**PHYS 114 – General Physics II – Spring 2021** **KSU - 4 credits**

| Section | Room | Instructor | Contact Info. |
|---|---|---|---|
| LEC: TU 1:30 & 2:30 | Remote/CW103 | Gary Wysin | 532-1628, wysin@ksu.edu |
| QUIZ: M 5:30 - 6:45 | Distance | Gary Wysin | office-hours via zoom, appt. |
| Director, UG Phys. Labs: | CW 401 | Brandi Lohman | 532-1605, bcl6677@phys.ksu.edu |

**Important!**
You must register for all four PHYS 114 sections, LEC, QZ, REC, and LAB. If you are missing any of these, get on the wait list immediately!

**Prerequisites**
PHYS 113, and a basic knowledge of algebra, trigonometry, geometry, and curiosity and imagination.

**Description**
PHYS 114 is an algebra/trigonometry based introductory physics course dealing with the topics of electricity, magnetism, light and quantum physics. Emphasis will be placed on the basic principles and concepts and their applications in everyday technology and in the world's economy.

**Objectives**
Successful students will understand how to analyze the processes of nature, what goes on in the world, and how some technology works, including the basic concepts and numerical estimates.

**Text**
OpenStax *College Physics*, Paul P. Urone and Roger Hinrichs, available for free online. We should cover Chapters 18 through 32.

**Course format**
Due to COVID-19, this course will be "live online" or "synchronous distance learning." Participation in the recitations and labs at the scheduled times via Zoom is ***required***. Attendance at the Lectures over Zoom is strongly encouraged, also, that will assist you in completing the lecture quizzes (in Canvas) most easily. If you understand the material from Lectures, it is going to make your life much easier in the other parts of the course, especially the Exams.

**Course Web Sites**

| | |
|---|---|
| Access the course textbook for free at: | openstax.org/details/college-physics |
| See your current grades at K-State Canvas: | canvas.ksu.edu |
| Do the on-line homework assignments at: | www.saplinglearning.com |
| See old lecture notes, exams and other aids at: | www.phys.ksu.edu/personal/wysin/GPII/ |

**Grading**
Grades will be determined from Recitation, Exams, Labs, and Homework, as follows:

| Task | Max. Points |
|---|---|
| Chapter Exams (Canvas, best 12/15 chapters) | 480 |
| Lab writeups (remote, best 11/12 labs) | 180 |
| Recitation work (remote, best 14/15) | 140 |
| On-line homework (Sapling, best 14/15) | 140 |
| Lecture quizzes (Canvas, best 25/30) | 60 |
| Total | 1000 |

| Grading scale |
|---|
| A: 1000–900 |
| B: 900–800 |
| C: 800–700 |
| D: 700–600 |
| F: below 600 |

Recitation includes an in-class group-work problem on paper (10 pts. each, lowest 1 dropped) and possibly help with the online homework at saplinglearning.com. The lowest online homework grade will be dropped. The best 11 lab scores will be scaled out of 180 points. Exam scores will be recorded for each of 15 chapters; the lowest 3 chapter scores will be dropped. The last exam for the last 2 chapters takes place at the final exam time: 6:20 - 8:10 p.m., Tuesday, May 11 (See http://courses.k-state.edu/exam-schedule.html). Because lowest scores are dropped, there are no makeup recitations, labs, or exams.

**Lecture & Lecture Quizzes**

The lectures will be live and synchronous distance learning, given at the scheduled times of Tuesday/Thursday 1:30 and 2:30 p.m., over Zoom. A link for the meetings is posted in Canvas. Lectures will describe concepts and show demonstrations and worked examples, as well as some in-class short questions and post-lecture short quizzes (Lecture Review Quizzes). The format of the Lecture Review Quizzes is similar to the Exams, you can consider it part of your preparation for Exams. You are allowed to use your notes and textbooks for these Review Quizzes, and you have multiple attempts and no time limit (but not for Exams). I expect you to use these quizzes as a study aid.

