

## **BME H11 HONORS MOLECULAR BIOTECHNOLOGY**

(Elective)

<b>Catalog Data:</b>	<b>BME H11 Honors Molecular Biotechnology (Credit Units: 4)</b> Overview of engineering applications of cellular analyses; engineering of cells for manufacturing or sensing purposes. Analysis of DNA and protein; DNA sequencing; PCR; cloning; transgenic cells and animals; stem cells, antibodies, engineering and production of fusion proteins. Prerequisite: admission to the Campuswide Honors Program. (Design Units: 0)
<b>Textbook:</b>	Alberts, B., et al. <i>Essential Cell Biology: An Introduction to the Molecular Biology of the Cell.</i> , 2 <sup>nd</sup> edition, Garland Press, 2003
<b>References:</b>	
<b>Coordinator:</b>	James P. Brody
<b>Course Outcomes:</b>	Students will: Describe the steps involved in obtaining the complete DNA sequence of a genome. Identify different assays for protein quantification and their advantages and disadvantages. Design PCR reactions to identify whether particular pathogens are present. Describe the process of cloning. Describe the biomedical applications of cloning. State the ethical arguments for and against cloning and the use of stem cells in medicine. Design processes for the production and purification of recombinant protein.
<b>Prerequisites By Topic:</b>	
<b>Lecture Topics:</b>	DNA engineering, restriction enzymes. DNA hybridization. Polymerase Chain Reaction, PCR. Antibodies, monoclonal and polyclonal. Monoclonal antibody production. Immunoassays. DNA transfections. Protein expression vectors and systems. Large scale protein purification. Cloning, benefits and limitations. Stem cells, benefits and limitations.
<b>Class Schedule:</b>	meets for 3 hours of lecture and 1 hour of discussion each week for 10 weeks.
<b>Computer Usage:</b>	Students will use Microsoft Excel or equivalent to develop numerical methods to solve class problems.

**Laboratory Projects:**

**Professional Component:** Contributes toward the Biomedical Engineering Topics.

**Relationship to Program Outcomes:** This course relates to Program Outcomes a, c, d, e, f, h, i, j, and k as stated at:

<http://undergraduate.eng.uci.edu/degreeprograms/biomedical/mission>

**Design Content Description**

*Approach:*

*Lectures:*

*Laboratory Portion:*

**Grading Criteria:**

Homework assignments:	25%
Midterm exams:	35%
Final exam:	<u>40%</u>
	100%

**Estimated ABET Category Content:**

Mathematics and Basic Science: 0 credit units or 0%

Engineering Science: 4 credit units or 100%

Engineering Design: 0 credit units or 0%

**Prepared by:** James P. Brody **Date:** July 2007

**CEP Approved:** Fall 2005