

General Biophysics

(بف 211)



Lecture 1

Prepared by:
Dr. Abdo A. Elfiky

References



❧ Biophysics DeMYSTiFieD®

Daniel Goldfarb (2011)

❧ Biophysics: A Physiological Approach

PATRICK F. DILLON

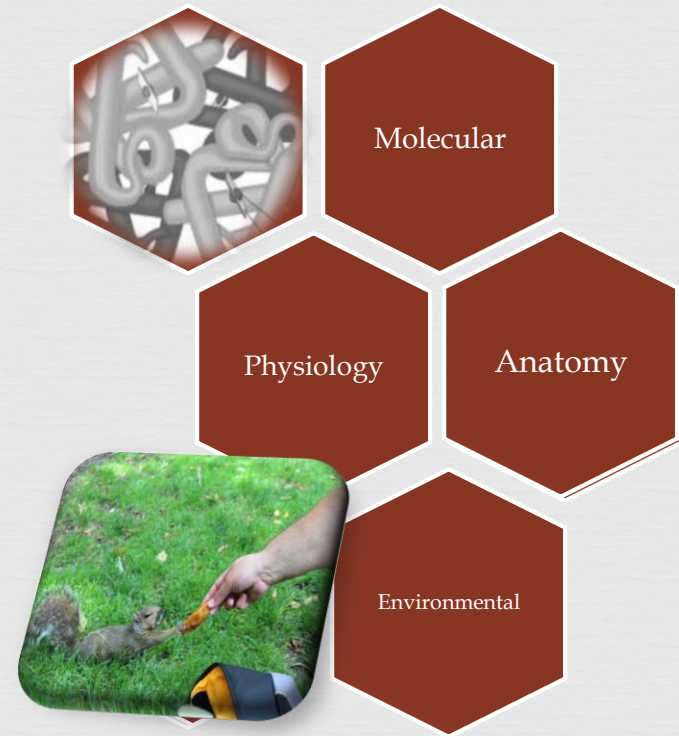
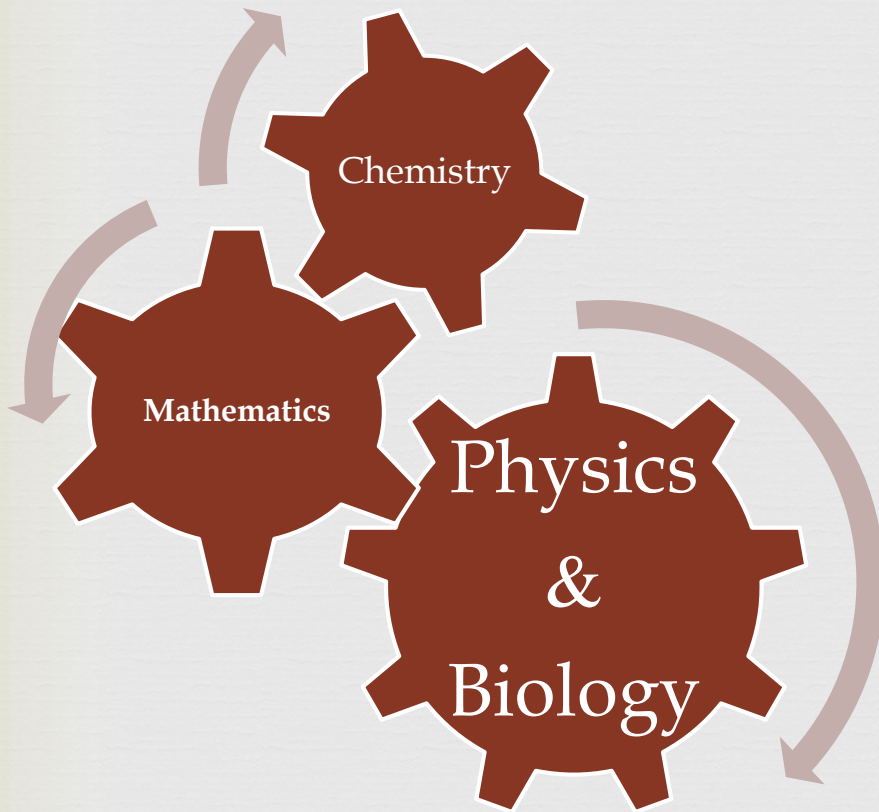
(2012)

What is biophysics?



- It is an interdisciplinary science.
- Biophysics uses of the principles, theories, and methods of physics to understand biology.
- Biophysics tries to understand how the laws of matter and energy are at work in living systems.

What is biophysics?