**Laboratory**

The laboratory (synchronous live remote with Canvas modules) is a required and integrated part of the course, and counts 18% towards your grade. **A passing grade (60%) in the laboratory is required to pass the course.** See the lab manual in Canvas and listen to your lab instructor for rules and grading procedures. You do not need to buy any lab manual. The lab information will be found in electronic form on KSU Canvas before each lab. Due to COVID-19, some lab experiments are videos of experiments, which you analyze. Address your questions about lab grades and procedures either to your lab instructor or to Brandi Lohman, the Director of Undergraduate Physics Labs.

**Credit for Previous Lab Work**

Students retaking the course, who have successfully completed the lab must contact Brandi Lohman in CW 401 (532-1605) prior to the first week of lab to get credit for the previous lab work. There is a special lab section to enroll in for retakes.

**Recitations**

The recitation is where you can go for help and practice solving problems and learning concepts. In your recitation hour (synchronous live remote) you will receive an extended problem to work out in small groups. You can help your group do its best by participating and making sure everyone understands what they are doing. You may get help from your group and also from your instructor, but your final submitted work must be your own.

Your recitation solution should show the details of how you solved it. Include necessary **diagrams**, identify the **concepts** or **physics principles** you are using, show the **equations** you apply, and show how the numbers with units are inserted after that, and finally, a numerical answer with the correct units. No credit will be given for just numbers or a yes/no response. Students who do best on exams are the ones who work carefully, writing things out clearly with well-organized presentation of the **concepts** and **equations** used before inserting numbers. See the problem solving tips on pages 4 and 5, and the Guide to Solving Physics Problems at https://www.phys.ksu.edu/personal/wysin/GPII/problem_solutions.pdf.

If you have written your solution, of course you have it available for your future reference, and discussion/studying with other Phys114 students. However, remember that you are training to be some kind of professional, and maintaining your integrity and honesty (or not) can make (or break) your career. Sharing (physically or digitally) or copying of the problems or solutions with websites (or persons not in Spring 2021 Phys114) is a violation of your honor code, and it is a very serious issue. Don't do that and then cry about it later if you are caught. This applies to all assignments in the course. Keep in mind that digital copies have an infinite life and can be easily tracked.

**On-line homework**

Each week there is an on-line assignment at saplinglearning.com (140 points/semester). Each on-line assignment will be available at www.saplinglearning.com about 10 days before the associated recitation. A link is available in KSU Canvas. The due dates will be Sunday nights, Your lowest on-line score will be dropped. You are allowed to work with others (not copying) on your HW, which means discuss the ideas and things you don't understand, until you do. Many of the problems have randomized numbers: everybody gets different numerical values. So you will be happiest if you understand what you are doing. You are not allowed to use solution manuals, on-line solution websites, Cramster, etc. These are considered **unauthorized aids and a violation of the honor code**. The point of homework is to

practice thinking, not copying a solution algorithm from another source. As mentioned above, an honor code violation is a serious event and you do not want that to negatively affect your career.

**Chapter Exams**

These will be synchronous online Quizzes on Mondays at 5:30 p.m. in Canvas Modules. Each Chapter counts 40 points. They are to be done working on your own, using only the information in your head and on the Equation sheet for that Chapter. The **honor code** applies to all exams, they must be your own work. Please do not jeopardize your career by cheating on exams, it is a serious offense. See the statements on Academic Honesty in this Syllabus.

About half the exam questions are multiple choice or short answer and half are numerical calculations. There is a time limit. The time should be much more than you need. If you have been doing the exams at the SAC, then you will be given extra time, but not extra attempts. Each question is locked after being answered and you cannot go back. So you want to work them very carefully, without guessing! Draw any needed diagrams, write the known quantities, find the equations you need, and solve them. Make sure to use correct units and do needed conversions, etc. Give your numerical answers to 1.0% precision. Re-read the question to make sure you are answering the right thing requested, before hitting the submit button. Always double-check everything before submitting that question!

If you work carefully on the Lecture Review Quizzes, thinking carefully, without guessing, they may help you prepare for how to do the Exams, since they are of similar formats.

The exam problems will be based on the same concepts as covered in the lectures and homeworks. Old exams and solutions can be found on the course website. Try to **study the concepts** and **how to apply them**, *do not* just try to memorize how to solve *particular* problems. One page on the exam will be an equation sheet that summarizes the important formulas you may need to do the problems in those chapters. This equation sheet will be posted to KSU Canvas some days before the exams. Partial solution keys to the exams will be posted on the course website.

