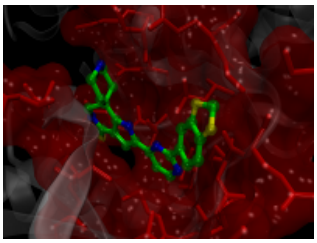
Biophysics of Macromolecules
BIOL 4596



Term:	Spring 2018
Class Times:	MWF 9:30am – 10:20am
Location:	213 Tureaud Hall
Instructor:	Michal Brylinski
E-mail:	mbrylinski@lsu.edu
Website:	http://brylinski.cct.lsu.edu
Office 1:	407 Choppin Hall
Office 2:	2054 Digital Media Center
Office hours:	Mon 3pm – 5pm (Office 1) Thu 3pm – 5pm (Office 1) or by appointment

Recommended Text: "Molecular Biophysics: Structures in motion" by Michael Daune, Oxford University Press

Course Objectives: Understand the biophysical principles of structure, dynamics and function of various biological molecules and their assemblies at the molecular level. Students are expected to be able to apply key principles to their research and to everyday life. Emphasis will be placed on theory and methods commonly used in structure-based drug design. Using advanced visualization software, students will learn how to effectively communicate biophysics concepts to a broad audience. Furthermore, well-known tools, such as Microsoft Excel, Apache OpenOffice Calc, or LibreOffice Calc, will be used at an advanced level to tackle common problems and perform calculations in molecular biophysics. Progress will be assessed through in-class presentations and discussions, individual project assignments, and exams. This 3 credit hour course requires a minimum of 6 hours (on average)/week outside class work/study.

Projects: Each student will be assigned an individual project related to molecular biophysics in modern drug design. You can either select the assignment from a list provided by the instructor or propose a new project that is within the scope of this course. In order to accomplish these assignments, you will need to learn how to 1) use open source molecular visualization software, 2) use common spreadsheet software at an advanced level to perform molecular calculations/simulations, 3) create domain-specific presentations that include 3D molecular visuals to effectively communicate biophysical concepts and results. You may discuss project assignments with your classmates or use online resources for help, but you must present your own work throughout the semester.

Grading Policy: Projects 20%
Presentations 20%
Midterm 25%
Final 35%

Tentative Schedule:

Conformation of biopolymers

- Geometry of a polymer chain
- Intermolecular forces
- Calculation of conformations I
- Calculation of conformations II

Conformation of nucleic acids

- Structure of a nucleotide chain
- Double helix structure
- Polymorphism and flexibility of DNA
- Structure of ribonucleic acid I
- Structure of ribonucleic acid II

Conformation of proteins

- Amino acids and peptide bond
- Protein secondary structure I
- Protein secondary structure II
- Protein tertiary structure

Biophysics of proteins

- Protein fold space
- Protein structure determination
- Protein folding

Associations between molecules

- Molecular associations
- Protein-drug interactions
- Drug discovery and development

Students with disabilities: If any student feels that he/she has a disability and needs special accommodations of any nature whatsoever, the instructor will work with you to provide reasonable accommodations to ensure that you have a fair opportunity to perform in this class. Please advise the instructor of such disability and the desired accommodations at some point before, during or immediately after the first scheduled class period.