PHYS 3050
Introduction to Biophysics
Winter 2025

Instructor: Stefan Wallin, office C-3018, phone 864-8880, email swallin@mun.ca
Classes: Monday, Wednesday, Friday at 10:00-10:50 in room C-2045.
PR: one of COMP 1510 or 1001 or PHYS 2820, and one of PHYS 2053 or CHEM 2301.
Office hours: Mondays 12-2 (C-3018).

Course outline: You will learn how concepts and tools from physics can be applied to understand biological processes at the molecular and cellular levels. The focus will be on simple but quantitative models. We will use physics from a range of areas, including electrostatistics in solutions (Poisson-Boltzmann equation), polymer physics, random walks, diffusion, and entropic forces (e.g. depletion interactions). We will cover topics such as ligand-receptor binding, molecular machines, size and structure of biomolecules, allostery, and single-molecule experiments.

Course material: Our main textbook will be *Biological Physics: Energy, Information, Life* by Phillip Nelson, Student Edition (2020). This book is available at the MUN bookstore. The course material is organized into 5 modules [Chapters in Nelson]:

1. What's inside cells [Ch 1-2]
2. Random walks, friction, and diffusion [Ch 4]
3. The statistical physics tool box [Ch 3, 6]
4. Entropic forces at work [Ch 7, 8]
5. Cooperative transitions in macromolecules [Ch 9, 10]

Evaluation:

Assignments (20%)
Quizzes (20%)
Course project (20%)
Final Exam (40%)

Supplemental final exam will not be allowed.

Assignments (3-4). Some assignments will require minor computational work, including searching in databases, data fitting, or running scripts. Assignment may be "open-ended" with multiple possible correct solutions. Solutions should be handed in at the beginning of class on the due date. A*ssumptions and approximations used should be explicitly stated and logic behind calculations clearly explained.*

Quizzes. There will be 2 quizzes during the semester to be written in class (tentative dates are Feb 10 and Mar 10).

Course project. You will work in groups of 2 students to study a specific topic in biophysics and prepare a class presentation. A set of topics are available or groups can suggest their own. Each group must meet with instructor at least once to discuss project.

Instructional continuity
In the case of a class disruption or cancellation, and in the case of revisions to evaluation methods, the instructor or the Head of the department will notify all students registered in the course via the course shell in Brightspace. Any necessary revisions to the evaluation methods will be made in consultation with the students registered in this course. If a student demonstrates that they would be disadvantaged by the change, then, as per 6.7.4 of the University Calendar, accommodations will be made.

Accommodation
Memorial University of Newfoundland is committed to fostering equitable and accessible learning environments for all students. Accommodations for students with disabilities are provided in accordance with the Accommodations for Students with Disabilities Policy (www.mun.ca/policy/site/policy.php?id=239) and its related procedures. Students who feel that they may require formal academic accommodations to address barriers or challenges they are experiencing related to their learning are encouraged to contact Accessibility Services (the Blundon Centre) at the earliest opportunity to ensure any required academic accommodations are provided in a timely manner. You can contact Accessibility Services (Blundon Centre) by emailing blundon@mun.ca.

Assistant tools (AI)
Original work, completed wholly by you, is expected to be submitted in this course. The use of an artificial intelligence tool like ChatGPT is not permitted.

Important general information from the University.
It is the student's responsibility to acquaint themselves with these items. Please read.

3. Student Code of Conduct.
http://www.mun.ca/student/conduct/

6.8.2 Exemptions From Final Examinations
http://www.mun.ca/regoff/calendar/sectionNo=REGS-0628

6.12 Academic Misconduct
http://www.mun.ca/regoff/calendar/sectionNo=REGS-0748