PHYS 245-001 Spring 2020
Syllabus

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Original Syllabus, see below for revised version

Course Goals: The basic goal of this course is for students to understand the concepts of electricity, magnetism, optics, and modern physics. The course meets GMU's core requirements.

Prerequisites: Successful completion of PHYS 243 or equivalent, a college-level math course, and a working knowledge of algebra and trigonometry. Students who received a D in PHYS 243 are cautioned against taking PHYS 245.

Required Text: OpenStax's College Physics by Urone, Hinrichs, et al. Chapters 18→32 will be covered. This textbook is available at no cost at https://openstax.org/details/books/collegephysics.

Mason Core: The Mason Core natural sciences courses engage students in scientific exploration; foster their curiosity; enhance their enthusiasm for science; and enable them to apply scientific knowledge and reasoning to personal, professional and public decision-making.

Mason Core Learning Outcomes:

- Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding: a) evolves based on new evidence, and b) differs from personal and cultural beliefs.
- Recognize the scope and limits of science.
- Recognize and articulate the relationship between the natural sciences and society and the application of science to societal challenges (e.g., health, conservation, sustainability, energy, natural disasters, etc.).
- Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).

General Course Policy:

- Class will start on time. Come on time, and be prepared to start working.
- This class requires active participation by you. You are expected to think, and write, and share, and ask questions, and in general be engaged while you are here.
- My class policy is: **NO LATE COMERS AND NO LEAVING IN THE MIDDLE OF THE CLASS.** Entering and leaving in the middle of the class is extremely distracting and discourteous to your fellow students as well as to me.
- Be respectful of yourself and others in the class. Don't talk during class about things that aren't class related; when working in groups, keep voices to a low level so all can communicate; don't denigrate others' work or ideas. Give everyone in your group a chance to speak and contribute.
- You must turn off your cell phones before you enter classroom (unless there is a potential emergency involved, in which case you should inform me that such disruption may occur and sit yourself in such location in the classroom where it will affect other students the least). Anyone

whose electronics disturbs the class will be penalized 1% of the overall course grade each time it happens.

- Please be aware that if you are disturbing the lecture, I will ask you to stop. If laptops prove to be too distracting, I will ban their use by all or by specific individuals or for all, except at specified times**.**
- ***Never hesitate to ask questions.*** *There are no dumb questions, only ignorance as a result of failure to seek an answer. Your suggestions for improving the course are also requested. You have a valuable perspective on the class, and I want to hear it and learn from it.*

Class Components:

Lectures **There will be no make-up lectures**

The lectures will follow the subjects as shown in the course schedule at the end of this document. Major changes to the schedule will be announced in class and posted on Blackboard. As the instructor in this course, I am your guide through the territory of physics. I will not be pouring facts into your head. **You must do the thinking and the learning: I can only assist and provide guidance and clarity.** Part of your task as a participant in this course is to help me identify the most difficult material and to help interpret that material for you and your classmates.

You are responsible for all the material covered in lecture and in the textbook as well as in any additional resources I may assign. In addition, you are responsible for any announcements (including exam information and scheduling changes) made in class. Oral announcements made in class are binding and it is your responsibility to find out what has occurred in any class you might have missed.

Keep in mind that this class is cumulative, so if you miss a class, read the book or you will not be able to follow the next one.

Homework **There will be no make-up homework**

Homework is very important to reinforce the material you study and to practice. There will be homework assignments for each week, so be prepared to spend a lot of time doing homework for this class. Homework will generally due on Sunday nights, but you are encouraged to do as much as possible before the weekend, since I and the LAs and the Tutor will not be around on weekends to answer your questions. Also, if you leave it to the last moment you will likely run out of time. Each distinct weekend assignment should take you about 1 hour of work.

