



Course Syllabus

PHYSICS 212: Physics and Everyday Thinking

Fall Semester, 2023

Instructor:	Dr. Steven Sahyun
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WWW:	http://sahyun.net/courses/physcs212
CANVAS:	http://www.uww.edu/CANVAS
Class Meetings:	M W F 10:00 – 11:45 a.m. See the attached schedule and at: http://sahyun.net/courses/physcs212/schedule.pdf for class meeting dates, class topics, homework and exam dates.
Course Modality:	This course is Face-to-Face instruction.
Exams:	There will be three mid-term exams and one final exam. Exams will be on-line with due dates given on the attached schedule for homework and mid-term exam dates. Final: Monday December 12, 10:00 a.m – 12:00 noon.
Office Hours:	M W 9:00 am – 9:50 am; M 3:30 – 4:30 pm; T 11:00 – 11:50 am and 3:00 – 4:00 pm or by appointment.
Required Text:	Next Gen PET Units packet available at the UWW bookstore: <i>Interaction and Energy; Interactions and Forces; Magnetism and Static Electricity; and Light</i> , (2017) SDSU Research Foundation, Activate Learning.
Supplemental Text:	Hewitt, <i>Conceptual Physics 11th ed.</i> (Text Rental)

Math Pre-requisite: MATH 139 or MATH 141

Course schedule note: This course has an integrated laboratory experience throughout the curriculum. The laboratory session listed in WINS is for scheduling and accounting purposes. **There is no distinction between class “lecture” and “laboratory” days as indicated in WINS.** Extensive information about the course pedagogy may be found at: <https://nextgenpet.activatelearning.com/studio-style-class#>

Required materials: You will need to purchase the unit pack consisting of seven “*Next Gen Physical Science & Everyday Thinking*” workbook units (EM, PEF, FM, CF, M, SE and L) from the UWW Bookstore; the price is about \$100 for the set. **Movies, simulation links, and homework referenced in the book are on-line at:** <http://nextgenpet.sdsu.edu/sc/index.html> as well as from links posted on CANVAS. This site contains links to homework and videos used in the homework as well as many other resources. Quizzes referenced in the homework are found on the course CANVAS site.

You may also wish to bring paper, colored pencils, and a scientific calculator (one with trigonometric and logarithmic functions, scientific notation, etc.) Other course materials will be distributed to you as needed during the course.

Course Description:

This one-semester introduction to physics is an activity-based hands-on learning course that focuses on conceptual understanding of physics phenomena. This course emphasizes a student-oriented pedagogy in order to develop understanding of various physics concepts and of the nature of science. K-8 elementary education students will find this course particularly helpful as this course explores ideas related to how children and students learn physics. Topics covered include motion, forces, energy, light, heat, electricity, and magnetism.

Course Content Description and Essential Learning Outcomes:

In this course, students will develop understanding of physics through the process of model development and activities throughout a series of modules.

In MODULE MSE: Developing Models for Magnetism and Static Electricity (Unit M), students will iteratively propose, test, and revise models for magnetism. In Developing a Model of Static Electricity (Unit SE) students will use a model-building process for static electric phenomena, where they will develop models to account for the behavior of non-conducting and conducting materials.

In MODULE IE: Interactions and Energy (Unit EM) students will explore energy concepts in various interactions, including contact interactions (pushes, pulls, and friction), heat interactions and electric circuits. Students will gain an understanding of the conservation of energy between multiple objects. With Potential Energy and Fields (Unit PEF) students will explore potential energy with elastic objects and non-contact forces (magnetism, static electricity, and gravity) and fields.

In MODULE IF: Interactions and Forces. Force Model of Interactions (Unit FM) students investigate interactions, forces, and motion for single forces, and falling objects. Students synthesize the effects of mass and force strength into Newton's Second Law. Combinations of Forces (Unit CF) students will examine combinations of forces to arrive at the idea of net force (and Newton's First Law), frictional forces, the vertical motion of falling objects with air resistance and Newton's Third Law.

MODULE WSL: Waves, Sound and Light. Students will describe waves and wave motion, and explore phenomena involving visible light using a ray model: pinholes and shadows, reflection, refraction, and color.

This course is a GenEd Elective in the Natural Sciences – Laboratory (GL)

This course will explore the phenomena of the natural world in the context of everyday life and contemporary problems. Through a variety of disciplines, this course will encourage curiosity and appreciation of scientific discovery and inquiry through the examination of scientific processes. Students will develop their ability to read and comprehend scientific information and use that information to make judgements and draw appropriate conclusions about its influence on the world around them.

Additionally, this GL course will include hands-on scientific experimentation in which the students will perform scientific processes to collect and/or analyze data to answer scientific questions. Students will understand the process of obtaining and evaluating scientific knowledge and how it impacts society and technological growth.