**Final Exam**

The Final Exam is the last chapter exams, covering Chapters 31, 32 on Tuesday, May 11, starting at 6:20 p.m. in Canvas If you are satisfied with the grades you have up to that point, then the last two chapter scores could be ones that you drop, and your grade will be calculated with them as zeros. That means the Final Exam could be optional for you if you have done excellent work up to that point. I encourage you to do that! The last two chapters scores will raise your grade if any of them are better than your lowest three scores on the earlier chapters.

Plan early, keep up with the course, take responsibility for your learning and your grade, and you can get done with PHYS 114 early and in good shape! If in doubt, do the final chapter exams, they can raise your grade or leave it unchanged.

**Grades on KSU Canvas**

Be aware that the total course grade you see in KSU Canvas during the semester is only an **estimate** of your grade. Until all homework, recitation and lab grades are entered, KSU Canvas does not give your precise grade, due to the low scores being dropped and scaling of points. Only when all components have been entered, is it correct.

Grades may be contested up to one (1) week after being posted on KSU Canvas - after that they become a permanent academic record. This applies to both the main gradebook for the course and the gradebook for the lab.

**Getting individual help**

Any student wanting individual help is urged to contact their recitation, lab or lecture instructor during office hours, or at other times by appointment. In addition, some physics graduate students work as paid tutors. A list of contacts will be posted in the Canvas page for the course. You can also find information and links to help for physics courses at http://www.phys.ksu.edu/teaching/ .

**Tips on doing Physics II homework problems**

* **Don't wait until the last minute.**

Begin homework assignments several days before they are due.
You can surely do some of them even before hearing about the topic in lecture.

* **What's going on here?**

Sketch the situation. Make it seem real for yourself.
Identify desired quantities, their symbols, and their units.
*I want to find* **charge q**, *in* **coulombs**
List the quantities you know, with units.
*I know* **potential V**, *in* **volts**.
*I know* **capacitance C**, *in* **farads**.
Recall the definitions of these items, it may help a lot!
What are the important equations or relations between them?
*The* **charge** *is given by the capacitor formula.* $q = CV$.

* **Get help if you need it.**

Being completely stuck is no fun. If you really are getting nowhere, and have no idea what to do next, you are encouraged to cooperate with other students, or seek help from your instructors.

* **What's my strategy?**

What concepts and equations apply?
Briefly state your strategy in words and sentences.
(Pretend you are explaining to another student.)
Write down the equation(s) you will use, in symbols.

* **Solve algebraically for the desired quantity.**

Still stuck? Did you really draw a diagram?!
You may need to combine some equations, or use trigonometry, that's OK!
Get the quantity you want on the left of the equals sign, and everything else on the right.
Don't skip steps.

* **Do the arithmetic, with units.**

Substitute numbers with units in your equation.
Power $P = IV$ becomes $P = (8.0\ A)(24\ V) = (8.0\ C/s)(24\ J/C) = 192\ J/s = 192\ W$.
Keep the units on everything until the end. It's a useful check.

* **Write down the answer, with correct units!**

* **Does the answer make sense?**

Is the number of reasonable size, not excessively large or small?
If you change the given numbers to very simple cases, will you get an expected result?
If you modified the situation into a simpler one, will your approach still work?

* **Enjoy the challenge.**

Hey, you figured out something new. Now you understand it.
And it wasn't so simple.
Have confidence, you can do as well or better on the next problem!

**Physics Study Hints:**

1. Read the textbook, paying attention to the equations and figures.

2. When you take notes in class, don't just copy equations and diagrams. Listen to the instructor and write down the *ideas* behind the equations and diagrams!

3. Study the examples in the book in order to learn how to solve problems.

4. If you don't understand, formulate a question. Write down your questions so you can ask your instructor later. Then ask your instructor later!

5. Stop occasionaly and think about what you just read. Try to think of real-life examples where the physics ideas might be applicable.

6. Look at extra questions and level I problems, just to see if you would know how to answer them. If so, you have a good grasp of the definitions of basic concepts.

7. If you can't work a difficult homework problem, try to work a related, but easier one first. Or, try breaking your problem into steps or parts.