Chegg: There is a strong temptation to use Chegg to get a better grade on homework: **DO NOT DO IT**. The thinking is like this: I will struggle in this class and I need every single score boost I can get. This is a faulty reasoning leading to failure. Physics is not a spectator sport, you need to put in the time to solve the problems even if you are unable to arrive at the solution. The only way you get better in physics is to try to solve physics problems yourself. **Problem solving practice is the secret ingredient for passing this class.** You are better off not completing any single homework assignment and trying to solve all the problems and in the process getting better and able to pass the exams, than getting the full homework grade using Chegg and failing the tests. **Even if you get the impression you do understand how to solve the problems by using Chegg, you will not be prepared for the exams – I have seen it time and again. If you struggle with homework, I, the LAs, and the Tutor are here to help. Email me, come to office hours, go to LA review sessions, use the free tutoring services.**

Modified Mastering Physics: (http://www.pearsonmylabandmastering.com/northamerica/masteringphysics/) **Homework** assignments require access to the Mastering Physics problem solving system. You may purchase access with the text or separately online. The Mastering Physics registration cost covers PHYS

243 and 245 for two years. Register to the Modified Mastering Physics using Blackboard only and **do not use the original class code provided**.

Please make sure that you get the access code for **Modified** Mastering Physics. The access codes are generally not refundable, so be careful.

You should consult the homework schedule on Mastering Physics several times a week for the due dates of homework assignments and unit quizzes in Blackboard. I will post the homework assignments and quizzes at least a week before they are due. The penalties for finishing the assignment increase daily up to a maximum of 30%. It should be noted that these penalties only apply to the part of the assignment that is not completed by the deadline. I reserve the right to change these penalties with sufficient notice. You may work with other students on the weekly homework assignments and unit quizzes but it would be cheating if another student actually entered answers for you or signed on to your account. The homework will be mainly problems and the answers will be randomized. These homework assignments may include some non-credit practice materials at the end. They will be listed as counting zero points. They will mainly be tutorials that I want to make available to you but do not require.

The unit quizzes will have about 10 multiple choice questions that are randomly selected from a pool of questions. The idea is that you review the lecture notes and then take the quiz to test your understanding. They will help you practice for the multiple choice tests in this class.

Computer Equipment: The hardware and software requirements for using Blackboard are available on the course site. The course notes are in Powerpoint so if you don't have that software you will need to download a free reader.

Grade Calculation: There will be two problem tests and 2 multiple choice tests during the semester and a comprehensive final. Except for the final, multiple choice testing will be done in the Testing and Tutoring Center (Room 2 of Planetary Hall). **Final Exam: The final exam is scheduled for TBD.** The final exam will be comprehensive covering almost all chapters. There will be extra emphasis on chapters not covered on any of the tests. The final will include worked-out problems and multiple choice.

Tests: During the semester, there will be two problem tests and two computerized multiple-choice tests for a total of 4 tests. The lowest test grades will be dropped.

Comprehensive Final	**20%**
Tests (best 3 out of 4 counted, 15% each)	**45%**
Recitation	**10%**
Assignments on MasteringPhysics	**15%**
Unit Quizzes on Blackboard	**10%**

Since the lowest test grades (out of four) will be dropped, no rescheduled problem tests will be allowed for any reason. Consideration will be given for missed multiple-choice tests for well-documented excuses. Since the multiple choice test will be available for almost a week, there will be a penalty for most late tests even with an excuse. It is important that you be on time for problem tests since it will be difficult to give extra time if you are late.

In the event of an unforeseen school closing on a test day, the test will be given at the very next recitation session after the university reopens. If the weather forecast indicates a strong possibility of heavy snow, hurricane etc., I might decide to postpone the test until the next meeting. The course Blackboard page will have any announcements posted as soon as possible.

