



Purpose: It is the intention of this Administrative-Master Syllabus to provide a general description of the course, outline the required elements of the course and to lay the foundation for course assessment for the improvement of student learning, as specified by the faculty of Wharton County Junior College, regardless of who teaches the course, the timeframe by which it is instructed, or the instructional method by which the course is delivered. It is not intended to restrict the manner by which an individual faculty member teaches the course but to be an administrative tool to aid in the improvement of instruction.

Course Title - Environmental Biology

Course Prefix and Number - BIOL 2306

Department - Biology

Division – Math & Science

Course Type: (check one)

- Academic General Education Course (from ACGM – but not in WCJC Core)
- Academic WCJC Core Course
- WECM course (This course is a Special Topics or Unique Needs Course: Y or N)

Semester Credit Hours # : Lecture hours# : Lab/other hours # 3:3:0

Equated Pay hours for course - 3

Course Catalog Description - Human interaction with and effect upon plant and animal communities. Conservation, pollution, energy, and other contemporary ecological problems.

List Lab/ Other Hours
Lab Hours
Clinical Hours
Practicum Hours
Other (list)

Prerequisites/Corequisites - TSI satisfied in reading and writing

Approvals – *the contents of this document have been reviewed and are found to be accurate.*

Prepared by Jennifer Jeffery

Date 9/15/11

Reviewed by department head Kim Raun

Date 9/15/11

Accuracy verified by Division Chair Kevin Dees

Date 10/10/2011

**Approved by Dean of Vocational Instruction
or Vice President of Instruction** Leigh Ann Collins

Date 12/01/11



I. Topical Outline – Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, clinical or other non lecture instruction):

I. Introduction to Environmental Science

- A. Environmental Science
- B. Natural Resources
- C. Scientific Method
- D. Concepts of Sustainability

II. General Biology & Chemistry Concepts

- A. Chemical Foundations of Biology: elements, compounds, atomic structure, chemical bonding
- B. Importance of Water
- C. Structure & Function of Macromolecules: carbohydrates, lipids, proteins and nucleic acids
- D. Prokaryotic Cells vs. Eukaryotic Cells
- E. Energy Flow: autotrophs vs. heterotrophs, photosynthesis, cellular respiration, chemosynthesis

III. Evolution

- A. Natural Selection vs. Artificial Selection
- B. Speciation
- C. Extinction

IV. Population Ecology

- A. Population Attributes: size, density, distribution, sex ratio, age structure
- B. Population Growth: exponential growth, logistic growth, density-dependent vs. density-independent factors, biotic potential, r & K - selected species

V. Community Ecology

- A. Species Interactions: competition, predation, parasitism, herbivory, mutualism, commensalism, amensalism
- B. Ecological Communities: energy flow thru trophic levels, food chains and food webs, keystone species, invasive species, community succession, biomes

VI. Ecosystem Ecology

- A. Primary Production
- B. Nutrient Cycles - Importance & Man's Impact Upon Carbon, Nitrogen & Phosphorus Cycles

VII. Human Population

- A. 'IPAT' Model
- B. Human Population Attributes: size, density, distribution, age structure, sex ratios,
- C. Factors Affecting Growth Rates: immigration & emigration, total fertility rates, demographic transition, population policies & family-planning programs, poverty, HIV/AIDS

VIII. Conservation Biology

- A. Biodiversity - species, genetic and ecosystem
- B. Extinction vs. Extirpation
- C. Causes of Biodiversity Loss: habitat destruction, invasive species, overharvesting, pollution, climate change
- D. Benefits of Biodiversity
- E. Conservation Approaches: Endangered Species Act, captive breeding, umbrella species, international approaches

IX. Freshwater Resources

- A. Freshwater Systems: lakes, rivers, streams, wetlands
- B. Freshwater Sources: surface water, groundwater, glaciers, rainwater, soil, water vapor
- C. Human Use & Impact: irrigation, dams, diversion, LCRA-SAWS project
- D. Solutions: desalination plants, reduce demand, economic approaches

X. Oceans

- A. Marine Systems: open ocean, deep ocean, kelp forests, intertidal zones, mangrove forests, coral reefs, salt marshes, estuaries
- B. Human Use & Impact: transportation, minerals, marine pollution (plastics, pollution, oil), overfishing
- C. Conservation: marine protected areas vs. marine reserves

XI. Air Pollution

- A. Composition of Atmosphere
- B. Thermal Inversions
- C. Outdoor Air Pollution: primary vs. secondary pollutants, Clean Air Acts 1970, 1990, criteria pollutants, industrial vs. photochemical smog, stratospheric ozone depletion & CFCs, acid deposition
- D. Indoor Air Pollution

