

**BIOL 5002**  
**Ecology, Biodiversity, and Adaptation**  
Olin Building, DU Campus

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### Course Description

BIOL 500: Ecology, Biodiversity and Adaptation is designed to assist science teachers in developing an understanding of content topics related to the Colorado Model Content Standards in the area of Life Sciences. Topics include Fossil Evidence, Classification, Skull Evidence, Natural Selection, Carrying Capacity, Ecology, and Diversity of Life. The major purpose of this course is to develop teacher content knowledge in the area of biology. Other outcomes consist of acquainting participants with a variety of methods, techniques and resources for integrating science issues into their practice.

### Meeting Times and Dates

BIOL 5002 will meet June 19<sup>th</sup> – 23<sup>rd</sup> and June 26<sup>th</sup> – 30<sup>h</sup>, 2006. Class begins at 8:30 and will end at 3:30. There will be 60 minutes for lunch.

**Attendance:** is mandatory due to the intense nature of the course. Any time missed will have to be made up by arranging with the instructors. More than one day missed brings forfeiture of stipend and credit.

**Credit:** Four hours of College of Liberal Arts and Sciences graduate credit from the University of Colorado, Denver, will be awarded upon successful completion of the course. Registration for the course and payment of the \$300 tuition is mandatory.

**Stipends:** A \$1500 stipend will be awarded to RM-MSMSP partner district participants upon successful completion of the course. An additional \$1500 will be awarded when the corresponding Structured Follow-Up is completed in the spring. Only partner district participants are eligible for stipends.

### Topics and Activities

Major themes will be covered throughout the course: Topics include ecosystems, population dynamics, food chains, biodiversity, and evolutionary processes of homology, adaptation, classification and natural selection. Opportunities for inquiry-based learning will be provided.

### Methodologies and Strategies

The course will utilize a variety of methods and strategies to accomplish participant understanding. The instructors will model inquiry-based learning focusing on the nature of science as it is practiced in the biology laboratory. Some classroom sessions will involve an instructor lecture approach to provide basic

information necessary to the topic. Other sessions will involve participants in cooperative small group activities in the development of materials and lessons. Student inquiry and authentic research within the classroom will be discussed and demonstrated through course activities. Videos, and computer programs will enhance participants understanding of both the process and content information.

**Professional Standards Addressed throughout the course and structured follow up:  
National Science Teachers Association (NSTA)**

1. Content	Participants will be able to structure and interpret the concepts, ideas and relationships in science that are needed to advance student learning in the area of licensure as defined by state and national standards developed by the science education community.
2. Nature of Science	Participants will be able to engage students in activities to define the values, beliefs and assumptions inherent to the creation of scientific knowledge within the scientific community, and contrast science to other ways of knowing.
3. Inquiry	Participants will be able to engage students regularly and effectively in science inquiry and facilitate understanding of the role inquiry plays in the development of scientific knowledge.
4. Context of Science	Participants will be able to relate science to the daily lives and interests of students and to a larger framework of human endeavor and understanding.
5. Skills of Teaching	Participants will be able to create a community of diverse student learners who can construct meaning from science experiences and possess a disposition for further inquiry and learning.
6. Curriculum	Participants will be able to develop and apply a coherent, focused science curriculum that is consistent with state and national standards for science education and appropriate for addressing the needs, abilities and interests of students.
7. Social Context	Participants will be able to relate science to the community and to use human and institutional resources in the community to advance the education of their students in science.
8. Assessment	Participants will be able to use a variety of contemporary assessment strategies to evaluate the intellectual, social, and personal development of the learner in all aspects of science.
9. Environment for Learning	Participants will be able to design and manage safe and supportive learning environments reflecting high expectations for the success of all students.
10. Professional Practice	Participants will be able to participate in the professional community, improving practice through their personal actions, education and development.

**Books and Materials**

A Course Packet will be provided that includes labs, course content and readings. Please bring paper, pencils/pens and packets to each class.

Bryson, Bill (2003). A Short History of Nearly Everything will be a resource used through the course. This book will be available for checkout during the course.

Wilson, E. O. (2003). The Future of Life will be a resource used throughout the course.

Natural History magazine, November 2005 special issue on evolution will also be used.

## Evaluation and Grading Criteria

Class participants will be graded on five major activities and reflective papers.

- *Reflective Reading Assignments* 25%

*Reflective Reading Assignments* include a one-page reflection and based upon assigned readings as well as a discussion regarding content. Do you understand the concepts covered? What additional background information do you need? How will you gain additional background information to clearly understand the concepts covered? There are five reflective reading assignments in this course.

- *Performance Based Assessments* 25%

*Performance Based Assessments* will be an ongoing throughout the course. Participants will work individually or in small groups to complete a variety of performance assessments related to specific content covered in the course. Performance assessments will include brief descriptions of specific content you have learned during each session. Do you understand the concepts covered? What additional background information do you need? How will you gain additional background information to clearly understand the concepts covered? There are nine performance based assessments throughout this course.