Grading schema: The letter grading schema is as listed below:

Grades Scored Between				Will Equal
97	% and	100	%	A+
94	% and Less Than	97%		A
90	% and Less Than	94%		A-
87	% and Less Than	90%		B+
84	% and Less Than	87%		B
80	% and Less Than	84%		B-
77	% and Less Than	80%		C+
74	% and Less Than	77%		C
70	% and Less Than	74%		C-
60	% and Less Than	70%		D
0	% and Less Than	60%		F

There will be no grade roundups at the end of the semester, not even for 0.0001%. Once the game is played, the goalposts cannot be moved. I can advise you on strategies to maximize your grade during the semester.

Curving: Each problem solving test will be curved if the middle score student fails to earn a B. **The multiple choice tests and final are not curved.** The curve will boost everyone's score such that the middle score (excluding the students who do not take the test) of the class earns the last B in the test. So on each test at least 50% of the students will get an A or a B. The curve will not be applied to missed tests earning a zero or to tests with cheating penalties.

Partial credit: Partial credit is given only to incomplete or wrong solutions which are conceptually sound.

Tests and Exams: The tests in this course will be multiple choice and free-form problems. Equation lists will be provided for the final exam and all tests.

Problem Tests: The problem tests will consist of about three free-form problems with multiple parts. Each problem requires a complete solution starting from basic formulas and with all steps shown. Free-form problems will be similar to recitation problems, examples worked in the notes, problems from old tests and examples from the book. The exams will test both your understanding of concepts as well as

your ability to solve problems. Time is likely to be a factor for many students, so you must budget your time carefully on tests.

Problem tests will be returned to students a week after the exam at the start of the next lecture. You are encouraged to review each test when you receive and request a re-grade of a specific problem if you think that a grading mistake has been made. This request must be made in writing on a separate sheet of paper and include a signed pledge that you have not written anywhere on the test. Also, since memories fade as to how much credit was taken off for a particular mistake, any request for re-grades must be made within three weeks of the first day the test was returned. It should be remembered that a re-grade could result in a lowered score, especially in the case of frivolous requests. Do not write anything on the test paper. I take a photo of every test page to prevent cheating so don't even consider altering the test paper.

Multiple Choice Tests in the Testing and Tutoring Center: Randomized multiple choice tests will be given in the Testing and Tutoring Center. To take a test you must have access to your account on Blackboard. A schedule of times when each multiple choice may be taken will be posted on the website. The questions will be randomized to make cheating difficult. Paper is limited in the center and only non-programmable calculators without wireless capabilities may be used. If technical problems occur at the testing center, I reserve the right to make adjustments to the way I handle the multiple choice part of the tests.

The testing center has a limited seating capacity and you will be assigned a specific date to take the test. **If your last name starts with A-G you will be in Group 1. If your last name starts with H-P you will be in Group 2. If your last name starts with Q-Z you will be in Group 3.** Individual date changes can be approved ahead of time. The testing center is open from 12 to 7pm every day except Sunday (when it is closed), and Friday (when it is open from 9am to 7pm). The testing center is located in the basement of Planetary Hall.

Please note: There are no makeup exams. If you miss an exam you get a zero.

- If you know you must miss exams, then **don't take this class.**
- Exam dates will only be changed under extreme circumstances. If the University closes due to weather or any other reason, exams scheduled on that date will be rescheduled. Check the University and class web sites.
- **Students with disabilities:** Please contact The Office of Disability Services (SUB I, Room 222, Phone 703-993-2474) if you have a learning or physical disability that will require accommodation in this class. You must obtain the proper paperwork as soon as possible and contact me during the first week of classes so that I can accommodate your needs throughout the course.

Online Office hours: Office hours will be held in person.

Recitation: ALL STUDENTS REGISTERED FOR THE LECTURE MUST ALSO BE REGISTERED FOR ONE OF THE RECITATION CLASSES. RECITATION IS MANDATORY. Students must attend recitation sections for which they are registered unless they have permission.

Letters of Recommendation: If you are in a situation where it may be necessary to request a letter of me, you must schedule several meetings with me during the semester so that I can get to know you better. This does not obligate me to write a letter; nor does it obligate you to request one. If you wish to have this interview, you must contact me by e-mail before October 4, to schedule a meeting.