Prerequisites for Biophysics



∞ If you apply a force F to an object of mass m , you will cause that object to accelerate with a rate of acceleration a .

$$F = m a$$

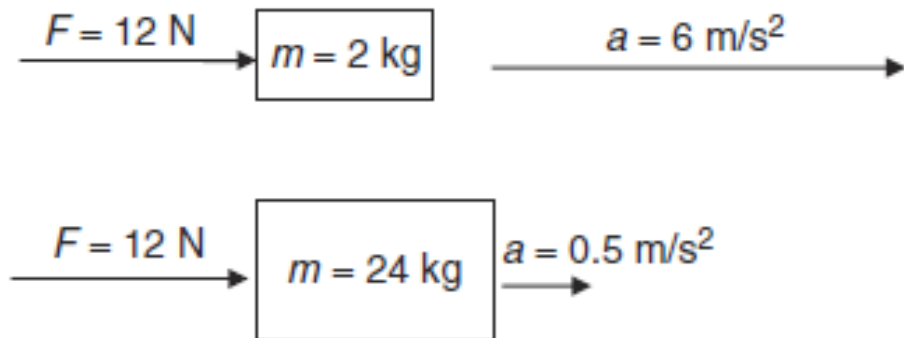
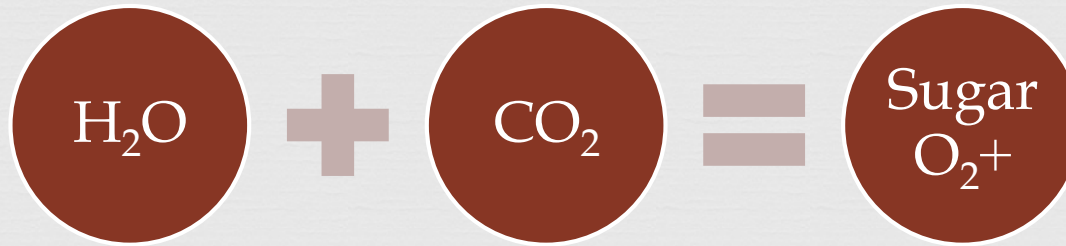


FIGURE 1-1 • If we apply the same force to two objects of different mass, the more massive object accelerates slower. The product, force = mass \times acceleration.

Prerequisites for Biophysics (Continued)



A Brief History of Biophysics



- ∞ Biophysics is a relatively new science (60 to 100 years old). it is far younger than physics, mathematics, chemistry, or biology, but somewhat older than genetic engineering or computer science.
- ∞ The first published use of the word *biophysics* was in 1892 by Karl Pearson.
- ∞ Schrödinger Lectures “What Is Life?” in 1943.

A Brief History of Biophysics (Continued)



- ✧ Medical Research Council of King's College in London established the Biophysics Research Unit of King's College (1946). Maurice Wilkins and Rosalind Franklin were among those who joined the unit to become biophysicists. They used X-ray diffraction to investigate the structure of DNA.
- ✧ In 1953 Watson and Crick made one of the most far-reaching discoveries of our time when they used Rosalind Franklin's X-ray diffraction data to discover the double helix structure of DNA.

A Brief History of Biophysics (Continued)



- By the early 1980s numerous universities offered graduate degrees in biophysics, but only a few offered undergraduate degrees.
- Cairo University offered undergraduate program in Biophysics by Prof. Dr. Fadel M. Ali *et al* (1986).
- Today over 60 colleges and universities offer undergraduate degrees in biophysics, and the Biophysical Society has over 9000 members.