- *Group Inquiry Project* 25%

*The Group Inquiry Project* will require conducting authentic scientific research to a scientifically oriented question, generating data and thorough analysis of the data, and presentation of your results to the class. This assignment will be presented on June 30<sup>th</sup>.

- *Final Content Exam* 25%

*A Final Content Exam* will be given during the last session. It will include short response essay questions and include content regarding the major topics covered in the course. The final content exam will be given during the last class. A study guide will be provided.

**Innovation Project:** One of the requirements for successful completion of the fall Structured Follow Up course is implementation of an Innovation Project. Each of the RM-MSMSP courses has its own Innovation Project requirements. In this course, a lesson study format will be required. More information about the Innovation Project will be provided as the course progresses, but one of the requirements for successful completion of **this course** is to turn in an outline of your Innovation Project.

## Professionalism

**Participation:** Involvement in class activities and discussions is important. Your thoughts and viewpoints are encouraged. Your experiences in life and schools are an important part of making the class environment exciting and challenging. If you have individual learning needs please contact the instructor.

**Presentation:** How an assignment looks, error free is very important. Please make an effort to turn in work that is graduate school quality and well proofread (spelling and grammar).

Assignment Due Dates: Assignments are due at the beginning of class on the dates noted in the daily schedule. Assignments may be amended with conversation between student and professor.

Absences and Participation: Class will begin promptly. Please make every effort to be there on time. You need to be in class to participate and demonstrate initiative. If you miss a class, please meet with a classmate to get the information you missed. There is no make up for participation in this intense summer class. If you find that you have to miss more than one class, please contact the instructor. If you find that you are having difficulties with assignments or a prolonged personal problem, please contact the instructor as soon as possible.

### **Final Course Grading Scale**

97-100 A

92-96 A-

87-91 B+

83-86 B

79-82 B-

78 and below C

### **Non-discrimination Policy**

The University of Colorado at Denver and Health Sciences Center is committed to providing reasonable accommodation and access to programs and services to persons with disabilities. Students should contact the Disability Services Office, Arts Building 177, 303-556-8387, TTY 303-556-8484. Any other person requiring accommodation in order to access programs and services of the University of Colorado at Denver, either on or off campus, should request accommodation from the individual or office responsible for providing the program or service. This request needs to be made in a timely fashion to allow the individual or office adequate opportunity to provide reasonable accommodation.

Ecology, Biodiversity, and Adaptation

Date	Topics	Assignments
June 19, 2006	Introduction to course Pretests Theories, Facts and Hypothesis Skeletal Homology and Adaptation Paramecia Population Experiment Project	Readings: <u>Fossils Say Yes, Natural History and Bryson Life Goes On</u> chapter. Write a one-page reflection due June 20 <sup>th</sup> .
June 20, 2006	Paramecia Sampling and Data Collection Fossil Evidence Field Experience: Denver Museum of Nature and Science: Prehistoric Journey PBA 1: DMNS Prehistoric Journey Guide	Reading: <u>Bryson Small World</u> chapter. Write a one-page reflection due June 21 <sup>st</sup> .
June 21, 2006	Paramecia Sampling and Data Collection Use and Build Classification and Dichotomous Keys Kingdoms PBA 2: Constructing a Key	Readings: <u>On Darwin's Shoulders, Natural History and Bryson Darwin's Singular Notion</u> . Write a one-page reflection due June 22 <sup>nd</sup> .
June 22, 2006	Paramecia Sampling and Data Collection Skull Anatomy and Adaptations Paleo Lab PBA 3: Tree Building	Reading: <u>Evolution in Action: Natural History</u> : Write a one-page reflection due June 23 <sup>rd</sup> .
June 23, 2006	Paramecia Sampling and Data Collection Birds and Beaks Selection Lab PBA 4: Natural Selection Field Experience: Denver Botanical Gardens PBA 5: Denver Botanical Gardens Guide	
June 26, 2006	Paramecia Sampling and Data Collection Scientific Units of Measure Measurement Repeatability Computer Lab PBA 6: Owl Pellets	Reading: <u>Bryson The Richness of Being</u> . Write a one-page reflection due June 27 <sup>th</sup> .
June 27, 2006	What is the value of species? Biodiversity Field Experience: Biomes and Communities from Foothills to Alpine (drive to Mt. Evans) PBA 7: Subalpine #1 PBA 8: Subalpine #2 Tree Coring	
June 28, 2006	What is the value of species? Biodiversity? Field Experience: Waterton and South Platte River: Benthics Collection DU: Benthics Identification	
June 29, 2006	Dendrochronology & Data Analysis Tree Coring Analysis	Work on Group Project: Due Friday, June 30 <sup>th</sup> .

	Paramecia Sampling and Data Collection Benthos and Water Quality PBA 9: Tree Coring Group Project Work Time	
June 30, 2006	Data Interpretation of Group Project Paramecia Project Benthics Project Tree Core Project Results and Presentation of Project Post Assessment	Group Project: Due