Academic Integrity: You are expected to observe the GMU Honor Code on tests and exams. Cheating on exams will be dealt with very severely. It can even result in your dismissal from the University. There

should be no communication of any kind between students during tests and exams. If you don't understand a question, please ask the instructor.

Any form of cheating on an activity, project, or exam will result in zero points earned. "Cheating" includes, but is not limited to, the following: looking at others' exam papers, having ANY paper visible (including under your seat) when not allowed, ***having ANY electronic device visible*** (including electronic devices in or on your ear, cell phones, etc), talking with another student during an individual assignment. If you have questions about when the contributions of others to your work must be acknowledged and appropriate ways to cite those contributions, please talk with the professor or utilize the GMU writing center.

There are no bathroom breaks during exams: once you leave the room you are done.

You may work with other students on all MasteringPhysics assignments and unit quizzes but it would be cheating for anyone to submit answers for you or sign in to your account.

University Resources

Counseling and Psychological Services offers psychological services, a variety of learning services, multicultural services, and educational programs that support students' educational goals. They also offer faculty and staff consultation about how to help students who are experiencing difficulties that impact their learning, including how to respond to students in crisis.

English Language Institute holds workshops for students whose first language is not English.

Mathematics Tutoring Center offers tutoring on a walk-in basis for all George Mason students enrolled in math courses up to MATH 290

Office of Alcohol, Drug and Health Education Services provide health-related information, education and training, and resources for the Mason community.

Office of Disability Services implements and coordinates reasonable accommodations and disability-related services that afford students with special needs equal access to university programs and activities.

Office of Diversity Programs and Services serves students, cultural organizations, and the Mason community by promoting an environment that fosters and values human understanding and diversity. The office seeks to provide services and programs that will instill university-wide appreciation for diverse perspectives and ensure equal levels of inclusion, participation, and retention of underrepresented student groups in their quest for a quality education. **Sexual Assault Services** provides direct services for survivors of sexual assault and sexual assault education and information to the university community. All services are available to survivors, and to their families, significant others, and friends at no cost.

Student Health Services provides high quality health care, counseling, education and prevention services in support of student learning and retention.

Schedule: I have set up the schedule below that shows when you should start to cover the material for each unit. The schedule listed below is subject to change, although test dates would only be changed under extreme circumstances. There will also be a multiple choice test which must be completed at the Testing and Tutoring Center. It may be necessary to change test coverage or recitation assignments; you are responsible for being aware of any such changes. Major changes will be announced in class and posted on Blackboard.

PHYS 245 Spring 2020 Schedule

(reserving the right to change)

Week	Day	Date	Class	Book sections

1	M			
	W	1/22/2020	1	Charge and Field
	F	**1/24/2020**	2	Charge and Field
2	M	1/27/2020	3	Electric Potential
	W	1/29/2020	4	Electric Potential
	F	**1/31/2020**	5	Current, resistance
3	M	2/3/2020	6	Current, resistance
	W	2/5/2020	7	Circuits
	F	**2/7/2020**	8	Circuits
4	M	2/10/2020	9	Magnetism
	W	2/12/2020	10	Magnetism
	F	**2/14/2020**	11	Induction
5	M	2/17/2020	12	Induction
	W	2/19/2020	13	Review for Test 1
	F	**2/21/2020**	14	**Test1**
6	M	2/24/2020	15	Waves
	W	2/26/2020	16	Waves
	F	**2/28/2020**	17	Sound
7	M	3/2/2020	18	Sound
	W	3/4/2020	19	EM Waves
	F	**3/6/2020**	20	Geometric Optics
8	M	3/9/2020		No Class, Spring break
	W	3/11/2020		No Class, Spring break
	F	**3/13/2020**		No Class, Spring break
9	M	3/16/2020	21	Geometric Optics
	W	3/18/2020	22	Optical Instruments
	F	**3/20/2020**	23	Optical Instruments
10	M	3/23/2020	24	Wave Optics
	W	3/25/2020	25	Wave Optics
	F	**3/27/2020**	26	Review for Test 2
11	M	3/30/2020	27	**Test2**
	W	4/1/2020	28	Relativity
	F	**4/3/2020**	29	Relativity
12	M	4/6/2020	30	Relativity
	W	4/8/2020	31	Quantum Physics-Superposition
	F	**4/10/2020**	32	Quantum Physics-Bell
13	M	4/13/2020	33	Atomic Physics
	W	4/15/2020	34	Atomic Physics
	F	**4/17/2020**	35	Quantum Physics
14	M	4/20/2020	36	Nuclear Physics
	W	4/22/2020	37	Nuclear Physics
	F	**4/24/2020**	38	Applications

