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**CAPITAL COMMUNITY COLLEGE  
COURSE OUTLINE  
Discoveries in Modern Bioscience**

**SECTION I**

**SUBJECT AREA & COURSE NUMBER:** Biology \* 216

**COURSE TITLE:** *Discoveries in Modern Bioscience*

**COURSE CATALOGUE DESCRIPTION:** The course emphasizes basic relationships between physiologic and physiochemical principles of tissue structure and function. Experimental procedures, mathematical measurement and data analysis are discussed. Concepts of scientific discoveries and information transfer are presented. The course is required for students accepted into the *Bridges to the Baccalaureate* program and is of special interest to anyone planning to major in a scientific discipline. Lectures and demonstrations are presented by faculty from the University of Connecticut Health Center (UHC). The course director is a member of the Department of Science and Mathematics (CCC) and there is a faculty coordinator from UHC.

**LECTURE HOURS PER WEEK:** 3

**CREDIT HOURS:** 3

**PREREQUISITES:** General Biology (Biology \* 105) or Anatomy and Physiology I (Biology\* 211) or consent of the Course Director.

**SECTION II**

**A. SCOPE:**

The objective of *Discoveries in Modern Bioscience* is to acquaint students with the findings of a variety of biomedical research areas and demonstrate how these findings were arrived at and evaluated. The course will 1) provide a broad exposure to basic biological and technological progress, from the molecular level of organization to that of the whole organism and 2) provide a foundation for understanding the premises of research, which will include establishing an hypothesis, designing a research project, performing experiments, and collecting and analyzing data. A section on principles of modern methodology is included.

**B. REQUIRED WORK:** Determined by the Course Director and faculty and described in the Syllabus. Work may include written in-class quizzes and/or examinations, presentations to the class, in-class and out-of-class projects, written reports, portfolios, and homework assignments.

**C. ATTENDANCE AND PARTICIPATION:** Students are expected to attend each class, arrive on time, take exams and submit papers on the scheduled dates, and participate in the in-class learning process. Specific faculty policies are included on the course syllabus.

**D. METHODS OF INSTRUCTION:** The method of instruction will be a series of lectures

by faculty members from the University of Connecticut Health Center followed by discussion of the topic by course registrants. Each lecture will discuss general principles of a particular research topic. The presented information will insure a sufficient background of knowledge for students to participate in a meaningful in-class discussion of the material.

### E. OBJECTIVES, OUTCOMES, ASSESSMENT

The following objectives and outcomes represent the Department's core requirements for student achievement.

LEARNING OBJECTIVES	LEARNING OUTCOMES	ASSESSMENT METHODS
<b>To demonstrate an understanding of:</b>	<b>Student will:</b>	<b>As measured by:</b>
The Scientific Method.	1) Formulate and state a hypothesis 2) Design an experiment 3) Collect and analyze data 4) Use fundamental analytical methods 5) Present findings	Written in-class quizzes and/or examinations, presentations to the class, in-class and out-of-class projects, written reports, portfolios, homework assignments.
Biomedical Research at the Levels of the Cell and Tissue.	1) Use prescribed methods to visualize cells 2) Review methods to visualize tissues 3) Measure molecular activity 4) Record data 5) Explain the utility of nanotechnology, proteomics, electrophoresis and chromatography 6) Practice procedures for the safe use of hazardous experimental materials	
Research on the Organismal Level of Organization.	1) Examine the use of functional anatomy and ecological morphology to	

	<p>elucidate the lifestyles of organisms</p> <p>2) Discuss experimental techniques such as electromyography, cineradiography and forceplate analysis in functional studies</p> <p>3) Survey behavioral observations used to elucidate anatomical function and ecological role</p> <p>4) Estimate ecological relationships among species from their positions in ecological space</p>	
Respiration and Oxygen Transport	<p>1) Describe the biology of lungs and breathing</p> <p>2) Identify both inborn and environmentally caused diseases of the lungs</p>	
Bones and Teeth	<p>1) Investigate the main developmental differences between bones and teeth</p> <p>2) Identify factors that regulate bone formation in bone growth and repair</p> <p>3) Contrast normal versus pathological calcification</p> <p>4) Describe diseases that affect bones and teeth</p> <p>5) Name and explore the properties of drugs that are used to treat bone diseases</p>	
Bone Cells and Bone Development	<p>1) Explain the role of bone cells in bone development</p> <p>2) Define terms such as transgenic mice, fluorescent protein and</p>	

	<p>stage specific promotor</p> <p>3) Explain how bone cells of different stages are labeled with different fluorescent colors and the utility of the technique in studying bone development and in testing medicines to cure bone diseases.</p>	
Biomaterials	<p>1) Describe how the chemical, physical and biological properties of biological tissues influence the choice of synthetic substitutes</p> <p>2) Define the terms tissue engineering and biomaterial</p> <p>3) Name two types of biomaterials</p> <p>4) Give examples of biomaterials that are implanted permanently in the human body such as heart valves and hip implants.</p>	
Extracellular Matrix	<p>1) Explain the physical and chemical properties of extracellular matrix.</p> <p>2) Explore cell surface molecules (integrins)</p> <p>3) Name diseases that have cell-matrix interactions as a fundamental part of their pathology.</p>	
Mechanics of Nerve Impulse Transmission	<p>1) Distinguish neuronal cell types</p> <p>2) Discuss communication in the nervous system</p>	

Body Fluids and Secretion	<ol style="list-style-type: none"> <li>1) Characterize the chemical and physical properties of saliva</li> <li>2) Define genomics and proteomics</li> <li>3) Explain how hormones get to their target tissues</li> <li>4) Explain why all humans have different protein patterns.</li> </ol>	
Taste and the Transduction of Chemicals in the Environment into Signals in the Nervous System	<ol style="list-style-type: none"> <li>1) Name the five distinct taste qualities that humans detect.</li> <li>2) Define the terms taste, sweet, bitter, taste bud, GPCR, electrophysiology, sensory coding, nerve, action potential.</li> <li>3) Explain what a sensory nerve does.</li> <li>4) Examine how food sources of animal species relate to bitter taste.</li> <li>5) Describe a G-protein coupled receptor.</li> <li>6) Describe what a taste bud does.</li> <li>7) Describe the circumstances in which a person overlooks bitter taste and swallows.</li> <li>8) List the bitter tastes.</li> </ol>	
Development of Salivary Glands	<ol style="list-style-type: none"> <li>1) Define the terms epithelium, gland, mesenchyme, extracellular matrix, growth factor/receptor, transcription factor, differentiation.</li> <li>2) Explain the cellular and molecular mechanisms of normal branching morphogenesis.</li> </ol>	

	3) Describe how the cellular and molecular mechanisms of branching morphogenesis help the researcher to understand pathological conditions and devise therapeutic strategies.	
Viral Respiratory Infections and Asthma	<ul style="list-style-type: none"> <li>1) Examine the nature of asthma.</li> <li>2) Describe how viral respiratory infections influence asthma.</li> <li>3) Describe the models that are available to study asthma.</li> <li>4) Investigate causes for the increasing incidence of asthma.</li> </ul>	

**F. TEXT AND MATERIALS:** Readings will be provided for each lecture topic from scientific journals or texts at the discretion of the Instructor.