Fall 2019

PHYS 350-001: Biophysics I - Quantitative Biophysics of Life

Gordon Thomas

Biophysics I: Quantitative Biophysics of Life

Physics 350-001; Fall 2019;
Fac. Mem. Hall 405. 1:00 - 2:20 M, W

Instructor: Gordon Thomas, Professor of Physics
Office: Tiernan 483, x3558
Lab: Tiernan B01, x5325

Synopsis: A view of how life works in terms of some basic concepts of physics. The course will discuss how simple mathematical concepts underlie topics ranging from birth to death, from touch to pleasure, from vision to beauty, and from a thought to a heartbeat.

Text: "Physics in Biology and Medicine," Paul Davidovits (3rd Edition, paperback and e-book, ISBN-13: **978-0123694119)**

Outcomes plan: Students will be able to do the following in Biophysics
- Formulate and describe experiments based on guided studies of the literature.
- Formulate protocols that test hypotheses and mathematical predictions.
- Take data that make scientifically valid tests of hypotheses and predictions.
- Demonstrate skill in working with a group in these tests.
- Create and present clear, concise and complete written reports of experiments.
- Create and present a similar talk

Themes
- Breathing
- Heart beats
- Blood pressure and heart attacks
- Electricity in the heart and brain

Assessment plan:
Final grade on the basis of the following weighting:
4 Reports 60%; 4 PPT slides 16%; 1 Talk 4%; 1 Final exam 20%.
Translate % values into final letter grades as follows:
F: <50; D: 50-54; C: 55-62; C+: 62-69; B: 70-75; B+: 75-79; A: >79

Academic integrity and honesty are important to both students and professors. NJIT requires that every professor bring cheating to the immediate attention of the Dean of Students. The NJIT Student Council condemns cheating and supports fairness.

Tentative schedule :

Date:	Topic	Assignments due
Section 1. Breathing		
Week 1: Sept. 4	**Intro and Treasure Hunt**	**Finds**
Week 2: Sept. 9 **Sept. 11**	**Ideas and plans**	**Hypothesis & prediction**
Week 3: Sept. 16 **Sept. 18**	**Oxygen measurement**	**Synopsis of text on breathing**
Week 4: Sept. 23 **Sept. 25**	**Refine & Discuss**	**Draft of Report 1** **Fit Equation for data**
Week 5: Sep. 30 **Oct. 2**	**Report**	**Refined reports** **Talks**
Section 2 Heartbeat		
Week 6: Oct. 7 **Oct. 9**	**Introduction & Planning**	**Talks** Predictions
Week 7: Oct. 14 Oct. 16	**Revise Plan & Start Experiment**	**Outline of report 2 Talks**
Week 8: Oct. 21 **Oct. 23**	**Experiment & Start Discussion**	**Report 2 due**
Week 9: Oct 28 **Oct. 30**	**Present Discussion**	**Talks**
Section 3 Blood Pressure		
Week 10: Nov. 4 **Nov. 6**	**Introduction & Planning**	**Talks & prediction**
Week 11: Nov. 11 **Nov. 13**	**Revise plan & Start Experiment**	**Poster due Talks**
Week 12: Nov. 18 **Nov. 20**	**Experiment & Start Discussion**	**Talks**
Section 4. Electricity		
Week 14: Dec. 2 **Dec. 4**	**Final Discussion**	
Week 15: Dec 9 last class	**Summary**	
Final grades posted: **Dec. 20**		**Final**

Written reports:

- Reports must be 3 pages including items 2-8 below, standard font, size 12, no cover sheet, and data in appendix in addition to 3 pages.

- Title, abstract and author: Clear identification of topic, author
- Introduction to your experiment with Medical application with reference to the source of your information.
- Hypothesis. Idea to test in your experiment.
- Protocol. Procedure: fully labeled diagram with terse explanation of physics
- Graph of results: data with sketch of expectations
- Conclusion. Discussion of physics and comparison of hypothesis with experiment, with reference to source of physics ideas

Talks: Same format as written reports

Parts of reports and talks	**Assessment**
Title and Abstract.	5
Introduction from lit.	20
Hypothesis	10
Protocol	15
Experimental data.	30
Conclusion.	20

Cite sources of information (books, articles or web addresses) and put quotes around words taken from sources. Not citing sources is plagiarism.

Instructor: Professor :Gordon Thomas; Tiernan 483
Office Hours: Mon 11:30 - 1:00 in T B01 (lab), and by arrangement
Phone: 973/596-3558 Email: thomasg@njit.edu

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