Through these course activities and assessments you will develop skills in Critical and Creative Thinking, Communication and Quantitative Reasoning.

ATTENDANCE AND PARTICIPATION:

You are expected to attend class and participate. This is a participatory course and group participation is not only important for your own learning, but for the learning of your group members. By engaging in meaningful discussions with your group members, by actively participating in whole class discussions, and by performing interesting experiments, you will develop with your classmates a set of ideas. Similar to the way in which scientists develop ideas, your ideas will be based on *evidence* gathered from the experiments you do. At appropriate times, you will be able to compare your ideas with those developed by scientists. It is expected that except for some special jargon, the ideas you develop with the class should be quite similar to the scientists' ideas.

There will be participation credit of 1 point per class up to a maximum of 30 points total (out of 36 counted days).

Because you will play such an important role in your own learning, **and especially the learning of your classmates, you are expected to come to class on time, come prepared, and participate every class period.** All personal electronic devices (e.g., cell phones, pager, iPods, etc.) **MUST** be turned off when not directly used for class-related activities. Be considerate to your group and **DO NOT TEXT** while in class. If your cell phone is not being used for class activities, I request that you put it in a box.

In order to encourage a classroom environment where the free exchange of ideas is possible, video and audio recording must be limited to that done for educational purposes. Prior instructor permission and notification of fellow students is required for any video or audio recording.

HOMEWORK:

Homework will be due almost every class period (see schedule) and consists of two parts: Written assignments and on-line quizzes. If the schedule is modified, I will post the changed schedule on the course Web site. Sometimes the homework will be discussed during the class period when it is due. Please ask if you have any questions about the homework. You may discuss assigned homework on the course CANVAS site. Written **Late** homework may receive up to half credit if turned in within one class of the due date. CANVAS **quizzes** may **NOT** be completed late so do them early!

Note: **ALL** of the assignments will require you to have access to a computer with an Internet connection in order to access simulator programs and movies. If you do not have a computer at home, or your computer cannot access the information, there are several computer labs on campus, or you can use the computers in our classroom before or after class. For homework and in-class activities requiring Internet access, the appropriate link will be available on the course CANVAS page.

It is your responsibility to locate and test the simulator and other applets located on the Web used in the course assignments before the assigned date to avoid any technical difficulties.

GRADING CRITERIA AND TENTATIVE DATES:

Course grades will be determined by the percentage of total points assigned for the course.

93% = A,	80% = B-,	67% = D+,
90% = A-,	77% = C+,	63% = D,
87% = B+,	73% = C,	60% = D-,
83% = B,	70% = C-,	< 60% = F.

The **approximate** distribution and estimated number of points are:

Course component	Point value	%
IE test	30	10%
IF test	30	10%
MSE test	30	10%
WL & Final	60	21%
Papers on covered topics	30	10%
On-line Homework and Quizzes	76	27%
Class Participation	30	10%
Total points =	286 points	

See the attached schedule for Exam and assignment dates.

Exams: There will be three mid-term exams as well as a comprehensive final. Exams may only be taken on the assigned day and may not be taken at other times. Questions for the exams will be similar to submitted homework problems and to problems in the in-class activities. See the class CANVAS site for sample exam questions.

You will be provided with a TI 30X IIS or similar calculator for use during exams. If you have a similar calculator to use as an alternate, it must be checked and approved by the instructor **before** the exam. No other electronic devices are allowed during exams. **NO CELL PHONES ARE ALLOWED DURING EXAMS.** You will not be allowed to use a cell phone as a calculator during the exams or have your cell phone available.

I reserve the right to adjust grades slightly based on class participation. There will be a few extra credit opportunities posted on CANVAS and other occasional opportunities for extra credit may arise. Extra credit is limited to 10 points. Extra credit must be submitted in the CANVAS dropbox and must be submitted before the last class.

In the event of university closure (for example due to flu), I will attempt to post videos of relevant in-class experiments on CANVAS. In such an event, group discussions would occur on-line in the CANVAS forum area. Homework would be submitted to the CANVAS dropbox.

CANVAS Grade book: Grades (exams, papers, and the homework total) will be posted on CANVAS as a **courtesy** and are for your information so that you can check that all your items have been accounted for. The CANVAS grade book is not the definitive score

as transcription errors can occur, but it should match my personal grade book. Please inform me if you notice any errors. The homework and extra-credit totals will only be occasionally updated; I will try to update the grades at other times if requested.

Campus Policies and Practices Statement

Course Policy Regarding Video/Audio Recording:

In order to encourage a classroom environment where the free exchange of ideas is possible, video and audio recording must be limited to that done for educational purposes. Prior instructor permission and notification of fellow students is required for any video or audio recording.

