Students enrolling in this course should be able to demonstrate achievement of the learning outcomes for the advanced-level course in Biochemistry curriculum with a particular emphasis on the biophysical foundations universal to all temporal and spatial scales in modern biology.

The passing grade in the course corresponds to the following minimal goals:

Upon completion of the course students will be able to:

1. Evaluate applicability of molecular, cell, tissue- and system-level models including Boltzmann distribution, two- and three-state models, entropy maximization analysis in protein sequence alignments

2. Select appropriate thermodynamic equations and models to calculate, analyze, and predict the properties and interactions in protein folding and macromolecular assembly formation.

3. Develop basic understanding of key physical principles used in the analysis of large and noisy data sets in biochemical experiments, including proteomics, gene-regulatory network mapping and metabolomics as examples.

4. Understand key models used to describe time-dependent processes in biological systems with special emphasis on biochemical kinetics, rates of biological processes and applications to bioenergetics.

5. Perform critical review of available scientific literature using biophysical models discussed in the class.