

**16:118:509, 16:160:537 Biophysical Chemistry I  
01:160:437 Physical Chemistry of Biological Systems**

**An Introduction to Biomolecular Structure and Interactions  
Fall Semester, 2016**

**Instructor and Contact Information**

Professor Wilma K. Olson - Wright-Rieman Labs, Rm A209; 848-445-3993; [wilma.olson@rutgers.edu](mailto:wilma.olson@rutgers.edu)

**Time and Location**

Tuesdays and Thursdays 3:20-4:40 PM  
Wright-Rieman Laboratories, Rm 260

**Description**

Three-dimensional structures and interactions of proteins, nucleic acids, and their macromolecular assemblies, emphasizing the principles of structural assembly and the connections between structure, interactions, and biological/physical properties and introducing students to the methods used to visualize and analyze macromolecular structures and assemblies.

**Course Structure**

Members of the class are expected (i) to read and understand all of the course literature, (ii) to participate in class discussions, (iii) to complete a variety of written/oral assignments, (iv) to prepare a final written paper, and (v) to deliver an in-depth oral presentation on a biomolecular system/structure of his or her own interest. Students will prepare answers to homework questions in advance of a particular class/paper, discuss the paper in class, and individually investigate supplementary issues brought up in class discussions. The supplementary items might include a brief oral/written report on relevant background material. Students will build simple molecular models and become familiar with and use various databases and software tools helpful in understanding/manipulating the 3D structures of biological macromolecules.

**Literature**

There is no textbook. The course will be taught using peer-reviewed literature as source material. The articles, which are required reading, are listed at the end of this document. The readings and associated homework questions must be submitted in advance of the class meeting at which the material will be discussed/presented.

**Useful Supplementary Textbooks**

Branden and Tooze, Introduction to Protein Structure, Second Edition, Garland Publishing, 1999.  
Calladine, Drew, Luisi, Travers. Understanding DNA. The Molecule and How it Works, 3rd Edition, Elsevier, 2004.  
R.D. Blake, Informational Biopolymers of Genes and Gene Expression, University Science Books, 2005.  
Liljas et al. Textbook of Structural Biology, World Scientific, 2009.

**Prerequisites**

Physical chemistry or equivalent. Organic chemistry and one semester of biochemistry highly recommended

**Requirements**

Homework (30%), class participation (20%), in-class oral presentation (25%), and final written report (25%)

**Attendance**

Students are expected to attend all classes; if you expect to miss one or two classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to the instructor.

### Class Schedule (tentative)

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Dates	Topics
Sept 6, 8, 13	Macromolecular structure and representation
Sept 15, 20	Principles of protein structure
Sept 22, 27, 29	Understanding protein structures
Oct 4, 6, 11	Protein folding and fluctuations
Oct 13, 18	Discovery of the double helix
Oct 20, 25	Principles of nucleic acid structure
Oct 27, Nov 1	Double helix at atomic resolution
Nov 3, 8	RNA folding and unfolding
Nov 10, 15	Nucleosome organization and recognition
Nov 17, 22	Ribosome structure and motions
Nov 29, Dec 1	Student projects/presentations
Dec 6, 8	Student projects/presentations
Dec 13	Student projects/presentations

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Students may be interested in attending and, for extra credit, preparing summaries of on-campus seminars related to the course material. The topics, locations, and times of forthcoming seminars will be announced as the information becomes available. Member of the class are encouraged to suggest talks for these announcements.