**Physics 237**
**Fall 2019**

Class Meeting Times: Independent Lessons and By Appointment in Kip Trout's Office as Needed

**PHYS 237: Introduction to Modern Physics (3 Credits)**
Relativity and quantum theory applied to selected topics in atomic, molecular, solid state, and nuclear physics. **PHYS 237 Introduction to Modern Physics (3)**A broad survey of post-classical physics, taken by physics and other science and engineering students. Required of all physics majors, it is typically taken in the fourth semester. The course covers much of the modern physics curriculum including topics such as special relativity, the concepts and mathematical formalism of quantum mechanics, both in one- and three-dimensional model systems, and the applications of quantum theory to topics ranging from atomic/molecular, nuclear, particle, and condensed matter physics to astrophysics. The course is a prerequisite for a junior-senior course in quantum mechanics.

**Instructor:** Kip Trout, B.S., M.S., Physics

**Office Hours:** Mon; Wed; Fri: 11:15 AM - 12:05 PM in 35 MCB (Elec. Lab – Back Right Office Closet)
Mon; Wed: 3:00 PM - 4:30 PM in 35 MCB (Elec. Lab – Back Right Office Closet)
Or… by Appointment

**Phone:**  (717)-676-1274  (Between 9 AM and 9 PM only. I can receive **texts** at this number, too.)

**Email:**  kxt7@psu.edu

You are strongly encouraged to use your Penn State e-mail account to communicate with the instructor of this course. Depending upon network servers and filters, the instructor may not receive email from a commercial account, e.g., yahoo; gmail; comcast, msn, etc.

I do my best to keep up with my email. But I do receive a lot of it, and I have a family and life outside of our class. Therefore, please allow me **at least 24 hours** to respond to your email. **If the message is urgent, please use my phone number above and call or text.**

**Course Goals and Objectives:**
- To help you become a better college student.
- To provide students a working knowledge of introductory topics in Modern Physics
- To improve students' problem-solving abilities, especially as applied to physical systems
- The objectives for individual course lessons are outlined at the beginning of each lesson.

**Materials:**  **Modern Physics (3rd Ed), by Kenneth Krane** (ISBN: 978-1-118-06114-5)
- **Course Lessons/Lectures and HW Solutions** (available through CANVAS)
- **Plenty of paper, pencils and erasers!**
- **Calculator** (one with **at least** the basic trigonometric functions COS, SIN and TAN)
Progress: Students are encouraged to make steady progress by completing approximately ONE lesson PER WEEK during a regular PSU semester. It is possible to finish the course faster, but the material will probably be retained better and make more sense by putting regular time in each week at a fairly steady pace. Some of the course material can be counterintuitive, especially so for the relativistic or quantum mechanical topics. Sometimes, even days after completing a lesson, questions may come to mind regarding the lesson. Students are strongly encouraged to let this process play out by not progressing through the course too quickly.

Lesson Submissions: You should submit your assignments online in CANVAS as a PDF document. Most often students will complete the lessons in handwriting rather than typing. If the lessons are handwritten, they should be neatly written and scanned to PDF for submission. Alternatively, you can email your lesson assignments to kxt7@psu.edu as an email attachment in PDF format. You may also snail mail (U.S. Mail) handwritten versions of your assignments to me at 1031 Edgecomb Ave. York, PA 17403. If using U.S. Mail, a heads-up email is appreciated. There are 13 assignment lessons. Your score on the 13 lessons will be averaged together and will represent 30% of your course grade.

Lesson Preparation: More details about lesson preparation are given in the first lesson for the course. Type or neatly write out your answers to the lesson assignment. If you handwrite the lesson assignments, please write legibly! Use only one side of each sheet of paper, and do not crowd your work. Leave at least a 1.5 " margin on the left side of each page so that your instructor can write corrections or suggestions. Please identify EACH page with your name, PSU userID and course number (Phys237). Number the pages in sequence like this - - page 1 of 5, page 2 of 5, etcetera.

