

Fall 2019

PHYS 204-001: Biophysics of Life

Gordon Thomas

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Biophysics of Life

Physics 204-001; Fall 2019;
Central King Building G08. 10:00 - 11:20 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 these non-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.
- Take data that make scientifically valid tests of hypotheses.
- 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
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Section 1. Breathing		
Week 1: Sept. 4	Intro and Treasure Hunt	Finds
Week 2: Sept. 9 Sept. 11	Ideas and plans	Hypothesis
Week 3: Sept. 16 Sept. 18	Oxygen measurement PBM/8.4-8.7	Synopsis of text on breathing
Week 4: Sept. 23 Sept. 25	Refine & Discuss	Draft of Report 1
Week 5: Sep. 30 Oct. 2	Report	Refined reports Talk
Section 2 Heartbeat		
Week 6: Oct. 7 Oct. 9	Introduction & Planning	Talks:
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 10/24 Talks
Week 9: Oct 28 Oct. 30	Present Discussion	Talks
Section 3 Blood Pressure		
Week 10: Nov. 4 Nov. 6	Introduction & Planning	11/7 Last day to withdraw
Week 11: Nov. 11 Nov. 13	Revise plan & Start Experiment	Talks
Week 12: Nov. 18 Nov. 20	Experiment & Start Discussion	Report 3 due. Talks
Section 4. Electricity		
Week 14: Dec. 2 Dec. 4	Final Experiment and Discussion	
Week 15: Dec 9 last class	Summary	
Final grades posted: Dec. 20		Final

Written reports:

- Reports must be 3 pages including oarts of reports 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 : Tiernan 483
Office Hours: Mon 11:30 - 1:00 in T B01 (lab), and by arrangement
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