COURSE SYLLABUS
METHODS in BIOPHYSICS
PHYS 5309-001

Faculty Information

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Course Information

Course: PHYS 5309-001
Place and Time: Science Building 112, Tuesday/Thursday 11:00 am – 12:20 pm
Pre-requisites: Undergraduate degree in physical sciences or related fields with Calculus.
Textbook: "Methods in Molecular Biophysics: Structure, Dynamics, Function" 1st Edition, by Igor N. Serdyuk et al. (Cambridge University Press)

Course Description

This course focuses on introducing the physics methods used in studying the conformations and dynamics of biological molecules and systems. The purpose of this course is to provide students with an understanding of the physics underlying the modern techniques used in biophysics, medical physics and biomedical sciences. Prior knowledge of calculus-based introductory physics and a solid background in advanced calculus are required. It is important to spend at least 6 hours or more outside of class each week on lectures, your notes and homework.

Course Purpose (Goals)

This is a required course for all physics graduate students with thesis research in biological physics. Graduate students from other physical science, engineering and other related disciplines that are interested in the use of physics tools to study the structure and dynamics of biomaterials are encouraged to enroll. The goals of this course are to introduce the physics of the techniques to study biological materials of different spatial and time scales, and the information that one can extract from physics-related techniques in biomedical research and modern biomedical instruments.

Course Outline

This course is divided into seven segments. Each segment will be covered in 1-2 weeks.

(1) Introduction of the tools for macro-, micro and single-molecule measurements.
(2) Optical Spectroscopy: UV/visible, IR, Raman and Fluorescence
(3) Scanning Probe Microscopy.
(4) X-ray, neutron and electron diffraction.
(5) Magnetic Resonance Spectroscopy and Imaging.
(6) Computational Biophysics.
(7) Diagnostics and Therapeutic Physics in Medicine.

Expected Learning Outcomes

Upon completion of this course, students will be able to:

(1) Know the principles of the techniques in Biophysics and Medical Physics fields.
(2) Apply the physics principles learnt in this class in their research and future career.
(3) Apply the knowledge of biophysics in public affairs and help improve higher education in the U.S.

Methods for assessing the expected learning outcomes
Examinations and grades; In-class responses by students; Evaluation of term-project via the written term-paper and 30-min oral presentation; Class discussions for assessing the assimilation of knowledge; Feedback from students after graduation about the usefulness of Biophysics.

Criteria for Grading
Homework assignments (20 points): Five homework assignments from the materials in the textbook and lectures will be given. The assignment will be due in two weeks. Each assignment is worth 4 points.

Mid-term Exam (20 points): A mid-term exam will be given after the due date of the third homework assignment. The format will involve both short-answer and analytical (calculation) formats.

Term-Project (40 points): A term-project is required in this course. It involves a written term-paper of at least 10 pages (including graphs and illustrations) and a 30-min oral presentation of the term-project. The topic of the project has to be closely related with the materials covered by this course and pre-approved by the instructor during the first month of the course.

Final Exam (20 points): A final exam will be given at the end of the course. It covers all the materials from the lecture and term-projects presented by the students.

Grade Scale: 100-A-86-B-72-C-58-D-44-F-0

Extra Credit policy: No extra credit is offered in this course.

Late Assignment policy: All assignments are considered late if the students fail to submit them at the beginning of class the day they are due. For each day (not including weekends) that assignments are late, a 5% deduction in the overall grade of that assignment will be enforced.

Attendance policy: Each unexcused absence or tardiness will lower the total grade in the class by 0.5 points. No make up exams will be granted. Please consult The Texas Tech University Catalog for the policy of excused absences due to religious observance, officially approved trips, or illness and death notification.

Academic Integrity
Academic Misconduct (OP 34.12): "*It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. The attempt of students to present as their own any work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offenders liable to serious consequences, possibly suspension.*"

Civility in the classroom: The students are expected to be respectful and attentive in class. More information about this topic is available on-line at
www.studentaffairs.ttu.edu/vpsa/publications/civility.htm

Students with Disabilities
Any student who because of a disability may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary accommodations. Student should present appropriate verification from AccessTECH. No requirement exists that accommodations be made prior to completion of this approved university procedure.