PHYS 210 - General Physics I
Course Information - Fall Semester 2019

General Information:

Instructor:	Dr. Gregory W. Clark	Office:	SCIC 112, in the Science Center
Email:	GWClark@manchester.edu	Office Hours:	M & W, 11-11:50 AM; or by appointment
Phones:	982-5071 (office)		
	982-7588 (home - please, no calls after 9:00 PM!)		

The Course:

General Physics I is a calculus-based physics course designed to meet the needs of majors in the Natural Science Division as well as those seeking General Education science credit. It is the first part of a two-course sequence. This semester we will study motion in one and two dimensions, rotational motion, energy, gravitation, oscillations, and, if time permits, waves. The overall goal of the course is that you become skilled in problem solving in these areas by applying Newton's laws of motion and the law of conservation of energy. The course requirements include regular attendance, class participation, timely completion of reading assignments and homework, laboratory participation, and three examinations. I will assume that you are very comfortable with college level algebra and trigonometry for this course (we will rely heavily upon their use) and have either taken or are enrolled in the first semester of a course in calculus.

Text and Other Resources:

The text is **Physics for Scientists and Engineers: A Strategic Approach** by R. D. Knight, third edition (Pearson, 2013). We will be covering the major topics from the first half of this text. Below is a tentative weekly schedule that we will strive to follow. Your first exposure to the material will be before we discuss it in class, so you are **expected** to read the appropriate reading assignment before class. To help encourage you to keep up with the readings, we will have brief Reading Quizzes after each weekly Base Group meeting (see below). In class we will process what you have read about. Bring questions about the material you have read to class!

Several texts are available in the library that can provide different perspectives on some topics. There is also an excellent collection of resources in the *Mathematics & Physics Study Room* (SCIC 113). Another resource will be the weekly *Physics Study Table*, staffed by upper level Physics students, which will begin after the first few weeks of classes (time to be announced). There is a *GP I Web Page* accessible through the Manchester University Home Page [via the Department of Physics Home Page]; I will use it to post information relevant to what we are doing in class. *Canvas* is another web-based resource that we will use for lab; details will be discussed in class.

Class Meetings:

The class meeting time is 1:00 - 1:50 PM, MWF in room SCIC 202. Class attendance & participation are essential and expected; they are course requirements. I will assume that you have read the assignments for each day. In class meetings, I not simply regurgitate the reading material. Come prepared with questions about the material & be sure to ask when anything is unclear. Questions are *indispensable* for learning physics! We will spend a bit of time working in groups during class; please arrive at class prepared to work with others and to contribute to discussions.

You will need a scientific calculator for this course; bring one to all class & lab meetings. You may use a cell phone for a calculator, but I encourage, rather, to obtain a dedicated calculator. I also strongly urge you to NOT use your phone or other electronic device for browsing, texting, *etc*., during class, unless asked to for a specific assignment. If you habitually spend time texting/web browsing during class I reserve the right to consider you absent for that day's work. Cell phone or computer use during exams or quizzes will result in failure of the exam/quiz.

Please report any anticipated absences to me in a timely fashion; it is your responsibility to see that missed class work is properly made up for excused absences. If you expect to miss class because of a Manchester University required function (*e.g.*, field trip, athletic game), make plans to have a classmate turn in your work for you for that day (or turn it in early!). Absences from exams will be excused only under extreme circumstances.

Homework:

Homework will be assigned daily - usually a combination of questions and problems from the textbook. Homework will be due by 6 PM on the first class meeting day after it was assigned. Late homework will **not** be accepted. Your lowest two homework scores will be dropped. The purpose of homework is to develop your problem-solving skills. Problem-solving is a skill that is acquired and honed only by lots and lots of practice. Expert problem-solvers do not wait until the last minute to begin attacking a problem! Start early while material from the class meeting is still fresh and while you have plenty of time to ask questions of classmates or of me. Working together is encouraged in order to discuss, dissect, and develop the physics; but writeups should be done individually in order to insure that *you* understand the physics. Do not turn in solutions that are a copies of someone else's work, if you want credit; all

students submitting identical solutions will receive zero credit. You will get the most out of problems if you work on them individually a bit before grouping up. Problem solving begins with reflective consideration of the problem! Pay close attention to the *Problem-Solving Strategies* in the textbook as you encounter them. They are a positive goldmine of hints that can make a significant difference if you learn to apply them. **Do not data-mine** for solutions on the internet; data-mining is great way to sabotage your learning! Presenting another person's work as your own is plagiarism and will be considered as cheating.

