# PHYS 1210/1310: Physics I – Mechanics Sum 22

**General Information**

Office E-mail

Instructor: R. Michalak, 215 PS rudim@uwyo.edu

TAs: N/A

**Office hours:**

tbd

*This course fulfils university program requirement USP03 ‘SP’ and USP2015 ‘PN’ for 4 credit hours*

Lecture & discussion: In-person class MTWRF 1100-1240 Enzi 185

synchronous Zoom runs during in-person lecture; video posted same day in Wyocourses under Announcements for asynchronous use; attendance only counts for synchronous attendance for the full lecture or in-person.

Laboratory : included in lecture time

Text: Sears & Zemansky’s University Physics, by

Young&Freedman  *provided via inclusive access through Wyocourses*

MasteringPhysics : inclusive access through Wyocourses

*Supplementary Reading Suggestions: On your request I am happy to name some useful texts, which adopt different teaching approaches than Young Friedman.*

**Course Content and Course Pre-Requisites:**

This course is an introduction to the physical phenomenon of gravity and the field of mechanics. We will approach the material from theoretical and applied angles. Our course is part of the suite of experimental physics courses. Consequently, significant emphasis is put on developing laboratory skills. Most physics courses differ from engineering courses in that *we pay* much ***more attention to where laws and equations come from*** (‘derive’ them) and what their ***range of applicability*** is. ALL laws of physics have significant limitations as to when and where they apply. It is important for any deeper understanding that the student develops an insight into these aspects of physical law.

Mechanics builds the foundation of classical physics and many disciplines, which build on it. We will deal with the so-called Newtonian Mechanics and will concentrate on an understanding of the concepts of force and energy as cornerstones of the theory. We will formulate the principles of Newton’s Laws, Energy Conservation, Momentum Conservation, and Angular Momentum Conservation.

These do all apply, too, in a bigger context than just Mechanics of Classical Physics, but their foundation lies in this field. We will then extend our understanding of Newtonian Mechanics to periodic motion and wave motion (Mechanics of Waves).

*A working knowledge of calculus is required.* ***Calculus I*** *is a* ***pre-requisite*** *for this course!* ***Calculus II*** *is a co-requisite! Note, that the systematic of the science of physics does not follow the systematic of mathematics! We will have to use concepts like differentiation, integration, and vectors from week one on. Also, good success in this course is unlikely without a solid grasp of algebra, geometry, and trigonometry.*

**All of the following information is tentative and I reserve the right to change any of it as seems necessary to keep the class average on course. If such changes are made, they will be announced in class:**

**Lecture**

Our course consists of a large amount of information in terms of concepts and problems. I have arranged the content into five major sections:

***Kinematics*** – the study of motion;

***Dynamics*** – the study of the causes of change of motion;

***Laws of Conservation*** – how to set up other equations for solving problems;

***Rotational Motion***- ibid.

***Special Cases*** - Law of Gravity & Periodic Motion and Mechanical Waves.

*Some technical notes:*

The lecture will in part be presented in power point and in part on the white board. Demonstrations, videos, and web-applets will be used wherever helpful in illustrating a complex or new phenomenon or principle.

You need to write down the information on the black board as your lecture notes, or it will be lost. You are expected to take notes about videos and demonstrations. The content of both may be part of exam questions.

I employ group work techniques during lecture. Our department’s record has shown that the use of modern teaching techniques deepens understanding and reliably improves the outcome of standardized tests of knowledge retention. You will see this at work when you do the FCI benchmark bonus test.

Our brain has only so much capacity to deal with new things in a short amount of time. To help you with that aspect of learning, I break lecture down into small lecture blocks and interactive activities. Some activities deal with videos, others with web applets (bring an internet device to class, if you can), others with in-class demonstrations and twenty minutes hands-on experiments taken from labs, and yet others with active problem solving. They are designed to clear your brain’s short term memory while processing what you have learned (‘download’ it) and make the memory susceptible again. This help will only be effective, if you actively participate in the assignments.

## Discussion Sessions and Laboratory

Discussions are integrated with lecture (studio style).

