

**Syllabus for CHEM501900 BIOPHYSICAL CHEMISTRY,
Fall 2011**

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Lecture:

Time: M7M8M9

Room: CHEM325

Method: Lecture, 3 credits

Course Outline:

Part I:

- Protein Folding
 - Basic principles
 - Protein stability and thermodynamics
 - Folding kinetics
 - Spectroscopic methods
 - Circular dichroism
 - Emission spectroscopy

Part II.

- Spin-Label Electron Spin Resonance for Biophysical Study
 - Fundamental principles;
 - Magnetic resonance of the hydrogen atom; Spin dipolar interactions; Distance measurement of doubly labeled spins by CW-ESR;
 - Studying protein and membranes by cw- and Pulsed-ESR.
 - Electron Spin-Echo Envelop Modulation (ESEEM) for Metalloproteins

Part III.

- Ligand Binding by Protein
 - General properties of protein-ligand interactions
 - Metalloproteins
 - Calcium-binding proteins; NAS- and nucleotide-binding proteins
 - Allostery: interactions between different binding sites

Grading:

Homework & Problem set	10%
Mid-term exams	2 x 30%= 60%
Final exam	30%

Test Schedule:

- 2 Mid-term exams
- 1 Final exam

References (* indicates important books):

- *K.E. van Holde, W.C. Johnson, P.S. Ho, Principles of Physical Biochemistry**.
- *T. Engel, G. Drobny, P. Reid, Physical Chemistry for the Life Sciences.*
- *D. Eisenberg, D. Crothers, Physical Chemistry with Applications to the Life Sciences**.
- *T.E. Creighton, Proteins – Structures and Molecular Properties**.
- *T.E. Creighton, The Biophysical Chemistry of Nucleic Acids and Proteins**.
- *M. Daune, Molecular Biophysics – Structures in Motion.*
- *P. Atkins and J. Paula, Physical Chemistry for the Life Sciences*
- *A.V. Finkelstein, O.B. Ptitsyn, Protein Physics**.
- *A. Fersht, Structure and Mechanism in Protein Science**.
- *C. Branden, J. Tooze, Introduction to Protein Structure, 2nd Ed.*
- *I. Tinoco, K. Sauer, J.C. Wang, J.D. Puglisi, Physical Chemistry: Principles and Applications in Biological Sciences*