I expect all homework to conform to the expectations outlined in the *Homework Checklist* (available on the GP I Web Page). Please pay careful attention to these requirements! I will usually only spot check the bulk of the homework and will randomly choose a few questions/problems to grade with a relatively fine-toothed comb for each assignment. Thus, you will likely find it helpful to use the solutions binder (see below) review your homework after it has been returned. "Chosen" problems and questions will be graded on a basis that mirrors the review practice of professional scientific journals:

Review Rating	*Points*	*Rating of Homework Solution*
publish as is	3	perfect or nearly perfect
publish after minor revision	2	minor errors that require revision
needs major revision	1	major conceptual errors, little significant progress
reject	0	problem solution late, obviously copied from available solutions or a classmate, or handed in with essentially no progress or work relevant to the question

The other questions/problems will be worth 1 point each if it is clear that you have made significant progress toward a solution and have a reasonable answer. Solutions to problems will be kept in a binder on the bookshelf in the *Mathematics & Physics Study Room*, SCIC 113. Do not remove the solutions binder from room SCIC 113.

Extra credit opportunities will arise occasionally during the semester. One bi-weekly opportunity for extra credit is the *Science Division Seminar*, 2nd and 4th Mondays at 4 PM in SCIC 203. One homework point of extra credit will be given if you attend (be sure to sign the sign-in sheet!) and turn in a 2 - 3 sentence summary via email by the following Friday.

Laboratory:

The laboratory is an essential and required component of this course. Please arrive at your lab section on time! You will need a bound quad-ruled lab notebook (*e.g.*, National 43-475; no spiral bound notebooks, please) for recording your raw lab data, analysis, calculations, graphing, and conclusions. As much as possible, keep your lab notebooks in the laboratory until after the final exam. You will find the use of a spreadsheet or other software valuable for plotting lab work; any such plots should be appropriately and neatly mounted in your lab notebook using clear tape or gluestick. Networked computers are available in the labs.

Before coming to your lab each week, you must complete an online PreLab quiz. These quizzes will be posted on the *Canvas* site for this course (accessible through the GP I Web Page) each Friday evening. You will also be required to take a Pre/Post Concept Evaluation for this course administered via *Canvas*. More details will be given out in class. There will be no lab the first week of classes.

A portion of your lab grade will be reserved for a formal laboratory paper. This will be a paper written in currently accepted scientific format that is a report on one of your laboratory experiments. The first draft will be due on Monday, 25 Nov 2019, and the final copy on Monday, 02 Dec 2019. More details on the paper and on the lab in general will be discussed at the first lab meeting (and are available on the course website).

Exams & Grading:

The breakdown for your overall grade in this course is as follows:

Homework, Class Participation, Quizzes	[Daily!]	30%
Laboratory	[Weekly!]	20%
Exams	[27 Sept 2019 (15%), 01 Nov 2019 (15%)]	30%
Final Exam	[To be announced by Registrar]	20%

All grading is done on a 12-point scale: A = 100 - 88, B = 76 - 87, C = 64 - 75, D = 52 - 63, F = 51 - 0. I do not grade on curves. We will have two exams during the term (on Friday, 27 Sept 2019, and Friday, 01 Nov 2019) and a cumulative final during Final Exam Week). For each exam, you will be provided with an equation sheet with relevant equations that are not on the *General Physics I Know Sheet* included in this syllabus & available on the course web page).

GROUP WORK

Base Groups

The ability to work well in groups is an important skill; most careers involve a significant amount of team-based work. In this course we will work in groups often. We will begin each week by meeting in **Base Groups.** Base Groups will be assigned on 02 Sept 2019 and you will keep the same Base Group for the semester. Ideally, your Base Group that will provide you with additional support, encouragement, and assistance needed to make academic progress. Base Groups personalize the work required and the course learning experience. Be sure to exchange phone numbers and schedules with your Base Group members as you may wish to meet or chat outside of class. All members are expected to participate actively in class discussions, work to maintain effective working relationships with other participants, complete all assignments, assist classmates in completing their assignments and express their ideas. I will monitor and grade you on Base Group participation. Think critically; interact cordially!