***Lab reports are mandatory*** for the successful completion of this course. Each student submits a lab report. Nearly identical copies of reports are not accepted. The report consists of:

*A concise description of the apparatus and anticipated main errors.*

*A summary statement about the main result(s) within error.*

*Tables with the main data analysis (usually average and standard deviation).*

*Graphs with proper error bars and appropriate fitting curves.*

*The pre lab answers (see lab manual).*

**Take note of these categories as points for reports are awarded according to this list only.**

**Exams**

The exams will contain both quantitative and conceptual problems. The exam is ***closed book and closed notes***. I will provide you with a formula sheet. You can see it in the lab manual. The use of any electronic equipment other than the computer you use for the exam is not allowed during the exam. Calculators with no formulas stored on them are acceptable.

All exams are mandatory and none of the grades will be dropped or replaced. The exams will be held at the following times and cover the following chapters in *Young & Freedman*:

Exam 1, midterm – F June 17th 1100 – 1240 pm Chapter 2-8

Exam 2, final – F July 15th 1100 – 1240 pm Chapter 9,10,12,13,15

**Homework**

We use the Mastering Physics online homework system (see course webpage). The online homework must be submitted by each student individually but you are *allowed to work together on* *the solution as long as everyone contributes an equal share and contributes* ***to all*** *problems*.

The deadline for each homework is indicated in the tentative schedule below but is subject to change *as announced during Office Hour and in Mastering Physics*. Be advised not to work last minute on the online submissions. The system tends to be busy at times and the internet connection could be down. It is your responsibility to work and submit before the deadline. I set the online hw system up to accept post deadline submissions for a penalty. The penalty builds up over two hours and then stays constant till the end of term. The system will close for late submission on the Saturday after final exam at 11pm.

The MP syntax requires some experience. I provide a no penalties training hw, which does not count toward the grade, but which gives you opportunity to learn the language syntax to avoid penalties in the actual hw. It is called ‘HW 0 - Introduction’. You should strive to use the training hw tonight because regular hw will be due soon.

A short list of common sources of grade loss in MP:

* Wrong spacer between multiple entries
* Wrong rounding of final or intermediate results
* Multiple attempts used up for the same wrong answer (note also: MP has a 2% answer tolerance criterion for grading)

Some problems have hint boxes. Opening hint boxes is not causing any penalty, except when you enter wrong answers into answer boxes within hint boxes. On the other hand, you can earn partial credit for a correct answer in a hint box.

Exams are **not** group work and must be entirely your own work and must be performed without consulting any help (no books, notes, electronic media, etc. other than what is being handed out to you).

Anyone, who will be caught committing academic dishonesty of any kind, will have charges filed against them with the College of A&S and the Dean of Students will be formally notified of the incident to take it on record. A typical penalty will be an F in the course.

**Grading**

The average final grade in the course has historically been a C+/B- (GPA ~ 2.6). This is close to the ten year average College of A&S and College of Engineering grade averages for 1000 and 2000 level classes (GPA 2.6).

Details of grading (subject to revision):

Exams: 2 (56%)

Homework: 6 double (20%)

Labs: 6 reports (18%)

2 lab perf. (bonus < = 5%)

Attendance: 32 (35-3) (6%)

*Three lecture absences excused without need to document reasons.*

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**100%** (+5% optional)

**Scale:**

A > 90.0%

B 80.0-89.99%

C 70.0-79.99%

D 60.0-69.99%

F < 60.0%

I reserve the right to curve the final grade and each exam.

I will discuss grades for hw, labs, exams, and all other grades *only for up to one week after* the work has been handed back to class (not one week after you have collected it).

**General requirements and expectations for the course:**

**Required texts, readings, and special tools or materials:**

Young Freedman, inclusive access

Michalak, Lab Manual

**General requirements and expectations for the course:**

Attendance is required. Absences in lab result in failing the course.

Late work is accepted. Mastering Physics has been set up to accept late hw until the last day of class for a penalty of 35%.

Students are expected to attend and participate in all activities, labs, and lectures. Students with a perfect attendance record in discussion and lecture get a 1% bonus toward final grades.

Grading Scale and Grading Policies:

90-80-70-60 scale.

Classroom Behaviour Policy:

Watch every lecture video, read the text and attend every online Office Hour and discussion, and attend each exam. Hand in every lab unless you transferred lab from a previous course.

