

# Syllabus for Update Course in Molecular Biotechnology & Bioinformatics (Spring, 2003)

**Goal of Course:** To introduce teachers to the theory and practice of modern molecular biotechnology and bioinformatics, particularly as it relates to human health and welfare; to offer teachers the skills to develop exercises that could be used in the classroom, particularly exercises that make use of the vast array of online resources.

## Types of Activities:

The course will be comprised of three types of activities:

- lecture topics that deal with current topics including basic molecular genetics, the human genome project, and implications and ramifications of biotechnology and bioinformatics
- online exercises that introduce teachers to biotechnology resources such as NCBI, Biology Workbench, the HHMI site, and the Cold Spring Harbor site
- laboratory exercises that will illustrate basic concepts in molecular biotechnology. Each teacher will amplify their own mitochondrial DNA, sequence the resulting DNA fragment and analyze the sequence

## Week 1:

### Lecture Topic:

- Overview of basic molecular genetics (*Chapter 1, Campbell text*)

### Online Computer Exercise:

- Summary of online resources related to molecular biology and biotechnology
- Detailed tour of National Center for Biotechnology Information Online NCBI Resources

### Wet Lab Exercise:

- Extraction of DNA (from various foods)
- Run DNA on gel to visualize

## Week 2:

### Lecture Topics:

- Overview of the Human (and Other) Genome Projects: (*Chapters 2 & 3, Campbell*)

### Online Computer Exercises:

- Introduction to "Biology Workbench" – logging in and completing the sickle cell anemia tutorial

### Laboratory Topics:

- Isolation of your DNA from buccal cells
- Setting up the Polymerase Chain Reaction (PCR) to amplify mitochondrial DNA

## Week 3:

### Lecture Topics:

- Overview of Genome Expression (*Chapters 4-6, Campbell*)

### Computer Exercises:

- Exercises from Campbell disk

### Laboratory Topics:

- Run out PCR product on gel to determine if the reaction was successful
- Set up DNA sequencing reaction

## Week 4:

### Lecture Topics:

- Broader Applications of Genomics (*Chapters 10-12, Campbell*)

### Online and Laboratory Exercises:

- Analysis of your mitochondrial DNA using online tools. Here we will use NCBI tools and the Cold Spring Harbor Laboratory site to analyze your DNA and compare it with other mitochondrial DNA sequences.