

Virginia Western Community College

NAS 2

Foundations of Natural Sciences

Prerequisites

MDE 10; ENG 111

Course Description

NAS 2 presents elementary biological and chemical principles for allied health students whose high school preparation is deficient in the biological sciences. In addition, students who have not passed college biology (BIO 101) within the past three years with a "C" or better OR who have not passed the Anatomy Placement exam with a 75% or higher may enroll in this course as a prerequisite for BIO 141 (Human Anatomy and Physiology I).

Semester Credits: 3 Lecture Hours: 3 Lab/Clinical/Internship Hours: 0

Required Materials

Textbook:

OER – OpenStax Anatomy & Physiology (See link below)

<https://cnx.org/contents/FPtK1zmf@8.108:zMtFGyH@4/Introduction>

Other Required Materials:

None

Course Outcomes

At the completion of this course, the student should be able to:

- Describe and identify major chemical elements, reactions, and bonds that are vital for life.
- Describe atomic structure and relate it to chemical bonding and chemical reactions, to include the role of enzymes. Describe the classes of enzymes and the reactions they catalyze.
- Demonstrate a basic knowledge of both inorganic and organic compounds.
- Describe the physiological importance of pH and the following inorganic molecules: water, acids, bases and salts. Be able to describe acid-base balance of the body.
- Describe the composition and general properties of organic compounds and their physiological significance.
- Describe the processes of ATP synthesis and energy transfer within the cell. Be able to describe metabolism involving the pathways in which mammalian cells generate energy, both aerobically and anaerobically.

- Identify and describe the functions of the components of a typical animal cell. Describe cell structure including the plasma membrane, cytoplasm, and all of the organelles within the cell as well as the processes involved in movement across the cell membrane.
- Be able to describe the cell cycle.
- Describe the processes involved in eukaryotic DNA replication, transcription, and translation.
- Briefly explain basic patterns of inheritance, to include definitions of chromosomes, genes, alleles, homologous, homozygous, heterozygous, genotype and phenotype, autosomal dominant, autosomal recessive, and sex-linked traits.
- Have a working knowledge of the relationship between anatomy (structure) and physiology (function).
- Apply anatomical knowledge to regional and sectional views of the human body.
- Be able to describe the term homeostasis and the mechanisms in which it is maintained.
- Be able to describe the general overall function of the eleven human body systems and the major organs involved in each system.
- Demonstrate proficiency in the use of basic laboratory equipment and procedures.
- Correctly measure, record and interpret quantitative data using metric units.
- Be able to incorporate information presented in the course to the development of pathological/physiological conditions

Topical Description

A. Chemistry & Cell Biology

Students who have completed this section of the course should be able to identify cellular structures and explain their respective functions.

This section of the course includes the following topics:

- Atoms, elements, and molecules
- Chemical bonding
- Inorganic compounds & solutions
- Organic compounds
- Enzymes and their regulation
- Energy transfer using ATP
- Intracellular organization of nucleus & cytoplasm
- Membrane structure & function
- Mechanisms for movement of materials across cell membranes
- Organelles
- Cellular respiration
- Cell cycle
- DNA replication
- mRNA transcription
- Protein translation
- Inheritance

B. Homeostasis

Students who have completed this section of the course should be able to explain the basic concept of homeostasis and how homeostatic mechanisms apply to body systems.

This section of the course includes the following topics:

- General types of homeostatic mechanisms
- Examples of homeostatic mechanisms
- Application of homeostatic mechanisms
- Predictions related to homeostatic imbalance, including disease states & disorders

C. Body Plane & Organization

Students who have completed this section of the course should understand the scope of studies in anatomy and physiology and be able to use and understand descriptive anatomical and directional terminology.

This section of the course includes the following topics:

- Anatomical position
- Body planes & sections
- Body cavities & regions
- Directional terms
- Basic terminology
- Levels of organization
- Survey of body systems

Notes to Instructors

1. Departmental policy dictates that instructors do not allow students to keep tests.
2. A comprehensive final exam counting 15% - 20% of the total grade will be given at the end of the semester.
3. Syllabus should state what the course grade will be based on, such as tests, quizzes, a comprehensive final exam, and any other assignments made by the instructor.