To participate in your Monday Base Group Meeting, you must have a ***Base Group Admission Ticket***. This ***Ticket*** will help you organize & digest the reading assignment and should contain answers to the following: (1) Briefly, what are the main ideas/concepts in the reading assignment? (2) What are four multiple choice questions regarding the most important aspects of the reading? (3) Was anything from the ***General Physics I Knowsheet*** in the reading assignment? If so, what? (4) What material, if any, did you not quite understand? Base Group members who do not have a ***Base Group Admission Ticket*** will not be given credit for Base Group work for that day, including the Reading Quiz. You are encouraged to bring and use notes from the assignment that you have written up during your Base Group Meeting; the use of your textbook will not be allowed.

In your Base Group Meetings, you should:

- ☛ Congratulate each other on survival since the last meeting and check if anyone is under any undue stress.
- ☞ Check that each Base Group Member has a complete ***Base Group Admission Ticket***.
- ☛ Work on the Base Group assignment (often this will be in the form of a Base Group Worksheet). Each Monday, you will be assigned specific Base Group tasks using specific roles and/or procedures.

Remaining on task will be important; I would like us to get our Base Group work accomplished in a timely fashion so that we may work on applying your new knowledge. We may occasionally work in Base Groups on in-class exercises for longer periods of time. As an incentive to develop strong group relationships, Base Group Bonus Points will be awarded to all Base Group members if all members receive a perfect score on their Reading Quiz. In addition, if all members of your Base Group achieve a scores of 70% or above on an exam, bonus points will be added to the exam score of each member. Additional incentives may develop as we move through the semester.

Informal Group Work

Often, we will work on questions and problems during class in pairs; please utilize the following procedure:

1. **Formulate** your own answer to the question/problem.
2. **Share** your answer with your partner.
3. **Listen** carefully to partner's answer. Change your mind only if persuaded by logic or information to do so.
4. **Create** a new answer, as a pair, that is superior to or incorporates each member's initial answer by synthesis, critical analysis, and cooperation.

Formal Group Work

We will occasionally work in the context of **Formal Groups** formed for specific tasks. All members are expected to participate actively, work to maintain effective working relationships with other participants, assist classmates, express their ideas, not change their minds unless persuaded by logic or information to do so, and indicate agreement with the group's work, in writing. You will get more information on these groups as needed!

Plagiarism

Plagiarism, in any form, will not be tolerated and will result in the forfeiture of the work involved with no opportunity to make up that work. Work (labs, homework, *etc*.) from previous offerings of this course are not allowed for reference in class or in lab. Although you are **expected** to work together on homework and to discuss the material from this class, any work you hand in should be an expression of **your own understanding** of the material, unless an assignment is specifically given to a group. For more information on academic dishonesty and grievance procedures, please see the course web page and *The Source* handbook.

General Physics I - PHYS 210 - Weekly Topic Schedule
Fall 2019

(*TENTATIVE: subject to change as the semester rolls on!*)

Reading assignments are from **Physics for Scientists and Engineers: A Strategic Approach** by Knight, 3rd ed.

	Week of ...	Reading Assignments	Topics	Notes	Lab
1	W, 28 Aug	Ch. 1	Motion concepts, intro to vectors	Welcome!	---
2	M, 02 Sept	Ch. 1, 2	1-D kinematics (motion)	† Camp Mack Possible!	1
3	M, 09 Sept	Ch. 2, 3	Kinematics, vectors	† Camp Mack Possible!	2
4	M, 16 Sept	Ch. 4	2-D & 3-D kinematics		3
5	M, 23 Sept	Ch. 5	Newton's 1^{st} & 2^{nd} laws	F, 27 Sept, Exam I	4
6	M, 30 Sept	Ch. 6	1-D dynamics		---
7	M, 07 Oct	Ch. 7	Newton's 3^{rd} Law	M & T = Fall Break	5
8	M, 14 Oct	Ch. 8	2D & 3-D dynamics		6
9	M, 21 Oct	Ch. 9	Momentum, impulse, & collisions		7
10	M, 28 Oct	Ch. 10	Energy	F, 01 Nov, Exam II	8
11	M, 04 Nov	Ch. 11	Work		9
12	M, 11 Nov	Ch. 12	Rotation, torque, & angular momentum		10
13	M, 18 Nov		Catchup + Thanksgiving Break!!!	Yippeeee!!	---
14	M, 25 Nov	Ch. 13	Gravitation	Lab paper drafts due.	11
15	M, 02 Dec	Ch. 14	Oscillations	Lab papers due.	---
	TBA	Final Exam	All material we covered!	Whew!	

