Curriculum Outline

Campbell High School
Character – Courage – Respect – Responsibility

Course & Level: **Environmental Science**

Department: **Science**

Teacher: **Linda Frost**

Grade level: **11 and 12**

Description of Course:

This science elective is designed for those students who are seriously concerned about the environment and wish to further their knowledge and understanding of environmental issues. Topics will include the study of world-wide ecosystems, pollution of air, water and soil, toxic wastes, agriculture, pest control, natural resources, energy, and environmentally sound lifestyles. A hands-on approach involving laboratory analysis and research will be emphasized. Participants will be expected to prepare research reports and develop or contribute to on-going environmental projects. Good organizational skills, a cooperative team attitude, and a productive and independent learning style are a must. This course is strongly recommended for those students who are thinking of pursuing a post-secondary program of study leading to a career, which may be affected by environmental issues. Students will be required to spend time outdoors in ALL KINDS of weather. They must also be prepared to work with their hands and tools and to "get dirty." Students collect and analyze water and soil samples, identify flora and fauna, and participate in a variety of other activities.

School – Wide Expectations:

The school-wide expectations are incorporated into all courses at Campbell High School. Underlined words in the following text illustrate this alignment between the school-wide expectations and the course curriculum.

Academic:
1. Read, write and speak effectively
2. Exhibit critical thinking and problem solving skills
3. Use resources to obtain information and facilitate learning

Civic/Social:
1. Work cooperatively in an atmosphere of mutual respect
2. Exhibit personal responsibility

Core Competencies and State Standards:

1. **Biodiversity** – Students will understand the intra-species relationships, and how these relationships affect life on the planet. Students will exhibit both critical thinking and problem solving skills to demonstrate their understanding of these relationships.
   LS 1 *All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).*
   LS 3 *Groups of organisms show evidence of change over time (structures, behavior, and biochemistry).*
   LS 4 *Humans are similar to other species in many ways, and yet are unique among Earth's life forms.*
   LS5 *The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.*
   PS 1 *All living and nonliving things are composed of matter having characteristics properties that distinguish one substance from another.*
2. **Ecological Concepts** – Students will explore the affects of the land, sea, and atmosphere in relation to how it affects life on the planet. Students will demonstrate their understanding by explaining the concepts either in a written or oral format.
   LS 2 *Matter cycles and energy flows through an ecosystem.*
   PS 2 *Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.*
3. **Scientific Investigation and Technique** – Students will use scientific equipment for data collection to investigate natural phenomena and communicate findings through summative and formative reporting method. Students will evaluate, solve, and explain solutions to problems via the scientific process both in an individual and cooperative process.
   SPS1 *– Scientific Inquiry and Critical Thinking Skills (INQ)* ***SPS2*** *– Unifying Concepts of Science* ***SPS3*** *– Personal, Social, and Technological Perspectives* ***SPS4*** *– Science Skills for Information, Communication and Media Literacy*
4. **Scientific Research** – Students will research, review and interpret significant scientific and human developments that pertain to the environment, and produce tangible, project-based application.
   SPS1 *– Scientific Inquiry and Critical Thinking Skills (INQ)* ***SPS2*** *– Unifying Concepts of Science* ***SPS3*** *– Personal, Social, and Technological Perspectives* ***SPS4*** *– Science Skills for Information, Communication and Media Literacy*

Suggested Texts and Media (Software, A/V, etc.):

1. Textbook and ancillary materials: Environmental Science (Holt, Rinehart and Winston)
2. World Oceans by Duxbury, (McGraw-Hill, Boston)
3. Numerous Peterson Field Guides: Trees, Forests, Mammals, Fish, Insects (Houghton – Boston)

The science curriculum at Campbell High School is a dynamic document, reflecting the nature of the subject. It addresses ever-changing areas of study, such as genetics and quantum physics, as well as the fundamentals, such as the Periodic table and Newton's Laws of Motion. Scientific Research is an important component for each course at Campbell. The analysis and interpretation of recent scientific information and articles will vary appropriately with grade level and course difficulty.
We utilize a variety of instructional resources beyond the identified textbooks and materials throughout the school year to enhance your student's educational experience. Parents/Guardians are welcome to review the available resources throughout the school year by contacting their student's teacher. Due to religious or moral objections, alternative assignments may be available upon request.

Suggested Instructional Strategies:

1. Lecture and Demonstration – Use of demonstration apparatus to guide student inquiry, in order to promote critical thinking and problem solving skills. For example, numerous biological specimens i.e. the "Black walnut event" – students make predictions on what this item is used for and who does it belong to, followed by lab investigations to collect evidence to support their predictions. Lectures frequently revolve around what students think about certain concepts, i.e. What causes the ocean gyros to move clockwise in the northern hemisphere, and counter-clockwise in the southern hemisphere? This type of approach leads to a student discovering alternate conceptions, which can be addressed during a guided discovery learning process.

2. Lab Investigations - Exploratory or investigation labs allow students to ask their own questions about a particular concept. These labs have limited formal outcomes, and are instead designed to elicit ideas from students to investigate and evaluate, and quantify as well as predict. Students will work effectively both individually and cooperatively in different investigations.

3. Research Project – Students will gain a broader understanding of the essence of scientific inquiry performing research for the purpose of writing an academically sound paper, as well as presenting their findings to the rest of the class in the form of a Power Point Presentation. This is specifically done in the Wood Lot Project, the Mammal Project, biome Project, and the Lichen Project.

Suggested Assessment Strategies:

1. **Quiz/ Test –** See Environmental Science, FS Creation Exam Pro Software. Typically 60% multiple choice, and/or matching and 40% open response (graphical analysis, data analysis, problem solving, and essay).
2. **Lab Report Rubric –** In order to demonstrate competency in the Scientific Investigation requirement, students communicate lab outcomes that comply with a standard reporting framework, as well as an informal lab inquiry. See attached lab reporting guidelines.
3. **Project Rubric –** there are several authentic projects which contain both performance criteria, journaling criteria, and reporting criteria. See attached examples of "Wood Lot Project" as examples of performance guideline and rubric.
4. **Informal Groupwork –** Summative and formative assessment in which students work on a particular problem in groups of two or four. Groupwork encourages peer learning, strengthens topical skill sets through teaching, and promotes collaboration and community. Examples of groupwork include inquiry investigations, data analysis, and laboratory experimental problem sets.