Lesson assignments that are illegible or poorly prepared will be returned to you ungraded. It is very important that you make and retain a copy of all of your assignments in case they get lost in campus mail or cyberspace. By scanning your lessons to PDF on a copier or using a phone app, the lessons should be automatically backed up for you.

Midterms and Final Examination:

There are two midterm tests. The midterms will each be worth 20% of your course grade. The final exam will be comprehensive and will be worth 30% of your course grade. You must also bring a pencil, eraser, calculator, and one form of picture identification to the tests.

Exams will cover material learned in the textbook reading assignments, study manual reading assignments, homework problems, and lesson assignments. The test format will be partial credit.

One 3" x 5" notecard (front and back) may be used at each exam. Three 3" x 5" note cards (front and back) may be used for the final exam.

Grading: Final grade in the course will be based upon the standard grading scale shown below, with each portion of the course scaled as indicated.

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>100% - 92%</td>
<td>A</td>
</tr>
<tr>
<td>91.9% - 90%</td>
<td>A-</td>
</tr>
<tr>
<td>89.9% - 88%</td>
<td>B+</td>
</tr>
<tr>
<td>87.9% - 82%</td>
<td>B</td>
</tr>
<tr>
<td>81.9% - 80%</td>
<td>B-</td>
</tr>
</tbody>
</table>
Lessons (13 Lessons in total)  30%
Midterm Exam I  20%
Midterm Exam II  20%
Final Exam  30%
TOTAL  100%

The instructor reserves the right to revise this grading system if he believes it is providing unfair or unreasonable grades. You must ultimately be competent in the course material and have regular attendance in order to pass.

Physics 237 – Course Outline

Lessons*

1  Review
2  The Special Theory of Relativity
3  The Particlelike Properties of Electromagnetic Radiation
4  The Wavelength Properties of Particles
5  Request for First Mid-Course Exam
6  The Schrodinger Equation
7  The Rutherford-Bohr Model of the Atom
8  The Hydrogen Atom in Wave Mechanics
9  Many-Electron Atoms
10 Request for Second Mid-Course Exam
11  Nuclear Structure and Radioactivity
12  Nuclear Reactions
13  Statistical Physics
14  Molecular Structure
15  Solid State Physics
16  Request for Final Exam

*Specific assignments for each lesson can be found in the study lessons for the course. Course reading averages about a chapter per lesson.

Be sure to read the university’s most up to date official statements on

- Academic Integrity,
- Disability Accommodation,
- Counseling and Psychological Services, and
- Education Equity/Report Bias

at the following website: https://york.psu.edu/academics/support/academic-affairs/syllabus-statements

Additionally, your professor, Kip Trout, has the following policies and reminders for you in this course. It is important that you understand these policies. Please ask Kip Trout questions about these policies if you need clarification.
Academic Integrity Statement for Mr. Trout’s Courses

Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. All University policies, Eberly College of Science policies, and University College policies regarding academic integrity/academic dishonesty apply to this course and the students enrolled in this course. Each student in this course is expected to work entirely on her/his own while taking any exam, to complete assignments on her/his own effort without the assistance of others unless directed otherwise by the instructor, and to abide by University, Eberly College of Science, and University College policies about academic integrity and academic dishonesty. It is your responsibility to be honest - and that means totally honest - throughout your college career. Your instructor believes that deceiving an instructor in any way, including lying, is grounds for dismissal from the University. Your instructor will do everything he can to see that the policies regarding academic integrity are upheld.

MAKE-UPS:

To make-up a test, you must contact the instructor before or within 24 hours of the test. A LEGITIMATE EXCUSE MUST BE PROVIDED AND THE INSTRUCTOR MAY MAKE PHONE CALLS TO FOLLOW UP ON THE EXCUSE. Examples of legitimate excuses:

1. Death of a family member or very close friend.
2. An incapacitating illness (stomach bug/horrible migraine/flu/etcetera).
3. Traffic accident or car breaks down.

The test makeup must occur within one week; otherwise the grade will be recorded as a zero.