Details of which sections of the chapters that you should read can be found with the daily homework assignments on the course webpage.
† Camp Mack Day Possible = Camp Mack Day will be on one of the following dates: 3, 4, 5, 10, 11, or 12 Sept. Go to Camp Mack!!

The Book of Nature is written in mathematical characters. ❧ *Galileo Galilei*

If I have seen further than others, it has been by standing on the shoulders of giants. ❧ *Isaac Newton*

General Physics fulfills a CORE requirement (The Natural World) in the Manchester University curriculum and is also a "Q" course. Below are the goals of these types of courses, as approved by the Manchester University faculty.

The Natural World: How and why the world works as it does. This category is devoted to the scientific study of natural processes in the world. Each course must satisfy the following criteria:

1. demonstrate a systematic understanding of some aspect of the natural world through learning the content, vocabulary, and interrelationships among well-supported scientific theories
2. articulate the unique features of scientific methodologies, such as hypothesis testing based on empirical observations, and probabilistic conclusions.

Quantitative Reasoning (Q): Criteria for Q-courses

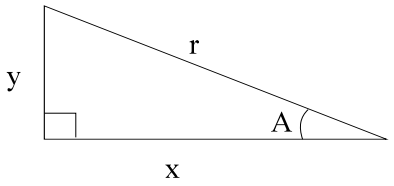
1. accurately interpret quantitative information from a variety of historical or contemporary sources [or]
2. organize, analyze, and persuasively convey data through graphs [or]
3. analyze data using tools such as statistical software or spreadsheets [or]
4. solve problems via appropriate quantitative methods.

PHYS 210 - GENERAL PHYSICS I KNOW SHEET

There are some basic tools that a scientist should have at his/her disposal without having to consult a reference. This list consists of relationships that will serve you well to know. Commit these all to memory! Items 1 - 8 you should have seen in high school mathematics at some point. Items 9 and 10, the Constants, and the Formulae we will encounter this semester - make sure you commit them to memory after they are introduced in a reading assignment.

1. $a x^2 + b x + c = 0$ ⇨⇨ $x = \frac{1}{2a}\left[-b \pm \sqrt{b^2 - 4ac} \right]$

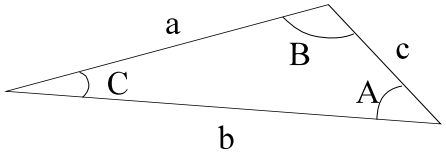
2. For right triangles:
   $\sin A = y/r$
   $\cos A = x/r$
   $\tan A = y/x$
   $x^2 + y^2 = r^2$



3. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
   $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$

4. Law of Cosines: $a^2 = b^2 + c^2 - 2bc\cos A$

   Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$



5. Circle: C = circumference = $2\pi r$ A⊙ = Area = πr^2

6. Cylinder: A = surface area = $2\pi r L + 2\pi r^2$ V = volume = $\pi r^2 L$

7. Sphere: A = surface area = $4\pi r^2$ V = volume = $4/3\,\pi r^3$

8. $\sin^2 A + \cos^2 A = 1$

9. $|\vec{a}\times\vec{b}| = ab\sin\theta$; $\vec{a}\times\vec{b} = \hat{i}(a_y b_z - b_y a_z) + \hat{j}(a_z b_x - b_z a_x) + \hat{k}(a_x b_y - b_x a_y)$

10. $\vec{a}\cdot\vec{b} = a_x b_x + a_y b_y + a_z b_z = ab\cos\theta$

Physical Constants: [Memorize as we encounter these in class.]

$g = 9.8\ m/s^2$ $G = 6.67 \times 10^{-11}\ N\,m^2/kg^2$ $c = 3.00 \times 10^8\ m/s$

Physical Formulae: [Memorize as we encounter these in class.]

$$\vec{v} = \frac{d\vec{r}}{dt} \quad \vec{a} = \frac{d\vec{v}}{dt} \quad \vec{F}_{NET} = m\vec{a} = \frac{d\vec{p}}{dt} \quad W = \int \vec{F}\cdot d\vec{r} \quad U_g = mgy \quad a_c = \frac{v^2}{r}$$

$$F_G = mg \quad \vec{F}_{GRAV} = \frac{GmM}{r^2}\hat{r} \quad F_s \le \mu_s N \quad F_{spring} = -kx \quad K = \frac{1}{2}mv^2$$

$$\vec{p} = m\vec{v} \quad \vec{\tau} = \vec{r}\times\vec{F} \quad \vec{v} = \vec{\omega}\times\vec{r} \quad \vec{l} = \vec{r}\times\vec{p} \quad f = \frac{1}{T} \quad \omega = \frac{2\pi}{T}$$

