

BSC4434 Bioinformatics for Biologists

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Course Description: The student will be introduced to the basic concepts and tools that scientists use to analyze biological information. Students will learn, through the examination of literature, development of projects and use of available web-based tools, how to store, retrieve and analyze genetic information. Special fee. (4 hr. lecture)

Prerequisite: BSC2010L , BSC2011 , BSC2011L , PCB3060 , BSC2010 , PCB3060L

Course Competency	Learning Outcomes
<p>Competency 1: The student will explain the study of bioinformatics by:</p>	2. Numbers / Data 3. Critical thinking 4. Information Literacy 8. Computer / Technology Usage
<ol style="list-style-type: none"> 1. Reviewing the basic principles of genomics. 2. Describing at the Human Genome Project. 3. Accessing public websites describing genomics. 4. Reviewing public websites describing genomics. 5. Detailing how to use computers to facilitate the study of molecular and evolutionary biology. 6. Describing computational techniques by which to convert massive amounts of biological data. 	
<p>Competency 2: The student will explore common <i>web-based</i> genomic tools, programs and databases used for sequence analysis, visualization and predicting three-dimensional structures by:</p>	2. Numbers / Data 3. Critical thinking 4. Information Literacy 8. Computer / Technology Usage
<ol style="list-style-type: none"> 1. Using the basic features of the National Center for Biotechnology Information web site. Demonstrating the basic aspects of the BLAST program. Using the basic aspects of web-based database, modeling and mapping programs such as GenBank (database), Protein Data Bank (database), or Primer3 (primers). 	
<p>Competency 3: The student will demonstrate a practical understanding of biomolecular data by:</p>	2. Numbers / Data 3. Critical thinking 4. Information Literacy 8. Computer / Technology Usage
<ol style="list-style-type: none"> 1. Downloading representative datasets from public internet repositories. Storing the datasets in a desktop database. Creating forms, menus and reports to display and access the data as information. Creating queries to find and access information, find patterns and display sequences. Generating multi-dimensional depictions and representations of the data for dynamic querying 	

<p>Competency 4: The student will demonstrate an understanding of how to use biomolecular data files by:</p>	<p>2. Numbers / Data 3. Critical thinking 4. Information Literacy 8. Computer / Technology Usage</p>
<p>1. Obtaining web-based biomolecular data. Editing, merging, and cataloging text files. Storing and manipulating biomolecular text. Implementing security measures in order to control access to sensitive data.</p>	
<p>Competency 5: The student will demonstrate knowledge of the computer's operating system search and substitution methods by:</p>	<p>2. Numbers / Data 3. Critical thinking 4. Information Literacy 8. Computer / Technology Usage</p>
<p>1. Searching archived sequence data files for patterns. Combining necessary commands to formulate complex searches and pattern substitutions across several biomolecular files. Comparing several biomolecular/bioinformatics datasets in order to find patterns across disparate and distributed sequences.</p>	
<p>Competency 6: The student will be able to describe and topically model the essential data structures of computational biology by:</p>	<p>2. Numbers / Data 3. Critical thinking 4. Information Literacy 8. Computer / Technology Usage</p>
<p>1. Defining lists, stacks and queues, and describing their functions. Defining several variants of the tree and describing their functions. Defining hashes and describing their functions. Defining priority queue and describing their functions. Describing the steps used to sort data. Describing the steps used to merge data.</p>	
<p>Competency 7: The student will perform data analysis using a desktop database application on biomolecular data by:</p>	
<p>1. Applying statistical methods to the ordered summarized and filtered data. Generating of 2-, 3- and n-dimensional graphs and charts from clustered and filtered data. Transforming the representation of the information into web-usable objects.</p>	
<p>Competency 8: The student will demonstrate the use and interpretation of basic analyses on biomolecular information through the use of a desktop database application by:</p>	<p>2. Numbers / Data 3. Critical thinking 4. Information Literacy 8. Computer / Technology Usage</p>
<p>1. Interpreting 2-, 3- and n-dimensional graphs and charts. Creating and implementing what-if scenarios. Composing word processing documents that are dynamically linked to tables and charts detailing an analysis of the derived information. Performing basic data mining.</p>	