BIOL143

Course Title: Introduction to Environmental Science

Course Description: Students will apply the process of science to investigate the relationship between humans and the environment. An interdisciplinary approach will be applied to study current and emerging environmental problems and to evaluate potential solutions. Students will develop an awareness of their individual impact on environmental systems.

This non-science major's course will introduce students to the scientific method and will foster scientifically literate citizens. The concept of sustainability will be a core component throughout the course. In the laboratory, students will learn to measure, record, interpret and apply environmental data to solve problems. Some field trips may be required.

Course Outcomes: At the end of the course, students should be able to;

General Outcomes

- Demonstrate the importance of using critical thinking skills and the scientific method to understand how human activities affect the limited resources of our planet.
- Describe the scientific basis of major environmental issues
- Explain how ecological systems function and are interrelated.

Sustainability

- Define sustainability.
- Explain how sustainability relates to students' lives and how their actions impact issues of sustainability.
- Apply concepts of sustainability to their campus or community by engaging in a relevant community service project
- Understand and connect with local ecosystems and communities.

Background Science

- Understand the scientific method and the process of science.
- Understand the fundamentals of matter and chemistry.
- Explain the processes of photosynthesis and cellular respiration and summarize their importance to living things.

Evolution and Population Ecology

- Define evolution and understand how it occurs.
- Explain the process of natural selection and cite evidence for this process.
- Discuss reasons for species extinction and the current mass extinction event.
- List the levels of organization.
- Outline the characteristics of populations that help predict population growth.
- Understand logistic growth, carrying capacity, limiting factors, and other fundamental concepts in population ecology.

Species Interactions and Community Ecology

- Compare and contrast the major type of species interactions.

- Characterize feeding relationships and energy flow, using them to construct trophic levels and food webs.
- Identify characteristics of a keystone species.
- Explain ecological succession.
- Explain the characteristics of invasive species and predict their potential impacts.

Environmental Systems and Ecosystems Ecology

- Define ecosystems and evaluate how living and nonliving entities interact in ecosystems.
- Compare and contrast the movement of nutrients and energy in ecosystems.
- Explain how humans are affecting the major biogeochemical cycles.
- Understand the eutrophication process.
- Assess ecosystem services and how they benefit our lives.

Environmental Ethics and Economics

- Characterize the influences of culture on the choices people make.
- Evaluate ethics as they relate to environmental issues.
- Understand how environmental pollution and land use impact environmental justice communities.
- Explain how our economies depend on the environment.
- Understand the implications of externalizing costs to the environment and human health.
- Be able to explain viable economic solutions to environmental problems.

Environmental Policy

- Identify the institutions important to U.S. environmental policy.
- Explain the major U.S. environmental laws, including their significance and effectiveness.
- Explain the major international agreements pertaining to environmental issues.

Human Population

- Explain the major factors which affect population growth over time.
- Evaluate how the human population, affluence, and technology affect the environment.
- Understand the concept of demographic transition.
- Describe how wealth and poverty, the status of women, and family planning affect population growth and ultimately environmental impacts.

Food and Agriculture

- Describe the role of the green revolution in feeding a growing human population.
- Explain the causes and consequences of food security and insecurity.
- Describe the impacts of modern industrial agriculture on the environment.
- Evaluate the effectiveness and sustainability of current agriculture methods in feeding a growing human population.
- Discuss the science behind the debate over genetically modified food.
- Describe the environmental effects of meat.
- Understand the environmental and health costs of cheap food.
- Understand the environmental and health consequences of CAFOs.

Biodiversity

- Compare the background extinction rate with periods of mass extinction.
- Explain the benefits of biodiversity.

- Evaluate the primary causes of biodiversity loss and the ongoing mass extinction crisis.

Environmental Health and Toxicology

- Identify major environmental health hazards
- Describe the types, abundance, distribution, and movement of toxic substances in the environment.

Freshwater Systems and Resources

- Describe the distribution of freshwater on the Earth.
- Understand the major types of freshwater systems.
- Discuss how we use and alter freshwater systems.
- Assess problems of water supply and evaluate solutions to address its depletion.
- Understand problems related to water quality and evaluate proposals to solve this problem.
- Explain how drinking- and waste-water is treated.

Atmospheric Science, Climate Change, and Air Pollution

- Describe the major factors that influence the Earth's climate.
- Explain the scientific evidence for climate change and humans as a primary cause.
- Outline future trends and impacts of global climate change.
- Identify the major pollutants of ambient air pollution and evaluate potential solutions.
- Explain stratospheric ozone depletion, related problems and solutions.
- Define acid deposition and illustrate ecological consequences.
- Characterize the scope of indoor air pollution and assess potential solutions.

Waste Management

- Summarize and compare the types of wastes that are generated.
- List the major approaches to managing waste.
- Discuss the environmental problems associated with waste.
- Evaluate approaches for reducing waste: source reduction, reuse, composting, and recycling.
- Be familiar with bioremediation technologies.

Energy

- Compare and contrast current conventional energy uses with those of sustainable energy.