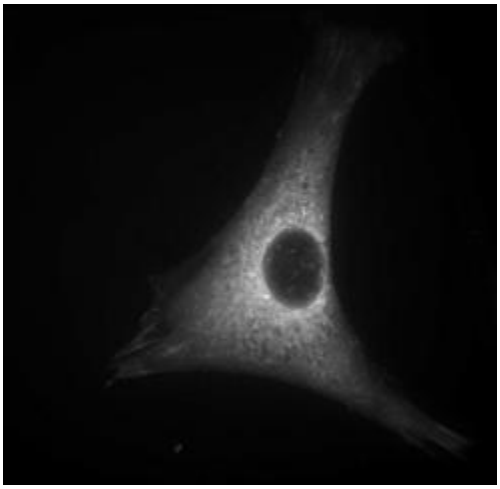
Module 1 /Introduction to Modern Biology

Welcome to the OLI version of Modern Biology. This introductory course is called "Modern Biology" because it is focused on topics at the forefront of experimentation in the fields of cellular biology, molecular biology, biochemistry, and genetics. It is carefully planned to provide the background students will need for advanced biology classes. Students from other disciplines may also find this course useful as it explains many of the concepts and techniques currently discussed in the popular press and applied in other contexts.

Fluorescent image of a living mouse cell



This is a mouse tissue culture cell showing the cytoskeletal structure. The large clearing in the center is the nucleus.

Image courtesy of Jon Jarvik, Department of Biological Sciences, Carnegie Mellon University.

An image of a living mouse cell in culture is shown above. As the cell adheres to the bottom of the culture dish it spreads out exploring the local environment giving it the angular shape. The cell can move, utilize energy, and divide to produce new cells. During this course you will explore the fundamentals of how a cell is able to carry out each of these processes. Modern biology is about the molecular events that occur inside a cell: the making of proteins, the building of cellular structures, and the interaction of a cell with its environment.

This Modern Biology course is built around several key concepts that provide unifying explanations for how and why structures are formed and processes occur in a biological system. Because it is not possible to cover the breadth of modern molecular biology in one semester, an understanding of these key concepts will provide a basis for extension of your knowledge to biological systems beyond the specific topics covered in this course. One of the major goals of the course therefore is for you to not only learn the fundamentals of the concepts but also to recognize how they can be applied in other contexts. Several key concepts include:

- Bioselectivity
- Energy
- Equilibrium
- Ionic State
- Regulation
- Solubility
- Correlation of Structure and Function

The course is organized into units covering the areas of basic biochemistry, cell biology, and molecular and cellular function. The first unit introduces the basic chemistry of a cell. All other units will rely heavily on the concepts and background introduced in this unit. You are encouraged to master this material before proceeding to the other units.