The University of Wisconsin-Whitewater is dedicated to a safe, supportive, and non-discriminatory learning environment. It is the responsibility of all students to familiarize themselves with UWW policies regarding: Special Accommodations, Academic Misconduct, Religious Beliefs Accommodation, Absence for University Sponsored Events, the "Rights and Responsibilities" section of the Undergraduate Catalog or the "Academic Requirements and Policies" section of the Graduate Catalog, the "Student Academic Disciplinary Procedures" (UWS Chapter 14), and the "Student Non-academic Disciplinary Procedures" (UWS Chapter 17). Federal law requires all university employees to report information obtained during the course of their duties regarding sexual misconduct, including domestic and dating violence, unless otherwise exempt by state law. For more information, including on how to report an incident, see <http://www.uww.edu/sexual-misconduct-information>. If you have questions or concerns, you are encouraged to talk with your course instructor or department chair.

COVID related Policy: See the UW-Whitewater for the latest campus policy related to COVID.

Tentative Course Schedule. See updates on CANVAS or at:
<http://sahyun.net/courses/physcs212/schedule.pdf>

Tentative Physics 212 Schedule				Fall 2023	
Week	Class Day	Date	Unit and Topic	Unit Activity	Homework DUE
1	1 Wed	6-Sep	Introduction, Teaching and Learning	Intro, TL1	
	2 Fri	8-Sep	Unit M: Model of Magnetism	M A1 A2	TL: Ext A, B
2	3 Mon	11-Sep	Exploring Magnetic Effects	A2 A3	
	4 Wed	13-Sep	Initial Model of Magnetism	A3 TL2, 3	M: Ext A
	5 Fri	15-Sep	Better Model for Magnetism	A4	TL: Ext E, F
3	6 Mon	18-Sep	Explaining Magnetic Phenomena	A4 A5	M: Ext B
	7 Wed	20-Sep	Unit SE: Model of Static Electricity	SE A1 A2	M: Ext C
	8 Fri	22-Sep	Representing Uncharged Objects	A3 A4	SE: Ext A, B
4	9 Mon	25-Sep	Model for Different Materials	A5 A6	SE: Ext D, E
	10 Wed	27-Sep	Exam I - online	Exam	Paper 1
	11 Fri	29-Sep	Unit EM Energy Model of Interactions	EM A0 A1	
5	12 Mon	2-Oct	Motion and Energy	A2 A3	EM: Ext A
	13 Wed	4-Oct	Slowing and Stopping	A3 A4	EM: Ext B
	14 Fri	6-Oct	Warming and Cooling	A4 A5	
6	15 Mon	9-Oct	Keeping track of Energy	A6 A7	EM: Ext D, E
	16 Wed	11-Oct	Conservation of Energy	A7 A8	EM: Ext G
	17 Fri	13-Oct	Unit PEF: Potential Energy and Fields	PEF A1	EM: Ext I
7	18 Mon	16-Oct	Comparing Magnetic and Elastic	A2 A3	
	19 Wed	18-Oct	Gravitational Interactions	A3 A4	PEF: Ext A, B
	20 Fri	20-Oct	Electromagnetic Interactions	A4 A5	PEF: Ext C
8	21 Mon	23-Oct	More electromagnetic interactions	A5 A6	PEF: Ext D, E
	22 Wed	25-Oct	Exam II - online	Exam	Paper 2
	23 Fri	27-Oct	Unit FM Force Model	FM A1 A2	
9	24 Mon	30-Oct	Continuous Force	A2 A3	FM: Ext A
	25 Wed	1-Nov	Slowing and Friction	A3 A4	FM: Ext B
	26 Fri	3-Nov	Changing Force and Mass	A4 A5	FM: Ext C
10	27 Mon	6-Nov	Falling Objects	A5 A6	FM: Ext D
	28 Wed	8-Nov	Force summary	A6 A7	FM: Ext E, TL: J
	29 Fri	10-Nov	Unit CF Combinations of Forces	CF A1	
11	30 Mon	13-Nov	Balanced Forces	A2	CF: Ext A
	31 Wed	15-Nov	Comparing Forces	A3	CF: Ext B, C
	32 Fri	17-Nov	Explaining using Forces	A4 TL3	CF: Ext D, E
12	33 Mon	20-Nov	Exam III - online	Exam	Paper 3
Wed 22-Nov Fall Break					
Fri 24-Nov Fall Break					
13	34 Mon	27-Nov	Unit W Waves	Waves & Sound	
	35 Wed	29-Nov	Unit L Light	L A1	WS: Ext A
	36 Fri	1-Dec	Shadows	A2	L: Ext A
14	37 Mon	4-Dec	Reflection	A3	L: Ext B
	38 Wed	6-Dec	Refraction	A3 A4	TL: Ext P, Q
	39 Fri	8-Dec	Color	A4 A5	TL: Ext R, S
15	40 Mon	11-Dec	Final Exam 10:00 a.m. - 12:00 noon		