15	M	4/27/2020	39	Applications
	W	4/29/2020	40	Review for Final
	F	**5/1/2020**	41	Review for Final
16	M	5/4/2020	42	Review for Final

Final Exam Info: TBD

Title	
Event Type	
Reference	
Event State	
Primary Organization	
Summary	

Updated Syllabus
I retain the right to make additional changes as needed

New schedule

				No Class, coronavirus emergency
				No Class, coronavirus emergency
				No Class, coronavirus emergency
9	M	3/23/2020	21	Geometric Optics
	W	3/25/2020	22	Optical Instruments
	F	**3/27/2020**	23	Optical Instruments
9	M	3/30/2020	21	Geometric Optics
	W	4/1/2020	22	Optical Instruments
	F	**4/3/2020**	23	Optical Instruments
11	M	4/6/2020	27	**Review Test2**
	W	4/8/2020	28	**Test2**
	F	**4/10/2020**	29	Relativity
12	M	4/13/2020	30	Relativity
	W	4/15/2020	33	Atomic Physics
	F	**4/17/2020**	34	Atomic Physics
13	M	4/20/2020	35	Quantum Physics
	W	4/22/2020	36	Nuclear Physics
	F	**4/24/2020**	37	Nuclear Physics
14	M	4/27/2020	38	Applications
	W	4/29/2020	39	Applications

	F	**5/1/2020**	**Review Test3**
15	M	5/4/2020	**Test3**

In the transition period I have tried to use Blackboard Collaborate Ultra to communicate with students. The results were poor due to network bandwidth issues. For example Sundays I have no issue whatsoever with Bb collaborate, but during the week, since everyone is at home in my neighborhood and accessing the network, I get low network performance warning and I could not hear the students speaking. The alternative was to use the phone bridge number, but even in this case in one instance the number was busy, and the phone could not connect. **As such I am changing the format of the class to accommodate for network issue:**

I am recording all lectures using Kaltura and I am posting the videos in Bb under Instruction videos. It takes a long time to make the videos, and sometimes I make mistakes in the videos. I am not re-recording the videos, but instead I am posting corrections and other relevant information below each video.

During regular lecture time I will hold Q&A sessions only. **I will not hold office hours anymore, see below on how to communicate with me on a continuous basis.**

For exam reviews, and other physics questions, please ask them through Piazza. The 4 LAs will act as gatekeepers on Piazza and will direct you to the problem solution if the questions was already asked. If the question is new, they will email me, I will solve it, and I reply back to them. Then **they will post the solution on Piazza for everyone to see and eliminate duplicate questions. DO NOT ASK ME PHYSICS QUESTIONS DIRECTLY. Email me only for emergencies.**

Grades:

Per GMU decision, you can earn 3 kinds of grades:

- Incomplete (with proof that you cannot participate the rest of the semester in the instruction process)
- Pass/Fail if you declare you want a no (or low) credit Pass/Fail. I am not entirely sure how this work, I would imagine it involves the registration office and I do not know how many credits a Pass/Fail will carry. Please get clarification from the registration office and I will ask the department for clarification as well.
- Regular grade

For Pass/Fail I give you the choice to declare PASS/FAIL until the last day of the class **unless the university will overrule this**. I want you to have the flexibility to see your test 2 and test 3 scores to decide the best course of action for you.