8. Keep in mind, the level II problems usually require you to apply more than one concept. You probably need to use more than one equation.

9. In physics, the same idea can be expressed several ways: as a picture or diagram, equation, or graph. Look for the main idea. Think about how the different presentations help you to understand it.

10. Remember, physics isn't always complicated. Most of the ideas are simple and common-sense.

**Laboratory Hints:**

1. Work smart, which is to say, efficiently. Check yourself as you go along (hints 3,5,6 above). Do it right the first time, because you won't have time to do it over.

2. Write down the names and telephone numbers of your lab partners on your data sheet.

3. Read the lab manual before lab. Figure out what you want to look for, and how you will look for it. Write this down before you get to lab. (This is the start of your lab report.)

4. In lab, pay attention to the lab instructor's explanation. Some things aren't in the lab manual.

5. While taking data, make a graph right away so you can see if your data make sense. Professional physicists do this all the time. Plot each data point as soon as you've finished writing down the number. This habit can save a lot of trouble later, because you can immediately see what the data are doing!

6. After you have taken a few data points, do a sample calculation for analyzing the data. This will (a) let you know if your data make sense, (b) let you know whether you understand what you are doing, (c) let you know if you've forgotten to write down any quantities. A sample calculation will save you from getting home, then realizing that you forgot to get a number.

7. Write down everything on your data sheets. Never rely on your memory. Use pen. Never erase. Cross mistakes out neatly instead, so you can still read them if you have to. Write down ideas that occur to members of your lab group, too!

8. Work as a team. Make sure that everyone gets to play with the equipment. Report broken equipment to the lab instructor, so he can make sure it gets fixed.

9. Graphs on the data sheet may be crude. Graphs in the lab report should be drawn large enough to see, preferably on a full page. Grpahs and tables must have titles. The axes on graphs must have labels (i.e., numbers, name of quantity being plotted, and its units).

10. Use words and sentences to describe what you are doing. Correct spelling and grammar are encouraged. Graphs, tables and equations supplement the words. They never replace words.

## IMPORTANT STATEMENTS

**University Statement Regarding Academic Honesty**
Kansas State University has an Honor System based on personal integrity, which is presumed to be sufficient assurance that, in academic matters, one's work is performed honestly and without unauthorized assistance. Undergraduate and graduate students, by registration, acknowledge the jurisdiction of the Honor System. The policies and procedures of the Honor System apply to all full and part-time students enrolled in undergraduate and graduate courses on-campus, off-campus, and via distance learning. The honor system website can be reached via the following URL: www.k-state.edu/honor. A component vital to the Honor System is the inclusion of the Honor Pledge which applies to all assignments, examinations, or other course work undertaken by students. The Honor Pledge is implied, whether or not it is stated: "On my honor, as a student, I have neither given nor received **unauthorized aid** on this academic work." A grade of XF can result from a breach of academic honesty. The F indicates failure in the course; the X indicates the reason is an Honor Pledge violation.

**Important!! – My Amplified Additional Statements on Academic Honesty**
Use of any kind of **solution manual**, online websites, online apps, online sites where problems are solved for you by others, or copying or posting of solutions to/from online sites, for doing homework, labs, recitations, quizzes, or exams is an **unauthorized aid**. These are serious violations of the honor code and the damage to your career for such violations is much greater than any possible advantage you might get from using them. Remember that digital data has a lot of tracking. These websites also have an honor code and they share data with KSU, so you can be caught. You are training to be a professional and your personal integrity is at stake. Don't jeopardize your future for a few points, it is not worth it in the long run. It is better to be honest, and do your own work. Someone has to know something, and be the expert, why not you?

**Statement Regarding Students with Disabilities**
Students with disabilities who need classroom accommodations, access to technology, or information about emergency building/campus evacuation processes should contact the Student Access Center and/or their instructor. Services are available to students with a wide range of disabilities including, but not limited to, physical disabilities, medical conditions, learning disabilities, attention deficit disorder, depression, and anxiety. If you are a student enrolled in campus/online courses through the Manhattan or Olathe campuses, contact the Student Access Center at accesscenter@k-state.edu, 785-532-6441; for K-State Polytechnic campus, contact Julie Rowe, Diversity, Inclusion and Access Coordinator, at jarowe@ksu.edu or call 785-826-2971.