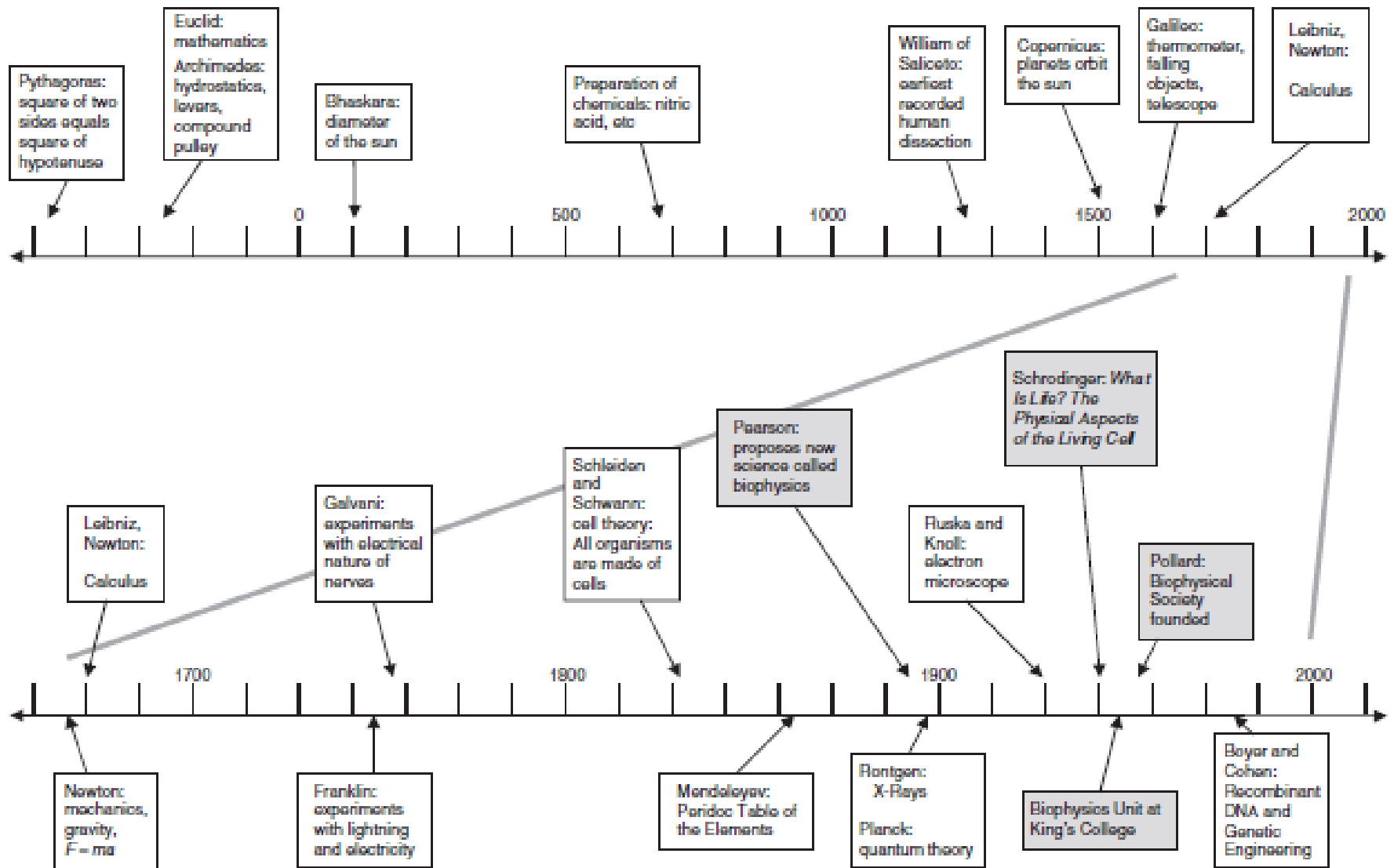


FIGURE 1-2 - How old is biophysics?
Monday, March 10, 2014

The scope and topics of Biophysics



Molecular and subcellular Biophysics

- Studying the forces between atoms that determine the shape of a protein or DNA molecule.

Physiological and Anatomical (Medical) Biophysics

- Developing algorithms for a computer to analyze and display a three-dimensional image of the brain in real time during brain surgery.

The scope and topics of Biophysics

(Continued)



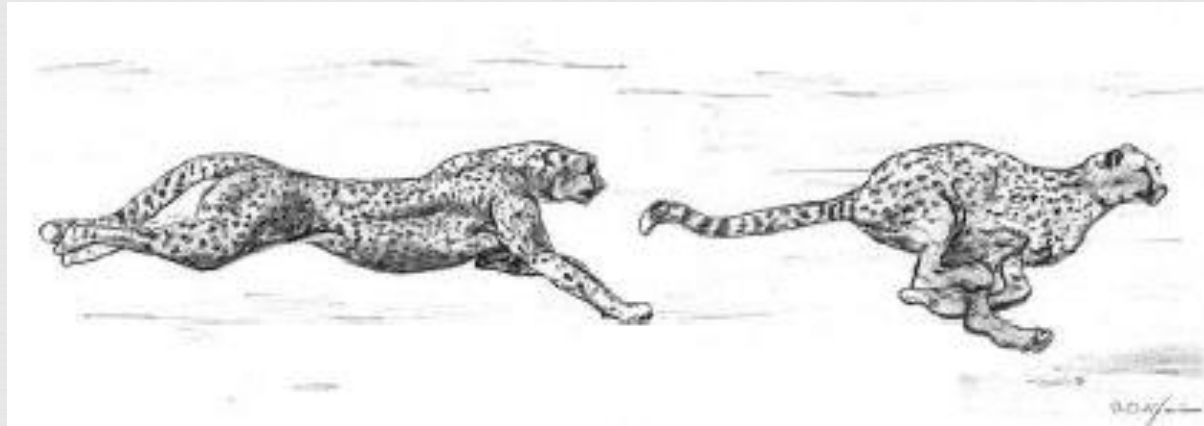
Environmental Biophysics

- Researching the effects of radioactivity on the environment.


General Biophysical techniques

- Investigating and comparing the mechanics of limb movements or blood flow in various organisms.

Quiz (p.8)



Course materials and Lectures



 http://scholar.cu.edu.eg/?q=abdo_elfiky/