor

Dr. Valerie Holcomb  
Samuel V. Champion High School  
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Phone: 830-357-2814 (email contact is preferred)  
CHS Classroom: A222

#### Office Hours

Office hours are available MW 8:00-8:30am or by appointment.

#### Course Information

An introduction to the unifying principles of biology with emphasis on biological diversity, evolution, and ecology. Laboratory is designed to reinforce lecture topics and develop analytical skills essential to the practice of biology. Recommended as a first semester course of a two-course sequence for students majoring in biological sciences or related disciplines. Not intended for non-majors.

As an advanced course, Dual Credit Biology has Biology I and Chemistry I as a prerequisite.

#### Student Learning Outcomes

The scientific study of life

By the end of this course successful students should be able to:

- Describe the characteristics shared by all living organisms
- Compare and contrast the three branches of life
- Identify standardized, dependent and independent variables in an experiment
- Apply the scientific method to analyze data
- Discuss the limitations of the scientific method

Origins and history of life

By the end of this course successful students should be able to:

- Summarize the major events of life's history on the geologic timescale.
- Outline the scientific evidence for the origin of life on Earth.
- Describe how conditions on the early Earth could contribute to the production of biological molecules.

Introduction to diversity of life and biological classification systems

By the end of this course successful students should be able to:

- Describe the forces that lead to the evolution of new species
- Define a biological species
- Compare and contrast several forms of prezygotic and postzygotic barriers to reproduction
- Compare and contrast allopatric, sympatric, and parapatric speciation
- Identify the proper way to name a biological species.
- Name the levels of the taxonomic hierarchy from domain to species.
- Use a cladogram to identify monophyletic, paraphyletic, and polyphyletic groups.
- Use biological information to create a cladogram
- Interpret a phylogenetic tree or cladogram to determine relationships between species

Diversity of Life--Prokaryotes

By the end of this course, successful students should be able to:

- Describe the primary characteristics of bacteria and archaea
- Identify the features and functions of structures found in bacteria.
- Identify how bacteria and archaea are classified
- Differentiate and compare archaea with bacteria.
- Describe the different ways bacteria obtain energy from the environment.
- Describe how bacteria interact with other species in the environment.

Diversity of Life--Protists

By the end of this course, successful students should be able to:

- Describe the characteristics common to all protists
- Explain how endosymbiosis is involved with the evolution of multicellular eukaryotic organisms from prokaryotic ancestors
- Understand the multiple origins of multi-cell eukaryotes from single-cell eukaryotes

- Describe the criteria used to classify protists
- Describe how protists interact with other species in the environment

#### Diversity of Life--Plants

By the end of this course, successful students should be able to:

- Describe the characteristics common to all plants
- Explain the evidence supporting the evolution of plants from green algae.
- Understand the adaptations necessary for plants to become dominant terrestrial organisms.

#### Diversity of Life--Fungi

By the end of this course, successful students should be able to:

- Describe the characteristics common to all fungi
- Understand why fungi are not classified as multicellular heterotrophs.
- Explain the role of fungi as decomposers.
- Identify symbiotic relationships that exist between fungi and other organisms.

#### Diversity of Life--Animals

By the end of this course, successful students should be able to:

- Describe the characteristics common to all animals.
- Employ the criteria biologists use to classify animals.

#### Ecology of Life--Genetics and Population Dynamics

By the end of this course, successful students should be able to:

- Describe how asexual and sexual reproduction are the same and different.
- Describe the advantages and disadvantages of asexual and sexual reproduction.
- Differentiate between haploid and diploid cells, gametes, fertilization, zygote.
- Differentiate between chromosome, autosome, sex chromosome, homologous pair, sister chromatids, genes, and alleles.
- Explain the roles of meiosis, gamete formation, and fertilization in sexual reproduction.
- Describe the role of homologous chromosomes in sexual reproduction.
- Compare and contrast mitosis and meiosis.
- List and explain three ways that meiosis generates genetic variability among offspring.

- Describe the factors that affect the size of a population
- Distinguish among the different forms of population distribution
- Describe how birth and death rates influence a population.
- Compare and contrast the three types of survivorship curves.
- Use the exponential and logistic growth equations to measure changes in a population.
- Define carrying capacity and understand how it can affect population size.
- Compare and contrast density-dependent and density independent growth.
- Compare and contrast r-selected and K-selected life history adaptations.

