

BIOL 5001
Cells, Human Systems, and Heredity
Olin Building, DU Campus

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Course Description

BIOL 5001: Cells, Human Systems, and Heredity 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 cells, cell structure and function, human system interactions, cell reproduction, inheritance, DNA and Biotechnology. 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 5001 will meet June 5th – 9th and June 12th – 16th, 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 fall. Only partner district participants are eligible for stipends.

Topics and Activities

Five major themes will be covered throughout the course: **Cells, Structure and Function, Photosynthesis and Respiration, DNA, and Replication/Translation.** Major topics include the cell and its parts, cell structure, function and the relationship between human systems, cell reproduction and inheritance, DNA structure and function, chromosomes, genes and biotechnology. Opportunities for inquiry-based learning and techniques of modern biotechnology 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 inquiries 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.

Evaluation and Grading Criteria

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

- *Reflective Reading Assignments* 25%

Reflective Reading Assignments are a major requirement of this course. These one-page reflections should be based upon assigned readings and include a discussion regarding content. There will be a total of five reflective reading assignments.

- *Performance Assessments* 25%

Performance Assessments will be an ongoing throughout the course. Participants will work in small groups to complete a variety of performance assessments related to specific content covered in the course. There are nine performance assessments for this course.

- *Daily Concept Reflections* 25%

Daily Concept Reflections 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 ten daily reflections due in this course.

- *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. 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.

BIOL 5001: Cells, Human Systems, and Heredity
Summer 2006

Date	Topics	Assignments
June 5, 2006	Introductions Course Overview Pre-Assessment What is inquiry? How does inquiry help students learn? Inquiry Lab: Why Does the Water Rise? PBA1: The Role of predictions, hypothesis, and Theories PBA 2: Inquiry Lab: Drugged out Daphnia	Write up lab report on Daphnia investigation. Due June 6 Watch Watson & Crick video: Write a one page reflection. Due June 13. Watch GATTACA video: Write a one page reflection. Due June 15.
June 6, 2006	How are cells alike and different? Investigating Cells: What are the Parts of the Cell and What Do They Do? Cell Size and Parts: Cell Complexity Building Cell Models: Calculating cell sizes PBA 3: Scale models of E. coli	Read E. coli chapter. Write a one page reflection. Due June 7.
June 7, 2006	What is Diffusion? How do molecules move in and out of cells? Membrane Properties: 3 Lab Exercises How does this relate to the digestive system? PBA 4: Molecules in a Bag Model: Inferences about molecular size. PBA 5: The Effect of Saliva on Starch	Read Bryson chapter: Cells. Write a one page reflection. Due June 8.
June 8, 2006	Cells and Human Systems. Detecting Carbon Dioxide: Use of indicator Solutions. Set up respiration experiments Field Experience: Body Worlds: An extended investigative activity Denver Museum of Nature and Science	
June 9, 2006	Photosynthesis and Cellular Respiration Respiration Experiments with Yeast Video: Misconceptions and Photosynthesis Lab: How do we measure photosynthesis? PBA 6: Photosynthesis Post-Test	
June 12, 2006	DNA as Information How does DNA make you unique? Crime Scene Lab	Read Bryson chapter: DNA. Write a one page reflection. Due June 13.
June 13, 2006	How does the structure of DNA facilitate information manipulation when cells divide? PBA 7: DNA model building DNA Extractions	Watson and Crick reflection due.
June 14, 2006	How can DNA mutation help you to reconstruct the	

	history of living organisms? Phylogenetic tree Invisible Ink Activities and Environmental Genomics	
June 15, 2006	How do changes in DNA impact other activities in the cell? Transcription/Translation Transformation Lab PBA8: Develop own classroom activity to teach DNA	Gattaca reflection due.
June 16, 2006	Explain the role of DNA mutation function and replication in inheritance? Blood Agglutination Lab PBA9: Meiosis/Mitosis Post Assessment	