



BSC4422 Biotechnology Methods and Applications-III

BSC4422 Biotechnology Methods and Applications-III

Course Description: This course will explore biotechnology as a science and its implications in modern society. Students will learn how to make well-designed and controlled experiments. Students will also demonstrate knowledge of data acquisition and interpretation. Special fee. (3 hr. lecture)
 Prerequisite: BSC2427 , BSC2427L , PCB3060 , BCH3023 , BCH3023L , PCB3060L
 Corequisite: BSC4422L

Course Competency	Learning Outcomes
<p>Competency 1: The student will demonstrate knowledge of biotechnology as a science and its implications in modern society by:</p>	2. Numbers / Data 3. Critical thinking 10. Environmental Responsibility
<ol style="list-style-type: none"> 1. Describing how bioscience and biotechnology bring together multidisciplinary capabilities for the study of life processes, living organisms, and human health. 2. Discussing the specific technologies and capabilities that contribute to biotechnology such as: biomedical research and technology, including optics and imaging, sensors, stable isotopes, lasers, biomechanics, robotics, modeling/simulation, computation, and informatics; cellular analysis, including flow cytometry, digital fluorescence microscopy and other spectromicroscopies, cell growth and cell cycle control, DNA damage and repair, cell transformation and carcinogenesis, and transgenic mouse facilities; biomolecular structure, dynamics, and functional analysis, including scanning tunneling and transmission electron microscopy, x-ray and neutron scattering, high-field nuclear magnetic resonance, ultra-fast kinetic techniques, and optical infrared spectroscopies; genome analysis including chromosome sorting, clone libraries, robotics, PCR, genome mapping and sequencing, positional cloning, protein/DNA interactions, modeling and simulation, computing tools, and databases. 3. Relating the methods and technologies of biotechnology to the numerous social and medical applications including: molecular medicine, a field to which the biotechnology contributes an understanding of diseases at the molecular level and a rational approach to the design of drugs and other therapies to cure these diseases, involves capabilities in genomics, structural biology, and theoretical and computational biology agricultural and food producing industries forensic science and practical usage 	
<p>Competency 2: The student will demonstrate knowledge of the elements of a well-designed and controlled experiments by:</p>	2. Numbers / Data 3. Critical thinking 10. Environmental Responsibility
<ol style="list-style-type: none"> 1. Reviewing concepts such as observation, hypothesis, predictions, experimental design, and conclusion. 2. Demonstrating the relationships between assumptions, hypotheses, conclusions, theories and laws. 3. Differentiating among experimental, observational, and, modeling methods of research. 4. Interpreting an experiment in which independent and dependent variables can be used to make a prediction. 	

<ol style="list-style-type: none"> 5. Identifying methods of using technology in data acquisition, manipulation, and analysis. 6. Establishing the importance of establishing positive and negative controls in experimental design. 7. Differentiating between qualitative and quantitative data. 	
<p>Competency 3: The student will demonstrate knowledge of data acquisition and interpretation by:</p>	<ol style="list-style-type: none"> 1. Communication 2. Numbers / Data 3. Critical thinking 4. Information Literacy 10. Environmental Responsibility
<ol style="list-style-type: none"> 1. Critiquing data from published journal articles. 2. Evaluating data from published journal articles. 3. Interpreting data from published journal articles. 4. Recognizing that validity of scientific knowledge is based on repeatability of results, statistically significance of results, limitations of current technology, and freedom from bias. 5. Recognizing that interpretations in science change over time to include novel observations. 6. Differentiating between basic and applied research. 7. Designing a controlled research experiment based on information collected. 8. Preparing a research paper. 	
<p>Competency 4: The student will demonstrate knowledge of the impact of biotechnology on society by:</p>	<ol style="list-style-type: none"> 1. Communication 2. Numbers / Data 3. Critical thinking 6. Social Responsibility 7. Ethical Issues 10. Environmental Responsibility
<ol style="list-style-type: none"> 1. Discussing scientific research that may contribute to ethical, legal, and societal conflicts, (including but not limited to reproductive and life-sustaining technologies, genetic basis for behavior, population growth and control, modern genetic research, the human genome project, and government and business influences on biotechnology). 2. Demonstrating knowledge pertinent to legislation regarding ethical issues in biotechnology. 3. Identifying state, national, and international Code of Ethics and possible consequences for its violation. 	