Archiving: It is recommended that you save all of your graded lessons and tests so that you can resubmit them to your instructor at some point if it becomes necessary. The instructor cannot be responsible for Acts of God. Saving your work would allow me to reconstruct my gradebook in the event that disaster strikes.

Disability Accommodation: Penn State welcomes students with disabilities into the University’s educational programs. The university is happy to provide you with all of the assistance to which you are legally entitled. However, those accommodations cannot be provided until your disability is properly documented in the Nittany Success Center. So, if you are expecting or requesting special accommodations in the course, then you should see the Director of the Nittany Success Center on the upper floor of the Pullo Performing Arts Center (located adjacent to the library) immediately. Additionally, you must follow this process for every semester that you request accommodations.

Counseling and Psychological Services Statement: Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional well-being. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention,
consultations, online chats, and mental health screenings. Contact the Counseling and Psychological Services at Penn State York at 717-771-4088 or 717-771-4045.

Penn State Crisis Line (24 hours/7 days/week): 877-229-6400
Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

**Statement on Flu Outbreaks:** In compliance with Pennsylvania Department of Health and Centers for Disease Control recommendations, students should NOT attend class or any public gatherings while ill with influenza. Students with flu symptoms will be asked to leave campus if possible and to return home during recovery. The illness and self-isolation period will usually be about a week. It is very important that individuals avoid spreading the flu to others. I’ll students should inform their instructors (but not through personal contact in which there is a risk of exposing others to the virus) as soon as possible that they are absent because of the flu and follow up to make arrangements to make up missed assignments or exams. For health-related questions you can email the Director of the University Health Services, at uhsinfo@sa.psu.edu.

**Snow Delay/Campus Closure Information:** In the event of a campus closure, course requirements, classes, deadlines and grading schemes are sometimes adjusted. Information about course changes will be communicated to you in some reasonable manner as soon as possible.

For notification about campus closures, please refer to Penn State York’s website at [http://www.yk.psu.edu](http://www.yk.psu.edu), call the weather hotline at 717.771.4079, or sign up for live text messages at PSUAlert ([https://psualert.psu.edu/psualert/](https://psualert.psu.edu/psualert/)). This is a service designed to alert the Penn State community via text messages to cell phones when situations arise on campus that affect the ability of the campus - students, faculty and staff - to function normally.

On a wintry day, if there is any change in the regular class schedule, many of the local broadcast stations will be contacted, including WSBA 910 AM; WHP 580 AM; and WGAL-TV Channel 8 (TV). If the announcement indicates we are on a **SNOW SCHEDULE (2-hr delay)**, that means:

<table>
<thead>
<tr>
<th>Typical M-W-F Times</th>
<th>Snow Time</th>
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<tbody>
<tr>
<td>8:00 - 8:50 a.m.</td>
<td>10:00 - 10:40 a.m.</td>
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<tr>
<td>9:05 - 9:55 a.m.</td>
<td>10:50 - 11:30 a.m.</td>
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<tr>
<td>10:10 - 11:00 a.m.</td>
<td>11:40 - 12:20 p.m.</td>
</tr>
<tr>
<td>11:15 - 12:05</td>
<td>12:30 - 1:10 p.m.</td>
</tr>
<tr>
<td>1:25 - 2:40 p.m.</td>
<td>1:40 - 2:30 p.m.</td>
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<tr>
<td>2:30 - 3:20 p.m.</td>
<td>2:30 - 3:20 p.m.</td>
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</tbody>
</table>

*All classes scheduled from 2:30 pm on meet at their regularly scheduled time.

<table>
<thead>
<tr>
<th>Typical T-R Times</th>
<th>Snow Time</th>
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</thead>
<tbody>
<tr>
<td>8:00 - 8:50 a.m.</td>
<td>10:00 - 10:40 a.m.</td>
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<tr>
<td>9:05 - 10:20 a.m.</td>
<td>10:50 - 11:45 p.m.</td>
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<tr>
<td>10:35 - 11:50 a.m.</td>
<td>11:55 - 12:50 p.m.</td>
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<tr>
<td>1:35 - 2:50 p.m.</td>
<td>2:05 - 3:00 p.m.</td>
</tr>
<tr>
<td>3:05 - 4:20 p.m.</td>
<td>3:05 - 4:20 p.m.</td>
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*All classes scheduled from 3:05 pm on meet at their regularly scheduled time.

