BIOC6036 Macromolecular Structure & Mechanism: Syllabus

Course Text: The Biophysical Chemistry of Nucleic Acids & Proteins by Thomas E. Creighton, pub. Helvetian Press, 2010; journal articles will also be assigned for some lectures

Class Time: Monday, Wednesday, Friday; 9-10:30 AM, RAB conference room

Jan. 10. Reading: Ch. 7, 8. Instructor: Dr. D. Ivanov
Topics: Amino acid structure and chemistry, the peptide bond, protein primary structure. Conformation of the polypeptide chain, protein secondary structure and stability, coiled coil and extended b-sheet structures.

Jan. 13. Reading: Ch. 9.1 (excepting 9.1H). Instructor: Dr. Dmitri Ivanov
Topics: Protein structure. Local secondary structure, supersecondary structure (motifs), tertiary structure and folding classes.

Jan. 15. Reading: Ch. 9.1H & TBA; Instructor: Dr. Dmitri Ivanov
Topics: Protein Quaternary Structure, Symmetrical and Asymmetrical Oligomers, Filamentous Arrays, Interfaces, Domain Swapping

Jan. 17. Reading: Ch. 9.2-9.3; Instructor: Dr. Rui Sousa
Topics: Membrane Protein Structure, Similarity in Protein Structure and Evolution of Protein Families,

Jan. 20: No class. MLK holiday.

Jan. 22. Reading: Ch. 10.1-10.6 &11.1-11.3, Instructor: Dr. Rui Sousa
Topics: Protein hydration Protein conformational flexibility, Protein Denaturation and Renaturation, Effects of solvents on protein stability.

Jan. 24. Computational prediction and modeling of Protein Structure and Protein:Protein interactions I. Instructor: Dr. Fongang

Jan. 27. Computational prediction and modeling of Protein Structure and Protein:Protein interactions II. Instructor: Dr. Fongang

Jan. 29. Reading: Ch. 11.4, Instructor: Dr. Rui Sousa
Topics: Kinetics of protein folding, disulfides bonds and proline isomerization in protein folding. Folding of ßmulti-domain vs. single-domain proteins.

Jan. 31. Reading: TBA. Instructor: Dr. Rui Sousa
Topics: Role of Molecular Chaperones in Protein Folding

Feb. 3. Reading: Ch. 12.1-12.4. Instructor: Dr. David Libich
Topics: Ligand binding to proteins: metalloproteins, calcium, and nucleotides

Feb. 5. Reading: Ch. 12.5 and TBA. Instructor: Dr. David Libich
Topics: Allostery, Positive and Negative Cooperativity, Protein:Protein Interactions

Feb. 7. Reading: Ch. 3. Instructor: Dr. Yogesh Gupta
Topic: DNA Conformation and Topology

Feb. 10. Reading: Ch. 13.2-13.4. Instructor: Dr. Yogesh Gupta Topics: Protein: Nucleic Acid Interactions; Structural Biology of Genome Editing

Feb. 12, Feb. 14, Feb. 17 Reading: Ch. 14 & TBA. Instructor: Dr. Rui Sousa
Topics: Chemical and Enzymatic Catalysis

Feb. 19, Reading: Ch. 15 & TBA. Instructor: Dr. Rui Sousa
Topics: Enzyme regulation.

Grading will be based based on problem sets and class participation.