XII. Waste Management

- A. Types of Waste: municipal, hazardous, industrial
- B. Disposal Methods: landfills, incineration
- C. Options to Minimize Waste Production: recycling, reuse, composting
- D. Hazardous wastes criteria: Ignitability, Corrosivity, Reactivity, Toxicity
- E. Hazardous waste disposal: landfills, surface impoundments, deep-well injection

XIII. Environmental Health

- A. Major types of Environmental Hazards: physical, chemical, biological, cultural
- B. Synthetic and Natural Toxicants: carcinogens, mutagens, teratogens, allergens, neurotoxins, endocrine disruptors
- C. Rachel Carson and Silent Spring

14. Global Climate Change

- A. Greenhouse Gases and the Greenhouse Effect
- B. Methods of Studying Climate Change: ice cores, direct sampling, computer modeling
- C. Climate Predictions
- D. Debate Over Climate Change
- E. Strategies for Reducing Emissions

II. Course Learning Outcomes

Course Learning Outcome	Method of Assessment
1. Demonstrate ability to think critically with regards to current environmental problems.	1. Case Study Assignments
2. Demonstrate ability to communicate, both written and verbally, information regarding environmental issues.	2. Case Study Assignments and Class Discussion
3. Discuss how the human population impacts living systems.	3. Post-test
4. Describe the importance of preventing pollution.	4. Post-test

III. Required Text(s), Optional Text(s) and/or Materials to be Supplied by Student.

Withgott and Brennan. *Environment: The Science Behind the Stories*. Pearson. Current edition

IV. Suggested Course Maximum - 36 lecture

V. List any specific spatial or physical requirements beyond a typical classroom required to teach the course.

VI. Course Requirements/Grading System – Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course

Lecture Average:	<u>80%</u>	Grade Assignments (%):
Exam average (3-4 exams)	40-50%	A 100-90
Other (case studies, quizzes, projects, etc.)	30-40 %	B 89-80
Final Exam (includes at least 50% comprehensive material)	<u>20%</u>	C 79-70
Total	100%	D 69-60
		F Below 60

VII. Curriculum Checklist

- **Academic General Education Course** (from ACGM – but not in WCJC Core)
No additional documentation needed
- **Academic WCJC Core Course**
Attach the Core Curriculum Checklist, including the following:
 - Basic Intellectual Competencies
 - Perspectives
 - Exemplary Educational Objectives
- **WECM Courses**
Attach the following:
 - Program SCANS Matrix
 - Course SCANS Competencies Checklist



Page 1: Competencies

Course Prefix & Number: BIOL 2306	
Competency	Method of Assessment
READING: Reading at the college level means the ability to analyze and interpret a variety of printed materials – books, articles, and documents.	
WRITING: Competency in writing is the ability to produce clear, correct, and coherent prose adapted to purpose, occasion, and audience.	
SPEAKING: Competence in speaking is the ability to communicate orally in clear, coherent, and persuasive language appropriate to purpose, occasion, and audience.	
LISTENING: Listening at the college level means the ability to analyze and interpret various forms of spoken communication.	
CRITICAL THINKING: Critical thinking embraces methods for applying both qualitative and quantitative skills analytically and creatively to subject matter in order to evaluate arguments and to construct alternative strategies.	post-test
COMPUTER LITERACY: Computer literacy at the college level means the ability to use computer-based technology in communicating, solving problems, and acquiring information.	



Page 2: Perspectives

Course Prefix & Number: BIOL 2306	
Perspective	Method of Assessment
1. Individual and society/world; cultural and ethnic diversity	case study assignments
2. Individual, political, economic, and social aspects of life; being a responsible member of society	case study assignments
3. Health and wellness	post-test
4. Technology and science: use and understanding	
5. Personal values for ethical behavior	case study assignments
6. Ability to make aesthetic judgments	
7. Logical reasoning in problem solving	post-test
8. Integrate knowledge from and understand interrelationships of the scholarly disciplines	post-test



Page 3: Exemplary Educational Objectives

Course Prefix & Number: BIOL 2306	
Component Area: Natural Sciences	
Exemplary Educational Objective	Method of Assessment
1. Understand and apply method and appropriate technology to the study of natural science.	
2. Recognize scientific and quantitative methods and the difference between these approaches and other methods of inquiry; and communicate findings, analyses, and interpretations both orally and in writing.	post-test
3. Identify and recognize the differences among competing scientific theories.	
4. Demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.	case study assignments
5. Demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.	post-test