Text Appendix A: *Derivatives*: Know them all! *Integrals*: Know the first five in the first column and the 3rd, 5th, and 6th in the second column [integrals of e^{ax}, sin(ax), and cos(ax)]

Manchester University Essential Information

Title IX Student Conduct Reporting Requirements

Manchester University is committed to fostering a safe community where the infinite worth of all individuals is respected. Title IX and institutional policy prohibit discrimination on the basis of sex and gender identity. Consequently, sexual misconduct- including harassment, domestic and dating violence, sexual assault, and stalking - is also prohibited at Manchester. Faculty, staff and administrators encourage anyone experiencing sexual misconduct, dating/domestic violence, or stalking to talk to someone about what happened, so they can get the support they need and Manchester University can respond appropriately.

If you wish to speak confidentially with a Manchester employee/on-campus representative about an incident of sexual misconduct, please contact:

MU Counseling Services (260-982-5306)
MU Campus Pastor (260-982-5243)
CARE Initiative (260-982-5027)
MU Health Services (260-982-5306)
North Manchester Campus Victim Advocate (260-563-4407)

Off-campus resources include the following:

Hands of Hope (Service to North Manchester Campus-24/7 Hotline 260-563-4407)
Fort Wayne Sexual Violence Treatment Center (Service to both Fort Wayne & North Manchester Campuses-24/7 Hotline 260-423-2222)
YWCA of Northeast Indiana (Domestic Violence & Sexual Violence: 260-447-7233)

Individuals who wish to file a report of sexual misconduct should contact the Title IX Coordinator (260-470-5721) or/and Manchester University Campus Safety (260-982-5999).

For questions about institutional policies and procedures regarding sexual misconduct, please contact the Title IX Coordinator. To make a police report, contact the North Manchester Police Department (260-982-8555) or Fort Wayne Police Department (260-472-1222).

You can learn more about Title IX and survivor support at the following websites:
https://www.manchester.edu/about-manchester/university-priorities/title-ix & https://www.manchester.edu/student-life/care-initiative/care-intitiative-home.

** Manchester University strives to uphold privacy and confidentiality as much as possible and only shares information received with those who have a need to know in order to respond. Individuals who desire anonymity in discussing and seeking assistance about sexual misconduct should contact and/or be referred to a **confidential employee**.**

Student Disability and Reasonable Accommodation Policy

Manchester University, in compliance with federal guidelines, is committed to assuring students with disabilities equal access to programs and activities however, it is the student's responsibility to self-disclose the disability. Students who feel they may need an accommodation based on the impact of a disability should contact Mia Miller, the Disability Support Coordinator, to establish eligibility and to coordinate reasonable accommodations. Students whose accommodation requests are approved will be provided with confidential letters to deliver to their professors. Each letter verifies the disability and documents the need for auxiliary aids and services and/or academic adjustments/accommodations. Students are encouraged to meet with each professor early in the semester to discuss academic implications as they relate to each specific course and to request appropriate accommodation. The Disability Support Services office is in the Success Center (second floor of the Jo Young Switzer Center) and can be reached by phone at 260-982-5888 or 260-982-5499 to schedule an appointment.

Medical Emergency/Evacuation Assistance Policy

Students should speak to the instructor immediately if (1) they may require medical attention during class, or (2) they have a disability, chronic condition, or a temporary injury that may limit or affect their ability to evacuate the classroom/building in an emergency. The student and the instructor should discuss the student's specific needs and the types of precautions that should be made in advance of such an event. In the event of a fire or other situation requiring emergency evacuation, students with ambulatory disabilities are to go with or without assistance to the nearest stairwell area. Faculty and staff will assist with evacuation management efforts until such time as the Campus Safety and/or Police and Fire Departments arrive on the scene to assist in student evacuation from the building. Elevators are not to be used for evacuation by any persons.

Students who need special arrangements in the event of an evacuation should also register with Mia Miller in the Success Center as early as possible in the semester to help facilitate the provision of needed emergency assistance.

Academic Dishonesty

Information on Academic Dishonesty and Grievance policies can be found on the course website.