FLORIDA ATLANTIC UNIVERSITY™

Graduate Programs—NEW COURSE PROPOSAL

UGPC APPROVAL _____
UFS APPROVAL _____
SCNS SUBMITTAL _____
CONFIRMED _____
BANNER POSTED _____
ONLINE _____
MISC _____

DEPARTMENT NAME:
PHYSICS

COLLEGE OF:
CHARLES E. SCHMIDT COLLEGE OF SCIENCE

RECOMMENDED COURSE IDENTIFICATION:

PREFIX _____**PHZ**_____ **COURSE NUMBER** ____**5715**____ **LAB CODE** (L or C) _

(*TO OBTAIN A COURSE NUMBER, CONTACT ERUDOLPH@FAU.EDU*)

COMPLETE COURSE TITLE: **Introduction to Biophysics**

EFFECTIVE DATE
(first term course will be offered)
NA

CREDITS: 3

TEXTBOOK INFORMATION: Physical Biology of the Cell, Rob Phillips, Jane Kondev, Julie Theriot (Garland Science 2009).

GRADING (*SELECT ONLY ONE GRADING OPTION*): **REGULAR** ___X___ **PASS/FAIL** _____ **SATISFACTORY/UNSATISFACTORY** _____

COURSE DESCRIPTION, NO MORE THAN 3 LINES:
This course is a survey of the ideas and application of physics in the realm of biology. It is designed to be accessible to physics or biology students. The emphasis is on how the ideas of statistical physics can be used to give physical insights into complex biological problems with quantitative understanding and prediction.

PREREQUISITES W/MINIMUM GRADE:*	**COREQUISITES:**	**OTHER REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL):**
PHY 2054, PHY 2049, or equivalent.		

PREREQUISITES, COREQUISITES & REGISTRATION CONTROLS SHOWN ABOVE WILL BE ENFORCED FOR ALL COURSE SECTIONS.

*****DEFAULT MINIMUM GRADE IS D-.*

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE:
PHD IN PHYSICS

Other departments, colleges that might be affected by the new course must be consulted. List entities that have been consulted and attach written comments from each. **NA**

Andy Lau, alau@fau.edu 561-297-3380
Faculty Contact, Email, Complete Phone Number

SIGNATURES

Approved by:	***Date:***
Department Chair: _____	_____
College Curriculum Chair: _____	_____
College Dean: _____	_____
UGPC Chair: _____	_____
Dean of the Graduate College: _____	_____

SUPPORTING MATERIALS

Syllabus—must include all details as shown in the UGPC Guidelines.

Written Consent—required from all departments affected.

Go to: *http://graduate.fau.edu/gpc/* to download this form and guidelines to fill out the form.

Email this form and syllabus to sfulks@fau.edu and *eqirjo@fau.edu* one week ***before*** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website by committee members prior to the meeting.

Syllabus

Course title: Introduction to Biological Physics (3 credit hours)
Course number: PHZ 5715
Pre-requisites: PHY 2054, PHY 2049, or equivalent
Instructor: Dr. Andy Lau
Office: SE 104
Telephone: 297-3380
E-mail: alau@fau.edu

Required Text and Materials: A large portion of the course material is covered in the book by Rob Phillips, Jane Kondev, and Julie Theriot, *Physical Biology of the cell* (Garland Science, Taylor & Francis Group, LLC, New York, 2009.) If supplementary material is needed, this will be distributed in class.

Course Description: Perhaps, one of the most fundamental mysteries of Nature is the phenomenon of life. Not until the late 19th century, this mystery was thought to be beyond the grasp of the human mind when it was discovered that all life on earth share a common thread, and that is that we are made of cells. Living cells are complex machines that perform specific tasks via chemical and physical processes with a plethora of **macromolecules**, such as the famous DNA molecules, the carrier of genetic codes. Many of these macromolecules, such as molecular motors (myosin), are themselves machines and their workings are governed by physical laws. Therefore, there is reason to hope that physics may explain why they look and work the way they do. Although we are still very far from understanding life beyond the descriptive level, there has been, in the last two decades, a revolution in which biology strives to become a quantitative science.

This course is an introductory survey of the ideas and application of physics in the realm of biology. It will expose the students to key physical insights relevant to understanding the macromolecular machinery inside cells. We expect that students from very diverse backgrounds (undergraduate, graduate, physics majors, biology majors) will be enrolling in this course, and therefore, a substantial portion of the lectures will be descriptive and the technical level will be kept at a bare minimum.

Course Objectives: After completion of PHZ 5715, a student should have developed a clear understanding of the physical principles and a mastery of the mathematical techniques in solving biophysical problems, such as those arising from biopolymers, diffusion, and fluids at low Reynolds numbers. In addition, he or she is expected to be gain the necessary competence in doing research in biophysics.

Course Outline: Introduction to biological order, biochemistry; Stochastic methods, random processes; Static conformations of biopolymer, such as, DNAs, RNAs, protein, lipids, etc., and their description in terms of random walk; Diffusion equation; Fluids at low Reynolds numbers; various mechanisms of transport of biomolecules in and out of the membrane; self-assembly of lipids, bilayer membranes and vesicles, discussion of

various forces that keep biomolecules together; finally, important role played by computer simulation studies in biomolecular systems will be reviewed in 1-2 lectures.

Method of Instruction: The format of the course will be lectures, reading assignments, and homework assignments.

Grading Procedure: Final grade will be decided from (1) scores from 4-5 homework assignments [40%], (2) a 20-minutes presentation (during the end of the semester) on a topic of student's choice [40%], and (3) a cumulative final exam [20%]. Students who will attend the lectures regularly are expected to do well in the course.

Grading:	A: 100-93%	A-:92-89%	B+: 88-85%	B: 84-80%	B-: 79-76 %
	C+:75-72%	C: 71-68%	C-:67-65%	D+:64-60%	D: 59-56%
	D- : 55-50%	F: <50%.			

Bibliography:

P. Nelson, *Biological Physics: Energy, Information, Life*, Freeman (2005).
R. A. L. Jones, *Soft Condensed Matter,* Oxford (2002).
B. Alberts, *et al., Essential Cell Biology, 2nd ed.,* Garland, New York (2003).
J.N. Israelachvili, *Intermolecular and surface forces,* Academic, New York (1985) .
M. Doi, *Introduction to Polymer Physics,* Clarendon Press, Oxford (1986).

Make-up tests: If a student cannot attend an exam or hand in homework on time because of a legitimate problem, for example, because of a significant health, he or she can make up the respective assignment.

Academic integrity: Students are responsible for informing themselves about the Honor Code standards before performing any academic work. The link to more detailed information about academic honesty can be found at:
http://www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf.
Scholastic dishonesty includes, among other things: plagiarism, copying other's work during a test, and using notes during a test. Any test or written assignment for which you are caught cheating will be marked as a zero grade, and the incident will be reported in accordance with Honor Code regulations.

Students with disabilities: In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability affecting execution of coursework must register with the Office of Students with Disabilities (OSD) located in Boca in the SU, room 133 (561-297-3880) or in Davie in MD I (954-236-1222), and follow all OSD procedures.