

Virginia State University: Biophysics 481

Instructor: Nelson Marquina, PhD, DC

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Textbooks:

Introduction to Physics in Modern Medicine by Suzanne Amador Kane. Taylor & Francis, 2003.

Biological Physics: Energy, Information, Life by Philip Nelson. Freeman 2004.

Course Schedule

Jan 14: SK Chapter 1 (overview) and Math Review Notes

Jan 21: SK Chapter 2 (fiber optics) and SK Chapter 3 (lasers)

Homework: SK Problems 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8

Jan 28: SK Chapter 3 – continuation plus journal articles on laser biophysics

Homework: SK Questions 3.1 to 3.9 and Problems 3.1 to 3.5

Feb 04: Notes on Laser Biophysics

Homework: Critique of articles on the biophysics of lasers

Test 1: SK Chapters 1 to 3 plus journal articles on laser biophysics

Semester Paper: draft of scope and rationale due on Feb 04

Feb 11: PN Chapter 1 (thermodynamics in biology)

Homework: PN Problems 1.1, 1.2, 1.3, 1.4, 1.5, 1.6

Feb 18: PN Chapter 2 (physics of cell membranes)

Homework: PN Problems 2.2, 2.3, 2.4, 2.5

Semester Paper: final scope and rationale due on Feb 18

Feb 25: PN Chapter 3 (physical chemistry in biology)

Homework: PN Problems 3.2, 3.3, 3.4

Mar 03: Test 2: SK Chapters 1 to 3 plus PN Chapters 1 to 3

Mar 10: Spring Break

Mar 17: SK Chapter 4 (ultrasound)

Homework: SK Questions 4.1, 4.2, 4.3, 4.4, 4.6, 4.7; Problems 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.10, 4.11, 4.12, 4.13, 4.14

Semester Paper: Draft paper due on March 17

Mar 24: SK Chapter 5 (X-rays & CT scans)

Homework: SK Questions 5.1, 5.2, 5.6, 5.7, 5.10, 5.11; Problems 5.2, 5.3, 5.4, 5.5, 5.11, 5.12

Mar 31: SK Chapter 8 (MRI)

Homework: SK Questions 8.2, 8.5, 8.6, 8.7; Problems 8.1, 8.3, 8.4, 8.6

Apr 07: PN Chapter 6 (entropy, temperature and free energy in biological processes)

Homework: PN Problems 6.2, 6.3, 6.6, 6.7

Semester Paper: Final paper due on April 07

Apr 14: PN Chapter 11 (physico chemical process on cell membranes)

Homework: PN Problems 11.1, 11.2, 11.3

Apr 21: PN Chapter 12 (physico chemistry of the nerve impulse)

Apr 28: Final Exam: SK Chapters 4, 5 and 8; PN Chapters 6, 11 and 12

Grading

Test 1: 15%

Test 2: 25%

Final Exam 30%

Homework: 15%

Semester paper: 15%