PHYS 2P50

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PHYS 2P50: Modern Physics

Course Outline 2022 (FW 2022/23 D2)

What this course is about:

We will be introducing concepts from the first part of the "Modern Era" of Physics, begining around 1905: special relativity, and the wave and particle aspects of both electromagnetic radiation and matter. Every other course you might take in Physics owes its origins to these discoveries.

Requirements:

In this course some simple integrals will be solved, so it is important that the students feel comfortable with the calculus covered in Y1 mathematics courses. Elementary classical mechanics is essential. As such, the prerequisites are: PHYS 1P21 or 1P91 (recommended); PHYS 1P22 or 1P92 (recommended); MATH 1P01 and 1P02, or MATH 1P05 and 1P06 (recommended).

Topics covered:

Special Relativity
- Relativity of Time, Length
- Lorentz Transformations
- Relativity of Velocity
- Doppler Effect for Light
- Relativistic Dynamics

Quantum Theory of Light
- Photoelectric Effect
- Blackbody Radiation
- Compton Effect

Wave Nature of Matter
- De Broglie's Hypothesis
- Heisenberg Uncertainty Principle

Quantum Mechanics
- The Schrodinger Equation
- Probability Density
- Examples in 1-D
- The Hydrogen Atom

Textbook:

Your textbook for this class is available for free online, in web view and PDF format or you can purchase a print version from OpenStax on Amazon. You can use whichever format(s) you prefer. Web view is recommended -- the responsive design works seamlessly on any device. If you buy on Amazon, make sure you use the link on your book page on openstax.org so you get the official OpenStax print version. (Simple printouts sold by third parties on Amazon are not verifiable and not as high-quality.)

University Physics Volume 3 from OpenStax, ISBN 1938168186,

Supplementary Reading:

Other textbooks on Modern Physics such as:

Modern Physics, 3rd Edition by Kenneth Krane

Times and Locations:

Lectures:

- Mon and Wed 10:00-11:30 am TH 257
- All deadlines and due dates will be given on the Sakai course page.

Tutorial:

- Tuesday 10:00 am-11:00 am TH 256

Instructor/TA Office Hours:

- TBA/by appointment

Note: Classes at Brock University end ten minutes ahead of the hour or half hour to facilitate transfer time.

Instructor:

Maureen Reedyk (MC B205, ext. 3877, e-mail: mreedyk@brocku.ca)

Teaching Assistant:

Mahdieh Gol Bashmani Moghadam, e-mail: mg18ll@brocku.ca)

Course Communications:

For class communications monitor your Brock email and the Sakai course page.

Learning Objectives/Outcomes:

To appreciate the relationships between results of experiments and theory and their role in developing the concepts of modern physics. To establish the vocabulary and concepts of modern physics pertaining to introductory relativity and quantum mechanics. To analyze and solve problems using oral and written reasoning skills both independently and in a group setting.

The marking scheme:

Component	Weight	
Reading Assessment Quizzes	10%	Total points earned will be divided by total points available and multiplied by 10%
WeBWorK Problems (exclusive of tutorial exercises)	15%	Total points earned will be divided by total points available and multiplied by 15%
Tutorial Exercises (Webwork and Written)	20%	Total points earned will be divided by total points available and multiplied by 20%
Test #1	15%	Wednesday Oct 19, 2022, 10:00 am -11:20 am (during lecture timeslot)
Test #2	15%	Wednesday Nov. 16, 2022, 10:00 am- 11:20 am (during lecture timeslot)
Examination	25%	You must obtain a grade of 40% or greater on the final exam in order to pass the course

Homework:

Homework problems and most tutorials are done using Brock's WeBWorK system, which can be accessed at WeBWorK. Scroll down the displayed list of courses, click on the course that you are enrolled in (PHYS2P50D02FW2022) and log on using your Brock username (of the form ab18cd) and password.

Important Dates:

The last date for withdrawal from this course without academic penalty is November 8, 2022. For other important dates see the Office of the Registrar's sessional or important dates.

Notes:

- No late reading assessment quizzes, WeBWorK or tutorial exercises will be accepted unless accompanied by medical documentation. See Medical Exemption Policy and the medical health certificate under forms and self-service.
- The tests and the examination will be based on material covered in the textbook, lectures, tutorials and webwork problems.
- In-person attendance at the tutorial session is mandatory to receive credit. You must bring a device capable of running Webwork.
- Topics may be covered in the assigned textbook readings, lectures, WeBWorK assignments and/or tutorials
- If your grade is less than 40% on the final exam your final grade can be no greater than 45. In this case, your reported final grade will be either your calculated final grade or 45, whichever is less.

Academic Policies:

Academic Integrity:

All students must comply with Brock's academic misconduct policies . Academic misconduct is a serious offence. The principle of academic integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should consult Section VII, "Academic Misconduct", in the "Academic Regulations and University Policies" entry in the Undergraduate Calendar, available at http://brocku.ca/webcal. Information on what constitutes academic integrity is available at https://brocku.ca/academic-integrity/ .

Intellectual Property Notice:

All slides, presentations, handouts, tests, exams, and other course materials created by the instructor in this course are the intellectual property of the instructor. A student who publicly posts or sells an instructor's work, without the instructor's express consent, may be charged with misconduct under Brock's Academic Integrity Policy and/or Code of Conduct, and may also face adverse legal consequences for infringement of intellectual property rights.

Special Accommodation:

The University is committed to fostering an inclusive and supportive environment for all students and will adhere to the Human Rights principles that ensure respect for dignity, individualized accommodation, inclusion and full participation. The University provides a wide range of resources to assist students, as follows:

- a) If you require academic accommodation because of a disability or an ongoing health or mental health condition, please contact Student Accessibility Services.
- b) If you require academic accommodation because of an incapacitating medical condition, you must, as soon as practicable, inform your instructor(s) of your inability to complete your academic work. You must also submit a Brock University Student Medical Certificate (found at https://brocku.ca/registrar/toolkit/forms). The University may, at its discretion, request more detailed documentation in certain cases. If you are unable to write a scheduled examination due to an incapacitating medical condition, you must follow the process set out in the Faculty Handbook III:9.4.1.
- c) If you are experiencing mental health concerns, resources can be found here.
- d) Information regarding the Student Wellness and Accessibility Centre can be found here.
- e) If you require academic accommodation on religious grounds, you should make a formal, written request to your instructor(s) for alternative dates and/or means of satisfying requirements. Such requests should be made during the first two weeks of any given academic term, or as soon as possible after a need for accommodation is known to exist.
- f) Information regarding Human Rights and Equity can be found here.

COVID 19:

All students are expected to comply with Brock Covid-19 policies. Information can be found here.

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