Faculty members who need assistance with accommodating a student with a documented disability should contact the access services office on the appropriate campus. Assistance may include administration of course exams with extended time and/or distraction reduced environment or providing an alternate format of text materials.

**Statement Defining Expectations for Classroom Conduct – Including Zoom**
All student activities in the University, including this course, are governed by the Student Judicial Conduct Code as outlined in the Student Government Association By Laws, Article V, Section 3, number 2. Students that engage in behavior that disrupts the learning environment may be asked to leave the class.

**Statement Regarding Wearing of Face Coverings**
In the event that we have in-person classes, please read the statement on face coverings at https://www.k-state.edu/provost/resources/teaching/course.html.

**Campus Safety Statement**
Kansas State University is committed to providing a safe teaching and learning environment for student and faculty members. In order to enhance your safety in the unlikely case of a campus emergency make sure that you know where and how to quickly exit your classroom and how to follow any emergency directives. To view additional campus emergency information go to the University's main page, `www.k-state.edu`, and click on the Emergency Information button.

**Copyright Statement**

ing this course students are prohibited from selling notes to or being paid for taking notes by any person or commercial firm without the express written permission of the professor teaching this course. The posting of any problems, problem solutions, quizzes, exams, or any other course content to any websites for any use is expressly prohibited, except for posting your own solutions to Canvas as part of the course requirements.

**Schedule for General Physics II, Spring 2021**

| Date | Lec/Reading | Lecture Topics / Recitation Chapters | Labs |
|---|---|---|---|
| 1-26 Tu | Lec 1. 18-1,2,3 | **18.** Electric Charge & Force: Coulomb's Law | Labs on 1-29 & 2-01: |
| 1-27 We | Recitation 1 | **18.** See saplinglearning.com for homework. | Introduction to |
| 1-28 Th | Lec 2. 18-4,5,7 | **18.** Electric Field & Field Lines | Electrostatics |
| 2-02 Tu | Lec 3. 19-1,2,3,4 | **19.** Electric Potential & Potential Energy | Labs on 2-05 & 2-08: |
| 2-03 We | Recitation 2 | **19.** | Equipotentials & |
| 2-04 Th | Lec 4. 19-5,6,7 | **19.** Capacitance: Storing Charge & Energy | Electric Fields |
| 2-09 Tu | Lec 5. 20-1,2,3,4 | **20.** Current & Resistance: Ohm's Law | Labs on 2-12 & 2-15: |
| 2-10 We | Recitation 3 | **20.** | Ohm's Law & |
| 2-11 Th | Lec 6. 20-4,5,6 | **20.** Electric Energy Units, Hazards, AC | DC Circuits |
| 2-15 Mo | **Exam #1** | **Chs. 18,19,20 – Basic Electricity – Canvas** | |
| 2-16 Tu | Lec 7. 21-1,2,3 | **21.** DC Circuits & Kirchhoff's Rules | Labs on 2-19 & 2-22: |
| 2-17 We | Recitation 4 | **21.** | Currents & |
| 2-18 Th | Lec 8. 22-1,2,4,5 | **22.** Magnetic Field and Forces | Magnetic Fields |
| 2-23 Tu | Lec 9. 22-7,8,9,10 | **22.** Magnetic Applications: Solenoids, etc. | Labs on 2-26 & 3-01: |
| 2-24 We | Recitation 5 | **22.** | Electromagnetic |
| 2-25 Th | Lec 10. 23-1,2,3,5 | **23.** Induced Electromotive Force (Faraday's Law) | Induction |
| 3-02 Tu | Lec 11. 20-5 | **20.** Alternating Current and | |
| | Lec 11. 23-5,6,7 | **23.** Generators, Motors & Transformers, etc. | No Labs |
| 3-03 We | Recitation 6 | **23.** | on 3-05 and 3-08 |
| 3-04 Th | Lec 12. 23-9,11,12 | **23.** Inductance; AC Resonance | |
| 3-05 Fr | no labs | no labs | |
| 3-08 Mo | no labs | no labs | |
| 3-08 Mo | **Exam #2** | **Chs. 21,22,23 – Electromagnetics – Canvas** | |
| 3-09 Tu | Lec 13. 24-1,2,3,4 | **24.** Electromagnetic Waves | Labs on 3-11 & 3-15: |
| 3-10 We | Recitation 7 | **24.** | Ray Tracing |
| 3-11 Th | Lec 14. 25-1,2,7 | **25.** Images by Reflection, Mirrors | |

