

# PHYS 220 - General Physics II

## Course Information - Spring Semester 2018

### General Information:

Instructor: Dr. Gregory W. Clark  
Phones: 982-7051 (office), 982-7588 (home - please do not call after 9:00 PM!)  
Office: SCIC 112, Science Center  
Office Hours: M & W, 11 - 11:50 AM; or by appointment.  
E-mail: GWClark on the MC network (GWClark@manchester.edu)

### The Course:

General Physics II 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 second part of a two-course sequence in introductory physics. This semester we will study rotational motion, thermodynamics, electricity and magnetism, waves, and light and optics. The course requirements include regular attendance, class participation, timely completion of reading assignments and homework, laboratory participation, and three examinations. I am assuming that you are very comfortable with college level algebra, trigonometry, and calculating derivatives and integrals. A co-requisite for this course is enrollment in (or having previously taken!) second semester calculus (MATH 122).

### 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 many of the topics from the second half of this text. Below is a 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 at the beginning of each weekly Base Group meeting (see below). The point of our class meetings is to process what you have read about. Bring questions about the material you have read to class!

There is an excellent collection of resources in the *Mathematics & Physics Study Room* (SCIC 113) that can provide alternate perspectives on some topics. 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 General Physics II 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 participation is essential and expected - it is a course requirement. As mentioned above, I will assume that you have read the assignments for each day. In class meetings, I will **NOT** simply regurgitate the reading material. Come prepared with questions about the material and 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. 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 writups 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. 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 II 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 fine-toothed comb for each assignment. Thus, it will be important to use these solutions to 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:

<i>Review Rating</i>	<i>Points</i>	<i>Rating of Homework Solution</i>
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 not received <u>on time</u> or handed in with essentially no progress or relevance 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. Homework that is obviously copied from available solutions or from classmates will receive zero credit. Solutions to problems will be kept in a folder on the bookshelf in the *Mathematics & Physics Study Room*, SCIC 113. Do not remove the solutions folder 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*, every other Monday 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 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 (use a National 43-475, available at the College Store; no spiral bound notebooks please) for recording your raw lab data, analysis, calculations, graphing, and conclusions. You may use your notebook from General Physics I, if you wish. As much as possible, keep your lab notebooks in the laboratory. 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 glestick. 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 II Web Page) each Friday evening. 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, 30 Apr 2018, and the final copy on Monday, 07 May 2018. 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	[02 Mar 2018 (15%), 13 Apr 2018 (15%)]	30%
Final Exam	[Friday, 18 May 2018]	20%

All grading is done on a twelve-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, 02 Mar 2018 and Friday, 13 Apr 2018) and a cumulative final on Friday, 18 May 2018 from 8:00 AM - 9:50 AM). For each exam, you will be provided with an equation sheet with relevant equations that are not on the *Know Sheet* (in-class handout; available on course web page). Calculators are not allowed on exams; cell phone use during exams will result in failure of the exam.

## 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 05 Feb 2018. 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. You should 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 II Knowsheet* in the reading assignment? If so, what? 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 notes from the assignment that you have written up; the use of your textbook will not be allowed during the Base Group Meeting.

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*.
- ☛ Review what members have read since the last meeting and work on the Base Group Worksheet.

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.

## General Physics II - PHYS 220 - Weekly Topic Schedule Spring 2018

(TENTATIVE!)

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

	Week of	Reading Assignments	Topics	Notes	Lab
1	W, 31 Jan	Ch. 12	Torque, Ang. Momentum; Rolling motion	Welcome back!	---
2	M, 05 Feb	Ch 13, Ch 14	Newton's Law of gravity; Oscillations		1
3	M, 12 Feb	Ch 25	Electric charges & forces		2
4	M, 19 Feb	Ch 26	Electric fields		3
5	M, 26 Feb	Ch. 26, 27	Calculating the field, Gauss' law	F, Exam 1	4
6	M, 05 Mar	Ch. 28, 29	Electric potential & fields		5
7	M, 12 Mar	Ch. 30, 31	Current, resistance	F, Mid Semester	6
-	M, 19 Mar	-----	Spring Break!!!	Yippeee!!	---
8	M, 26 Mar	Ch 31	Circuits		7
9	M, 02 Apr	Ch. 32	Magnetic fields		8
10	M, 09 Apr	Ch. 33	Electromagnetic induction	F, Exam 2	9
11	W, 16 Apr	Ch. 20, 34	Electromagnetic fields & waves		10
12	M, 23 Apr	Ch 21, 22	Selected topics in waves		11
13	M, 30 Apr	Ch. 16, 17	Matter, work, heat, & the 1 <sup>st</sup> law		12
14	M, 07 May	Ch. 17, 18, 19	Thermodynamics, micro/macro connection		---
		Final Exam	All material we covered! Date/time TBA	Whew!	