**Some Dates of Interest:**
- August 12 – Sept. 10, 2019: Apply for Graduation activation period
- Sat. Aug. 31: Regular Drop Deadline
- Mon. Sept. 2: No Classes – LABOR DAY
- Fri. Nov. 15: Late Drop Deadline
- Nov. 24 – 30: No Classes – THANKSGIVING BREAK
- Fri. Dec. 13: Last Day of Classes – Fall 2019
- Dec. 16 – 20: Final Exams
**Syllabus subject to change:** I anticipate that we will follow the plan that is presented in this syllabus. However, I may adjust some things as the course unfolds. Be sure to check in regularly with a classmate or the instructor to see if lessons have changed. I may also change basis for the course grade; if I do so, I will communicate this in a reasonable method. Remaining in the course after reading this syllabus signals that you accept the possibility of changes and responsibility for being aware of them.

**Suggestions from Your Instructor:**

To do well in a physics class you must be very good at all of the following:
1.) Math
2.) Logic (i.e. problem solving)
3.) Concentration
4.) Reading Skills
5.) Physics

A weakness in any of these areas will cause you to struggle in a physics class. If you find yourself struggling in the course, try to narrow in on what is giving you the trouble. A chain is only as strong as its weakest link. You will find that your physics class is much easier when you become strong in the first four categories listed above. The most important thing you should do is practice, practice, practice!

**Purpose of Course Parts**

**Lessons:** These are your main guide for what is important to study in the course. Many test questions will check your understanding of this material and will contain the types of problems discussed or assigned in the lessons.

**Readings:** The reading assignments are meant to "fill the gaps" in the lesson notes and assignments and to provide you further insight into the material. Material learned in reading is important!

**Videos:** The links to videos or computer animations online are meant to help you better understand the course material and its relationship to other topics. Sometimes hearing a different explanation/analogy or seeing a visualization of a complex idea can help.
Getting Started with CANVAS

Penn State uses a Course Management System called CANVAS. This is the place where many of your faculty members will store their syllabi, course materials, and sometimes quizzes, discussions, and places to turn in homework electronically. You can also see your course grades in Canvas if a faculty member chooses to use the gradebook. Your faculty members will tell you where to go to access your course materials - either in Canvas, or simply in class.

Communication in Canvas

Many times, faculty will also use the built-in communication tools like Canvas Inbox (mail tool) or announcements to keep you up to date. These are different from your official PSU email (webmail.psu.edu). Your faculty members will tell you how they prefer you to communicate with them. Just ask if you are not sure.

If you need technical help using Canvas

PSU has purchased a very robust help system for you. First, log-in to Canvas by clicking on the sign-in to Canvas button at

https://lmstools.ais.psu.edu/login/index.html.

Then in the bottom left corner of the Canvas screen, you will see a "?" Help icon. Click on the "?" and your help options will appear in a pop-up box - everything from chat, to phone, to guides, to email support. Please use the help options, they are great!! You can also look things up yourself in the Student Guide (one of the help options above!) available at
https://community.canvaslms.com/docs/DOC-4121.

Setting up Notifications

Canvas has very powerful notification settings that you can use to get updates via email or text message on things like announcements, grade postings, messages, and calendar changes. However, these all depend on how your faculty member decides to use Canvas. If they are not using the announcement feature, for example, then obviously, you won't get a text message with those kinds of updates. The most important thing to remember is to talk to your faculty member (usually posted in the syllabus) about how they want you to communicate with them and which features they decide to use. To read more about notification settings, go to
https://community.canvaslms.com/docs/DOC-1286

Canvas App

Lastly, Canvas has a student app that you can install on iPads, Android tablets, and smartphones. You can download these from the app store on your device. Use the technical support if you have questions.