The online homework assignments are found online at saplinglearning.com and due on Sunday nights at 11:59 p.m. Exams start at 5:30 p.m. on the indicated Mondays, except for the Final, see the next page. Exam scores will be saved for each chapter; the lowest three chapters are dropped.

**Schedule for General Physics II, Spring 2021 (continued)**

| Date | Reading | Lecture Topics / Recitation Chapters | Week's Lab |
|---|---|---|---|
| 3-16 Tu | Lec 15. 25-3,4,6 | **25.** Images by Refraction, Lenses | Labs on 3-19 & 3-22: |
| 3-17 We | Recitation 8 | **25.** | Human Eye & |
| 3-18 Th | Lec 16. 26-1,2,4 | **26.** Optical Instruments & Vision | Simple Camera |
| 3-23 Tu | Lec 17. 27-1,2,3,4 | **27.** Light Waves & Interference | Labs on 3-26 & 3-29: |
| 3-24 We | Recitation 9 | **26,27.** | Diffraction & |
| 3-25 Th | Lec 18. 27-5,6,8 | **27.** Rayleigh's Diffraction Limit; Polarization | Interference |
| 3-29 Mo | **Exam #3** | **Chs. 24,25,26 – Optics – Canvas** | Labs on 4-02 & 4-05: |
| 3-30 Tu | Lec 19. 28-1,2,3 | **28.** Relativity – Time & Length | Polarization |
| 3-31 We | Recitation 10 | **28.** | of Light |
| 4-01 Th | Lec 20. 28-4,5,6 | **28.** Relativity – Mass & Energy | |
| 4-06 Tu | Lec 21. 29-1,2,3,4 | **29.** Thermal-photons, Photo-electrons | Labs on 4-09 & 4-12: |
| 4-07 We | Recitation 11 | **29.** | Photoelectric |
| 4-08 Th | Lec 22. 29-4,5,6 | **29.** Photons & Matter Waves | Effect |
| 4-12 Mo | **Exam #4** | **Chs. 27,28 – Modern Physics 1 – Canvas** | |
| 4-13 Tu | Lec 23. 29-6,7,8 | **29.** Quantum Mechanics & Uncertainty | No Labs on 4-16 & 4-19: |
| 4-14 We | Recitation 12 | **29.** | (well being days) |
| 4-15 Th | Lec 24. 30-1,2,3,6 | **30.** Atomic Spectra & Bohr's Model | |
| 4-16 Fr | nothing | KSU well being day | |
| 4-19 Mo | nothing | KSU well being day | |
| 4-20 Tu | Lec 25. 30-7,8,9 | **30.** QM Rules for Atoms; Periodic Table | Labs on 4-23 & 4-26: |
| 4-21 We | Recitation 13 | **30.** | Atomic Spectra |
| 4-22 Th | Lec 26. 31-1,2,3,4 | **31.** Nuclear Physics & Radioactive Decays | |
| 4-26 Mo | **Exam #5** | **Chs. 29,30 – Modern Physics 2 – Canvas** | |
| 4-27 Tu | Lec 27. 31-4,5,6 | **31.** Half-Life, Decay Rates & Activity | Labs on 4-30 & 5-03: |
| 4-28 We | Recitation 14 | **31.** | Simulated |
| 4-29 Th | Lec 28. 32-1,2,3,4 | **32.** Radiation Damage & Dosimetry | Nuclear Decay |
| 5-04 Tu | Lec 29. 32-5,6 | **32.** Nuclear Energy, Fission, Fusion | |
| 5-05 We | Recitation 15 | **32.** | No Labs on 5-07 & 5-10 |
| 5-06 Th | Lec 30. 32-2,5,6 | **32.** Nuclear Physics Review | |
| 5-11 Tu | **Exam #6** | **Chs. 31,32 – Nuclear Physics – Canvas** | |

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