Per university policy, a D or above constitutes a PASS.

If you choose PASS/FAIL, after declaring it I will remove your Test 2 and Test 3 scores, and the grade will be computed by Blackboard according to the other scores earned until then. You can ask me "what if" questions before declaring a PASS/FAIL. You can ask "what if" questions only once per semester. I do not have the time to compute the alternatives every time you earn one more grade from Tests, MP or quiz.

Every semester I get the same question again, and again, and again: the grade in Bb is computed incorrectly. While I sometimes do make clerical errors on entering grades, and I do correct those mistakes, Bb does not make mistakes in computing the grade. I will not answer any emails challenging Blackboard computation, period. I will only answer questions challenging specific assignment scores.

Now onto the regular grade.

There will be no comprehensive final and the original 20% of the sore dedicated to it will be distributed 10% to MP homework and 10% wo unit quizzes in Bb.

The new weights will be as follows:

Tests (best 3 out of 4 counted, 15% each)	**45%**
Recitation	**10%**
Assignments on MasteringPhysics	**25%**
Unit Quizzes on Blackboard	**20%**

There will be no curves for test 2 and 3, the test will be multiple choice. The dropping of the lowest test score rule stays, the tests will be counted from Test1 free response, Test 1 multiple choice, Test 2 multiple choice, and Test 3 multiple choice.

Test 2 will cover:
Waves, sound, geometric optics, and optical instruments. Basically, all that was covered so far from waves and all the material in the new videos. **You will not be tested on induction.**

Test 3 will cover:
Everything in videos after test2.

Recitation: I asked all recitation instructors to send me your scores up to now. **We have to decide what to do with additional pointe earned in recitation from now on, me and the instructors need to come to an agreement first to make sure the scoring is uniform and fair for all students.**

Extra credit:
To get back to the original schedule I had to cut some topics. Some of those topics have MP homeworks, and quiz assignments. You can still find the original powerpoints in Bb and you should either have Giancolli, or the Openstax free book. **You can study those topics on your own and if you do the assignments they will count as extra credit. As an example, there are MP and quiz assignments on Light as a Wave due 3/29. Those are now extra credit.**

Test taking: The university is closed, and there are no test centers available. I will provide a link to install **Respondus Lockdown Browser** on your computer at home. you will need this browser to take Test2 and Test 3. The way it works, is as follows: Respondus will force you to close all other communication programs on your computer before launching the test. Respondus has a video camera option recording you during the test, but on short notice I cannot force you to

have a video camera and **I will not use this option**. The regular test time is 1 hour, there will be 10 questions, but to accommodate ODS requests and network outage issues I will extend the time to 4 hours. **Please be advised that Blackboard records all timelines of your actions during test taking and I will know how you spend the time during the test.**

To prevent cheating (using Chegg or other means) me and the recitation instructors will create brand new questions which do not have online solutions. To do well on the upcoming test you will need to master the material. Also the review questions will not be similar with the test questions, but will cover all relevant topics.

Test days are 4/8 and 5/4. With a documented network outage, you can take the test the next day on 4/9 and 5/5. This means I need proof you could not take the test on 4/8 or 5/4.

4/12 update:
Anyone caught cheating during the tests after the break will automatically get an F on this class, no exceptions. Ongoing cheating investigations may continue after the end of the spring semester. The university may impose additional penalties up to dismissal

Final Update

Per University policy I cannot have 2 grading schema. As such I will unify the 2 schema into one and **I will do it by picking the highest score under both letter grade and pass/fail.** I will do this in excel and I will also add the extra credit to your final score. **You no longer need to notify me of your pass/fail choice**, but you can still pick pass/fail with registration.