In some chapters, we will discuss only select topics. Details of which sections of the chapters that you should read will be given with the daily homework assignments on the course webpage.

*Number is the ruler of forms and ideas, and the cause of gods and demons.* ☛ Pythagoras

*Every now and then things become clear.* ☛ Jane Siberry

*I do not define time, space, place and motion, as being well known to all.* ☛ Isaac Newton

*God not only plays dice. He also sometimes throws the dice where they cannot be seen.* ☛ Stephen Hawking

*O amazement of things - even the least particle!* ☛ Walt Whitman

*Anyone who has not been shocked by quantum physics has not understood it.* ☛ Neils Bohr

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**PHYS 220 - GENERAL PHYSICS II KNOW SHEET**


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1. Make sure that you indeed know everything from the *General Physics I Knowsheet!!*
2. Know the following as we encounter them:

$$(1 + x)^n = 1 + n x + \frac{n(n-1)}{2!} x^2 + \dots, \quad -1 < x < +1. \quad [\text{Binomial Expansion}]$$

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

$$\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2/\text{C}^2 \quad h = 6.63 \times 10^{-34} \text{ Js}$$

$$e = 1.6 \times 10^{-19} \text{ C} \quad m_e = 9.1 \times 10^{-31} \text{ kg} \quad c = 3 \times 10^8 \text{ m/s}$$

$$R = 8.31 \text{ J/mol K} \quad N_A = 6.02 \times 10^{23} \text{ mol}^{-1} \quad \mu_0 = 4\pi \times 10^{-7} \text{ T m/A}$$

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

$$pV = nRT \quad \Delta E_{th} = Q + W \quad \vec{F} = q\vec{E} + q\vec{v} \times \vec{B} \quad E = hf$$

$$\oint \vec{E} \cdot d\vec{A} = \frac{q_{enc1}}{\epsilon_0} \quad \oint \vec{B} \cdot d\vec{A} = 0 \quad \vec{F}_{coul} = \frac{1}{4\pi\epsilon_0} \frac{qQ}{r^2} \hat{r}$$

$$\oint \vec{E} \cdot d\vec{s} = -\frac{d\Phi_B}{dt} \quad \oint \vec{B} \cdot d\vec{s} = \mu_0 \epsilon_0 \frac{d\Phi_E}{dt} + \mu_0 i_{enc1} \quad i = \frac{dq}{dt}$$

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**Manchester University Essential Information**
**Academic Dishonesty and Grievance:**

Academic dishonesty in any form is a serious offense. Academic dishonesty includes, but is not limited to, cheating on exams or quizzes; submitting another's work as your own, in whole or in part; failing to correctly cite any sources used; and falsifying documentation. All written and oral assignments must be your original work and may not be submitted concurrently with another class without specific written permission of both instructors. Academic dishonesty will not be tolerated, and may result in failure on the assignment or in the course. It is your responsibility to know what constitutes academic dishonesty; ignorance of the policy is not a valid excuse. Please see *The Source Handbook* for specific college policy. If you are not sure what constitutes plagiarism, please address these questions before the assignment is due.

**Course Evaluation:**

Manchester University depends on feedback from all students to improve the educational experience. Students' professional, constructive feedback to faculty will help us make adjustments to teaching styles and course content to better suit student needs. Student confidentiality to course faculty will be assured. Evaluations for the course will be available prior to the end of the course. Students will be notified via e-mail when course evaluations become available and the deadline for completion.

## Manchester University Essential Information

### **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 Statement:**

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.

### **Title IX Student Conduct Reporting Requirement:**

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)

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)

If you wish to file a report of sexual misconduct, please contact: Dean of Student Experience/Title IX Coordinator Allen Michaelson at 260-982-5052 or/and Manchester University Campus Safety (260-982-5999)

If you have questions about institutional policies and procedures regarding sexual misconduct, please contact the Title IX Coordinator. If you would like to make a police report contact the North Manchester Police Department (260-983-8555) 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-initiative-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.\*\**