Physics 333 – Biological Physics

Instructor:
Dr. Juan M. Vanegas
E-mail: jvanegas@uvm.edu
Office: Innovation Hall, E205
Office hours: WF 2:30 pm – 3:30 pm (in person or MS Teams)

Schedule:
Lectures: MWF 1:10 – 2:00 pm, Lafayette L111
Midterm exam: TBA
Final exam: TBA

Course textbook:
Authors: Rob Phillips, Jane Kondev, Julie Theriot and Hernan Garcia.
ISBN: 978-0-8153-4450-6

Supporting references:
Author: Philip C. Nelson

Author: David H. Boal

Author: Jacob N. Israelachvili
ISBN: 978-0-12-375182-9

Author: Paulo Almeida

Lehninger Principles of Biochemistry (any recent edition, W.H. Freeman)
Authors: David L. Nelson and Michael M. Cox

Authors: Jeremy M Berg, John L Tymoczko, and Lubert Stryer.
Available online for reference at the NCBI bookshelf:
http://www.ncbi.nlm.nih.gov/books/NBK21154/

Grading:
The grade for the class will be assigned based on homework problems (20 %), a midterm exam (30 %), a final exam (30 %), and in-class attendance/participation (20 %).

**Course plan (specific topics and order may change):**

1. Basic cellular components, length and time scales in biology.
2. Molecular solvation and the hydrophobic effect.
4. Macromolecular structure.
5. Proteins.
7. Heat, energy and entropy – how cells get work done.
8. Thermodynamics and statistical mechanics of biological systems.
9. Two-state models and cooperativity.
11. Elasticity and mechanics of filaments and membranes.
13. Brownian motion and diffusion in 2 and 3 dimensions.
15. Enzyme kinetics and the Michaelis-Menten equation.
16. Crowding effects.
17. In addition to the above topics, we will also take brief “interludes” to learn about computational and experimental techniques in biophysics including
   a. Molecular dynamics simulations
   b. Fluorescence microscopy and super-resolution techniques
   c. Electron microscopy and 3D reconstruction
   d. Single molecule force spectroscopy

**Student Learning Accommodations**

In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course. Faculty who receive Letters of Accommodation with Disability Related Flexible accommodations will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.
Student Responsibilities and Rights – Academic Integrity

Students are strongly encouraged to work together on problems during in-class activities and outside of class. However, each student must submit their own independent work unless specifically asked to submit a group answer. Submitting somebody else’s work as your own will be considered academic dishonesty and will be reported to the Center for Student Conduct.

The following policy addresses plagiarism, fabrication, collusion, and cheating:

http://www.uvm.edu/policies/student/acadintegrity.pdf

Grading Appeals:

http://www.uvm.edu/policies/student/gradeappeals.pdf

Religious Holidays

Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time.

https://www.uvm.edu/registrar/religious-holidays

FERPA Rights Disclosure

The purpose of this policy is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.

http://catalogue.uvm.edu/undergraduate/academicinfo/ferparightsdisclosure/

Promoting Health & Safety

The University of Vermont’s number one priority is to support a healthy and safe community
Center for Health and Wellbeing

https://www.uvm.edu/health

Counseling & Psychiatry Services (CAPS)

Phone: (802) 656-3340

C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by visiting the Dean of Students website at https://www.uvm.edu/studentaffairs