BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

BIOL 9H - Honors Current Issues in Biology **3 Unit(s)**

Prerequisite(s): ENGL 2 or concurrent enrollment and Admission to the Honors Program

Recommended Prep: Math Level IV

Transfer Status: CSU/UC

51 hours Lecture

This is an Honors level Current Issues in Biology course. This course utilizes a process of thorough analysis, critical thinking, extended discussions, and original oral and written responses, to introduce basic biological principles and how each of these principles affects daily human life. Biological principles include the scientific method, biological macromolecules, cell structure and function, cell division, genetics, DNA structure and function, metabolism, evolution, and ecology. Issues covered include nutrition, stem cell research, cancer, genetic diseases, cloning, genetic engineering, gene therapy, ecological diversity, invasive species, sustainability, and the impact of humans on the environment. Graded only.

II. **OBJECTIVES**

Upon successful completion of this course, the student will be able to:

A. Analyze and synthesize significant global ideas and primary original works and writing.
B. Demonstrate critical thinking skills in seminar-type discussions.
C. Employ advanced writing skills and critical, creative thinking in composing a minimum of 5,000 words in analytical papers and reading responses.
D. Generate creative, original responses to course material.
E. Design and conduct an experiment utilizing the scientific method. Identify characteristics that differentiate science as a distinctive way of knowing.
F. Identify the structure and function of biologically important macromolecules and evaluate the role of macromolecules in the nutrition of the human population.
G. Explain how each cellular structure affects cellular function and discuss the problems resulting from flawed cellular structure and function.
H. Solve inheritance problems, including calculations of genotype and phenotype ratios of offspring.
I. Describe the structure and function of DNA (including DNA replication and Protein Synthesis) and appraise how recent discoveries related to DNA structure and function have affected modern life.
J. Explain the mechanism of natural selection and the genetic basis of evolution. Apply this understanding to classic and current examples of evolution.
K. Define sustainability, illustrate examples of sustainable practices, and discuss the impact of humans on ecosystems.
L. Compare and contrast the processes of photosynthesis and respiration and discuss how these metabolic pathways contribute to global biogeochemical cycles and energy flow.
M. Discuss sensitive topics (such as stem cell research and genetic engineering) from an informed position using scientific evidence.

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

	Lecture
Topics	Hours

1.	Scientific Method: The process of the scientific method and the completion of a small individual research project. Proper data collection and presentation.	5.00
2.	Macromolecules: Structure and function of carbohydrates, lipids, nucleic acids, and proteins.	4.00
3.	Macromolecules: Role of lipids, carbohydrates, nucleic acids, and proteins in human health.	2.00
4.	The Cell: Structure and function of organelles in cellular processes.	3.00
5.	Cell Division: cell division, the cell cycle, and cancer.	4.00
6.	Genetics: Mendelian genetics, pedigrees, genetic disorders.	4.00
7.	DNA Structure and Function: DNA replication and protein synthesis.	4.00
8.	Biotechnology: Stem cells, cloning, genetic engineering, gene therapy.	4.00
9.	Metabolism: Photosynthesis and respiration.	4.00
10.	Ecosystems: Nutrient cycles and food webs; importance of biodiversity.	3.00
11.	Evolutionary principles: Natural selection, and the role of DNA in evolution.	3.00
12.	Evolution: Microevolution, and speciation.	4.00
13.	Ecology: The biosphere, growth of populations, interaction among organisms.	4.00
14.	Ecology: Sustainability, the role of humans in the environment.	3.00
Total Hours		51.00

IV. **METHODS OF INSTRUCTION**

A. Lecture
B. Collaborative Group Work
C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
D. Discussion
E. Reading Assignments
F. Multimedia Presentations

V. **METHODS OF EVALUATION**

A. Exams/Tests
B. Oral Presentation
C. Projects
D. Written Assignments
E. Essays and research papers
F. Class Discussion

VI. **EXAMPLES OF ASSIGNMENTS**

A. Reading Assignments
1. Read the book "Ignorance: How it Drives Science." Write a 600 word summary of the rationale outlined in the book for including the public in the inquiry process of science (rather than presenting science as a static body of facts). Be prepared to discuss how to best integrate the scientific thought process into public discourse.
2. Read the research article titled "The Impacts of Non-Native Grass Invasion on Fire Management at a Regional Scale." Present a summary of this paper to the class. The summary should include an outline of the methods, results, and conclusions as well as a question that follows from this research.

B. Writing Assignments

1. Research the process of developing transgenic plants and the variety of genes that have been used to breed new plant varieties. Write a position paper of at least 600 words proposing legislation that would specify the types of genes that are regulated by the government and the level of regulation for each gene type. Include rationale and evidence for your position.
2. Read the research article "A Trial of Sugar-free or Sugar-Sweetened Beverages and Body Weight in Children". Write a 600 word summary of the research article. Your summary should outline the methods, results and conclusions of the research; the summary should be understandable and appealing to the general public.

C. Out-of-Class Assignments

1. In a group of 3-5 students, develop and conduct a research project utilizing the scientific method. Include test and control groups as well as dependent, independent, and control variables. Write a properly formatted research paper summarizing your findings and analyzing the data. Develop a poster presentation to present your findings to the class.
2. In a group of 3-5 students, develop a 5 page textbook section outlining the essentials of DNA structure and replication. The presentation and content for this paper should be geared towards an introductory biology class for non-majors. Post this content on the class wiki so that other students can edit and comment on the content.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

A. Shuster, M., Vigna, J., Sinha, G., Tontonoz, M . Biology for a Changing World. 2nd Edition. Norton, 2014.
B. Firestein, S. Ignorance: How it Drives Science. 1st Edition. Oxford University Press, 2012.

Materials Other Than Textbooks:

A. Current journal articles from peer reviewed scientific journals such as *Science and Nature.*

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