**Classroom Statement on Diversity:** “The University of Wyoming values an educational environment that is diverse, equitable, and inclusive. The diversity that students and faculty bring to class, including age, country of origin, culture, disability, economic class, ethnicity, gender identity, immigration status, linguistic, political affiliation, race, religion, sexual orientation, veteran status, worldview, and other social and cultural diversity is valued, respected, and considered a resource for learning. “

**Disability Support**:

*The University of Wyoming is committed to providing equitable access to learning opportunities for all students.* *If you have a disability, including but not limited to physical, learning, sensory or psychological disabilities, and would like to request accommodations in this course due to your disability, , please register with and provide documentation of your disability as soon as possible to Disability Support Services (DSS), Room 128 Knight Hall. You may also contact DSS at (307) 766-3073 or*[*udss@uwyo.edu.*](mailto:udss@uwyo.edu)*It is in the student’s best interest to request accommodations within the first week of classes, understanding that accommodations are not retroactive. Visit the DSS website for more information at:*[*www.uwyo.edu/udss*](http://www.uwyo.edu/udss)

**Academic Dishonesty Policies**:

*Academic dishonesty will not be tolerated in this class. Cases of academic dishonesty will be treated in accordance with UW Regulation 2-114. The penalties for academic dishonesty can include, at my discretion, an “F” on an exam, an “F” on the class component exercise, and/or an “F” in the entire course. Academic dishonesty means anything that represents someone else’s ideas as your own without attribution. It is intellectual theft – stealing - and includes (but is not limited to) unapproved assistance on examinations, plagiarism (use of any amount of another person’s writings, blog posts, publications, and other materials without attributing that material to that person with citations), or fabrication of referenced information. Facilitation of another person’s academic dishonesty is also considered academic dishonesty and will be treated identically.*

**Duty to Report:**

*While I want you to feel comfortable coming to me with issues you may be struggling with or concerns you may be having, please be aware that I have some reporting requirements that are part of my job requirements at UW.*

*For example, if you inform me of an issue of sexual harassment, sexual assault, or discrimination I will keep the information as private as I can, but I am required to bring it to the attention of the institution’s Title IX Coordinator. If you would like to talk to those offices directly, you can contact Equal Opportunity Report and Response (Bureau of Mines Room 319, 766-5200,* [*report-it@uwyo.edu*](mailto:report-it@uwyo.edu)*,* [*www.uwyo.edu/reportit*](http://www.uwyo.edu/reportit)*). Additionally, you can also report incidents or complaints to the UW Police Department. You can also get support at the STOP Violence program (*[*stopviolence@uwyo.edu*](mailto:stopviolence@uwyo.edu)*,* [*www.uwyo.edu/stop*](http://www.uwyo.edu/stop)*, 766-3296) (or SAFE Project (*[*www.safeproject.org*](http://www.safeproject.org/)*,* [*campus@safeproject.org*](mailto:campus@safeproject.org)*, 766-3434, 24-Hour hotline: 745-3556).*

*Another common example is if you are struggling with an issue that may be traumatic or unusual stress. I will likely inform the Dean of Students Office or Counseling Center. If you would like to reach out directly to them for assistance, you can contact them using the info below or going to* [*www.uwyo.edu/dos/uwyocares*](http://www.uwyo.edu/dos/uwyocares)*.*

*Finally, know that if, for some reason, our interaction involves a disruptive behavior or potential violation of policy, I inform the Dean of Students, even when you and I may have reached an informal resolution to the incident. The purpose of this is to keep the Dean apprised of any behaviors and what was done to resolve them.*

**Substantive changes to syllabus**

*All deadlines, requirements, and course structure are subject to change if deemed necessary by the instructor. Students will be notified of these changes verbally in class, on our WyoCourses page announcement, and via UWYO address email.*

*Circumstances may alter the reading and/or test schedules. You are required to check WyoCourses and your email at least twice a day.*

**Student Resources:**

*DISABILITY SUPPORT SERVICES:* [*udss@uwyo.edu*](mailto:udss@uwyo.edu)*, 766-3073, 128 Knight Hall,* [*www.uwyo.edu/udss*](http://www.uwyo.edu/udss)

*COUNSELING CENTER:* [*uccstaff@uwyo.edu*](mailto:uccstaff@uwyo.edu)*, 766-2187, 766-8989 (After hours), 341 Knight Hall,* [*www.uwyo.edu/ucc*](http://www.uwyo.edu/ucc)

*ACADEMIC AFFAIRS: 766-4286, 312 Old Main,* [*www.uwyo.edu/acadaffairs*](http://www.uwyo.edu/acadaffairs)