#### Ecology of Life--Mechanisms of Genetic Inheritance

By the end of this course, successful students should be able to:

- Explain the link between natural selection and reproductive success
- Describe what fitness is in terms of reproductive success.
- Define Hardy-Weinberg equilibrium, list its assumptions and explain what it allows biologists to do.
- Use the Hardy-Weinberg equation to identify allele frequencies
- Differentiate between artificial selection, natural selection, sexual selection, and Lamarck's acquired characteristics (how are they the same/different)
- Explain how natural selection can affect allele frequencies in populations and contribute to evolution
- Compare and Contrast how other biological mechanisms (mutation, genetic drift, non-random mating, gene flow, and population size) can affect allele frequencies in populations and contribute to evolution
- Be able to define evolution and provide examples of how it occurs in populations.
- Compare and contrast directional, stabilizing, and disruptive selection
- Explain how natural selection can maintain harmful alleles in a population
- Explain how sexual selection can promote traits that decrease fitness

#### Ecology of Life--Animal Behavior

By the end of this course, successful students should be able to:

- Describe how behavior can improve survival.
- Describe how behavior can improve reproductive success.
- Describe the benefits and drawbacks of living in a group.
- Compare and contrast the behavioral adaptations of solitary and social animals.
- Explain how female mimics and sneaky males fitness compares to territorial males.

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### **Communities and Ecosystems**

By the end of this course, successful students should be able to:

- Compare and contrast the main types of interactions between species in a community.
- Describe competitive exclusion and niches.
- Explain how species interactions can lead to coevolution.
- Explain measures of diversity in biological communities.
- Compare and contrast nutrient cycling and energy flow through an ecosystem.
- Explain the roles of producers, consumers and decomposers in an ecosystem.
- Describe and give examples of the importance of a keystone species.
- Explain why the number of trophic levels in a community is limited.
- Describe the primary biogeochemical cycles.

### Course Delivery

Lectures will be delivered in the classroom; lab exercises will be conducted in the lab. Support documents are available in Google Classroom.

### Communication

I will respond to email within 24 hours during working hours Monday through Friday.

### Evaluation and Grades

Course grades will be based upon completing course requirements and meeting student learning outcomes.

There will be a minimum of 4 major grades (tests) and 14 minor grades (assignments, quizzes, labs, essays) per semester. The major grades and minor grades will be weighted as 50% of the overall semester grade. Additionally, a semester final will constitute 15% of the overall semester grade.

### Course Grade

#### Grading System

The following grading scale is used for this course:

A = 89.5-100 points

B = 79.5-89.4 points

C = 69.5-79.4 points

D = 59.5-69.4 points

F = 0-59.4 points

Rounding will follow scientific rounding rules; fractions will be rounded to tenths.

### Semester Calendar

A calendar is provided on Google Classroom that outlines the due dates of major and minor grades along with a daily agenda.

### Modifications to the Syllabus

This syllabus, including grade evaluation and course schedule, is subject to modification.

### Student Disability Services

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA), and subsequent legislation.

The Office of Student Affairs is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability, and it is the student's responsibility to initiate such a request by contacting:

[Ms. Dallas A. Swafford](#)

Director of Student Disability Services

- 325-942-2047
- [dallas.swafford@angelo.edu](mailto:dallas.swafford@angelo.edu)
- [Houston Harte University Center](#)

### Title IX Statement

Angelo State University is committed to the safety and security of all students. If you or someone you know experience sexual harassment, sexual assault, domestic or dating violence, stalking, or discrimination, you may contact ASU's Title IX Coordinator:

[Michelle Nicole Boone, J.D.](#)

Director of Title IX Compliance

- [Michelle.boone@angelo.edu](mailto:Michelle.boone@angelo.edu)
- 325-486-6357
- [Mayer Administration Building](#) 204

#### Student Absence for Observance of Religious Holy Days

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for [Observance of Religious Holy Day](#) for more information.

#### Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#) for more information.

#### Student Conduct Policies

##### Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

##### [Academic Integrity](#)

##### Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#) in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality via Turnitin. Resources to help you understand this policy better are available at the [ASU Writing Center](#).

##### Copyright Policy

Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any

portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

**General Policies Related to This Course**

All students are required to follow the policies and procedures presented in these documents:

- [Angelo State University Student Handbook](#)  
[Angelo State University Catalog](#)