

Sample Syllabi – Subject to Change

Physics 10700: Gravitation to Levitation: Physics from Supernova to Superconductor

Professor: Prof. Savan Kharel (he/him)

Textbook:

The Character of Physical Law, Richard Feynman The MIT Press; Reprint edition , Course notes by Professor

Class Information

Course Description

This course presents an introduction to the foundational concepts of fundamental interactions and its varied applications. Concepts include gravity, electromagnetism, light, particle physics, and quantum mechanics. Students will see how laws of physics are universal and how principles of physics can help us understand a range of phenomena from black holes to biology, superconductors to supernova and so on. The emphasis will be to establish strong conceptual foundations of physics and its application to cutting edge modern research. Students will be reading pedagogical scientific papers at the appropriate level. The course will be taught in an inclusive and interactive method.

Why is the Character of Physical Law?

Some physicists peer through telescope to see the largest scale of the universe. Some use particle accelerators to detect the smallest particles such as quarks and gluons. Some physicists are interested in developing quantum computers while others are interested in understanding the quantum nature of black holes. Physics can enrich the life you live. In this course, we will study topics that will give you a glimpse of the extraordinary world of physics. I envy you; I was once in your shoes. How thrilling and exciting to embark in the journey to study the laws of the universe!!!

Workload

We will integrate lectures and use interactive tools that promotes classroom engagement. The class period will provide opportunities for students to learn from one another as well as the instructor. I expect students to read the assigned materials before the class. I also expect to show you some interesting demonstrations and videos. Assigned material could either come from chapters in the textbook or other materials. There will be a reading reflection that is due two times a week. Moreover, there will be written homework assignment that is due each week.

Learning Outcome

At the end of the class, you should be able to:

- understand how laws of physics applies to phenomena in the world.
- apply basic mathematical tools to physics problems and use approximations and estimations to simply complex problems.
- transfer knowledge of physics to other disciplines like biology, chemistry, and other dimensions of human life.
- identify connections between the discipline of physics and human society.
- **understand and abide by the principle of academic integrity in the context of a physics course.**

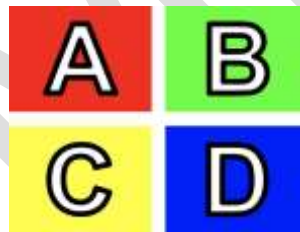
Technology

Canvas

Please make sure you are checking your canvas regularly. All announcements will be made there and I will also be uploading course materials and assignments.

ABCD card

I will use ABCD cards to get feedback on conceptual question during class. It is your responsibility to bring it with you to every class. If you lose it print it from the canvas site.



Whiteboard

For in class group work, I will be providing whiteboards.





Assessments

Class Participation (5%) and reading reflection (5%)

- During class, we will review physical principles, discuss conceptual and quantitative physics problems, and address questions from your reading reflections. Every week, you will have an opportunity to write your reading reflections, watch youtube video, and/or read an academic paper. This will be posted on canvas.
- **You are not allowed to use phones and computers in the classroom.** Studies show that multitasking during class time is detrimental for your learning and class performance. These studies furthermore show that multitasking distractions in class also disrupt your classmates learning. Therefore, out of consideration for everyone, as well as to maximize your own learning, cell phones, laptops may NOT be used in class, and should be put away in your bag. If there are special circumstances that absolutely require the use of these items in class, please speak to me ahead of time. **Using phones and computers room without prior notification to me will hurt your participation grade.**
- You are expected to attend class lectures. Attendance will be taken periodically. If you miss these attendance, it will hurt your grades.

Examinations (30%)

Exam covers a large portion of your grade. In order to do well in exams, you need to do your assignments diligently and regularly attend lectures. There is no final comprehensive exam.

Homework Assignments (40%)

Developing problem solving skill is the central objectives of this course. There will be a variety of problems in the homework ranging from conceptual problems to longer quantitative problems. I strongly encourage you to think about the problems and attempt it yourself before working with others. Of course, I invite you to work with others and seek assistance from me and the teaching assistants. You will be required to upload a pdf scan of your work to Canvas. **I will NOT accept late homework unless there is a documented excuse.**

Application of Physics to Community and the world (10%)

In this project, you will get a chance to showcase your interest and connect it with physics. The project could range from a video project to a written essay. More details will be provided!

Laboratories (10%)

This course includes a laboratory component that is designed and taught by the Department of Physics laboratory staff.

Extra Credit Assignment (Reflections of Physics and Physics Vlog)

An extra credit problem will be assigned. It is voluntary. (see canvas)

Diversity, Equity, and Inclusive Policies

Academic Integrity : Please hand in work that is your own and cite or give credit when you use somebody else's work. Review the university of Chicago policies for academic integrity. Suspected violations of academic integrity will be reported to the Dean of Students. **Assignments with "any" plagiarized elements will receive a zero.** There will be an assignment in canvas about academic integrity in the classroom!

Student Disability Services: Please contact SDS (disabilities@uchicago.edu) to set up accommodations for this course. All information will remain confidential.

Inclusive Learning Environment : This class will be an inclusive community, learning from the many perspectives that come from having differing backgrounds and beliefs. As a community, we aim to be respectful to all. I will conduct a class where we reject all forms of prejudice and discrimination, including but not limited to those based on age, color, disability, gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, and veteran status. Students are expected to commit to creating an environment that facilitates inquiry and self-expressions, while also demonstrating diligence in understanding how others' viewpoints may be different from their own. I will do the same and try to bring the best out of all of you.

Multilingual Students: If English is not your first language, please do not hesitate to contact me. I will try my best to accommodate you.

Personal Pronouns: If you prefer to be called a different name than what is on the class roster, please let me know. Feel free to correct me on your personal pronouns.

Very Tentative Class Schedule and Reading *

- Week 1:
 - Foundation: Laws of Motion: Newton to Einstein
 - Foundation: Energy and its application(also lab elements)
 - Week 2:
 - Holding the world together: Gravity and its mystery (black holes, neutron star, supernova),
 - Physics of interstellar and physics of "Interstellar", the movie; Gravitational waves
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- Foundation: Electric fields and Magnetic Fields, an introduction (lab elements)

- Week 3:
 - Application of EM fields: from electromagnetic waves, electric fishes to neutron star

*These are tentative dates. I will inform you of many inevitable changes throughout the semester. If there is a change in exam date, I will announce it at least a week ahead of time.

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- Strong and Weak Forces, Watch documentary: Particle Fever
- Applications to QM: superconductors to Large Hadron Colliders and perhaps visit to lab

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