*DEAN OF STUDENTS OFFICE:* [*dos@uwyo.edu*](mailto:dos@uwyo.edu)*, 766-3296, 128 Knight Hall,* [*www.uwyo.edu/dos*](http://www.uwyo.edu/dos)

*UW POLICE DEPARTMENT:* [*uwpd@uwyo.edu*](mailto:uwpd@uwyo.edu)*, 766-5179, 1426 E Flint St,* [*www.uwyo.edu/uwpd*](http://www.uwyo.edu/uwpd)

*STUDENT CODE OF CONDUCT WEBSITE:* [*www.uwyo.edu/dos/conduct*](http://www.uwyo.edu/dos/conduct)

Schedule Phys 1210 Summer Course ‘22

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| --- | --- | --- | --- | --- | --- |
|  | M  1100-1240 | T  1100-1240 | W  1100-1240 | R  1100-1240 | F  1100-1240  hw deadlines |
| May 23-26 | Intro  K1 | K2 | K3 | K4 | K5  prelab  HW0, 11pm |
| May30–Jun3 | K6 | K7  Expt(I)  Proj Mot | D1 | D2 | D3  HW1/2, Sun 11pm |
| Jun 6 – 10 | D4 | D5  Expt(II)  N Law | C1 | C2 | C3  HW3/4, Sun 11pm |
| Jun 13 -17 | C4 | C5  Expt(III)  Momentum | C6 | R1    HW5/6,Thu 11pm | midterm |
| Jun 20-24 | R2 | R3  Expt(IV)  Unfair Race | R4 | R5 | R6  HW7/8, Sun 11pm |
| Jun27- Jul1 | R7 | R8  Expt(V)  Atwood | R9 | PM1 | PM2  HW9/10,Sun11pm |
| Jul 4 – 8 | -  May the fourth be with you | PM3  Expt(VI)  Pendulum | PM4 | W1 | W2  HW11/12,Sun11pm |
| Jul 11-15 | W3 | W4  Expt(VII)\*  Stdg. Waves | W5 | G1  HW13 Thu 11pm | final exam |

K – Kinematics D – Dynamics C – Conservation Laws R – Rotational Motion PM – Periodic Motion W – Mechanical Waves G- Gravity

**\* no lab report**

**Regular term lecture plan (use reading guide on webpage to come prepared):**

**Intro Syllabus in online Office Hour 1 on 5/27 matching lab**

**K1 ch 2: models, velocity/acceleration, vectors**

**K2 ch 2: examples**

**K3 ch 3: examples, more on vectors**

**K4 ch 3: projectile motion, examples**

**K5 ch 3: proj. motion, examples; rel. mot. prelab**

**K6 ch 3: relative motion**

**K7 Projectile motion**

**D1 ch 4: Newton Laws, forces**

**D2 ch 4: examples, more on forces**

**D3 ch 4: examples**

**D4 ch 5: examples with friction**

**D5 Verifying Newton’ Law**

**D6 ch 5: examples with friction**

**C1 ch 6: work and energy**

**C2 ch 7: energy conservation**

**C3 ch 8: momentum, mom. Conservation**

**C4 ch 8: examples**

**C5 Momentum Lab**

**C6 ch 8: center of mass, examples**

**R1 ch 9: translation key, radians ‘unit’**

**R2 ch 9: rotational kinematics, mom inertia**

**R3 Unfair Race**

**R4 ch 9: mom. of inertia; more rot. Kin.**

**R5 ch9/10: torque + rotational dynamics**

**R6 ch9/10: torque + rotational dynamics**

**R7 ch10: angular momentum**

**R8 Atwood Machine**

**R9 (ch10: angular momentum, gyroscopes etc.**

**PM1 ch14: period and equilibrium, displacement eqn**

**PM2 ch14: examples harmonic oscillator**

**PM3 ch14: simple pendulum Pendulum**

**PM4 ch14: damped and forced PM, resonance**

**W1 ch15: transverse waves, wave velocity**

**W2 ch15: transverse waves, wave velocity**

**W3 ch15: standing waves**

**W4 (ch15: standing waves, wave eqn) Standing Waves\***

**W5 ch16: long. waves – dB, pressure, Doppler Effect**

**G1 ch13: Law of Gravitation, grav. Energy, g(r)**