

BIOLOGICAL FRAMEWORKS FOR ENGINEERS

Session #9 [nm: Decoding Protein and Protein Functions]

General Objectives:

- ✓ Introduction to purifying, detecting, and characterizing proteins,
- ✓ Identify and discuss physics involved in protein studies

Central Framework:

- ✓ One-by-one approaches to study proteins do not provide insights into a global picture of what is happening inside a cell, tissue, or entire organism, but advances in inactivating gene expression is helping to understand how proteins function in complex biochemical pathways and regulatory networks.

Session Outline:

- I. Purifying Proteins
 - a. Centrifugation
 - b. Gel Electrophoresis
 - c. Chromatography

II. Detecting Proteins
a. Western Blot

b. Mass Spectrometry

III. Characterizing Proteins
a. X-ray Crystallography

b. Cryoelectron Microscopy

c. Nuclear Magnetic Resonance Spectroscopy

IV. Understanding Protein Functions
a. Pharmacological inhibitors

b. Recombinant DNA

c. Knockout mice

d. RNA interference

e. Green fluorescent protein (GFP)