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Physics 422 Spring 2023 Syllabus - Medical Physics

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CUNY City College

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Physics 315 Medical Physics

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Introduction to the structure, properties, and function the human body. In depth study of the physical laws which underlay human structure and function. Introduction to spectroscopic methods for physical examination including light absorption or scattering, ultrasound, magnetic resonance and positron emission tomography. Prereq.: 1 yr. of Math, 1 yr. of Physics 3 hr./wk.; 3 cr.

Required Text: Physics of the Human Body, 2nd edition. Irving P. Herman
(a pdf of this book is available for free through the CCNY library site)

Course Objectives:

- 1) To understand the physical laws which underlie the structure and function of the human body
- 2) To use these laws to understand and predict the effects of deleterious changes in body structure and function
- 3) Become familiar with the techniques with which human structures are interrogated

Grading:

- 30% Homework, class participation, quizzes
- 20% Class project
- 30% Midterms
- 20% Final

Homework will be distributed every Thursday – Due at the start of class Tues. No late homework will be accepted.

Class Project

Groups of 3-4 students will perform an experiment related to some aspect of the course and make a 5-minute video which:

- Fully explains the physics of the experiment
- Presents the results
- Calculates the difference between the experimental results and literature values

<u>Week of</u>	<u>Topic</u>
1/26	Course intro, Scaling in biology
<i>Section I: Biomechanics</i>	
1/31	Biostatics
2/7	Biomaterial properties of the body
2/14	Biomaterial properties of the body (<u>cumulative midterm #1 2/14</u>)
2/21	Biomaterial properties of the body
2/28	Fluids and circulation
3/7	Fluids and circulation (<u>teams and experiment plans picked</u>)
3/14	Heart function, EKG
3/21	Lungs and Breathing
3/28	Lungs and Breathing (<u>cumulative midterm #2 3/30</u>)

Section II: Physics of the Senses

4/4 Sound and hearing

Spring Break 4/5 – 04/13

4/18 Optics and Vision
4/25 Nerve Function (video drafts turned in)

Section III: Spectroscopic methods

5/2 X-ray, MRI, EEG
5/9 Class Video Screening

TBD FINAL EXAM – Cumulative

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Students who find themselves experiencing difficulties obtaining food every day or who lack a stable and safe place to live are urged to come to Benny's pantry for assistance (<https://www.ccny.cuny.edu/bennysfoodpantry>). Benny's pantry is located on the ground floor of the North Academic Center (NAC) and is open to anyone within the CUNY community (students, staff, faculty) in need of support. The pantry is open from 10am to 6pm and is self-serve. Additional emergency support for financial, health and housing needs are also available through Benny's. Please contact Dee Dee Mozeleski at dmozeleski@ccny.CUNY.edu or Charles Ramirez @ cramirez@ccny.CUNY.edu for additional details.