

## **University Physics Summer Assignment for GSIP Physics Seniors 2025/2026**

The summer assignment has two parts: the conceptual understanding and the response paper. Please submit the assignment as a single pdf file through Canvas by Friday, August 22, 2025.

### **(1) Conceptual Understanding**

This part of the assignment is organized in seven different topics. Write a short paragraph to answer each individual question. Here are some URLs to instructional and necessary background materials:

[http://apcentral.collegeboard.com/apc/public/courses/teachers\\_corner/2262.html](http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/2262.html)  
[http://apcentral.collegeboard.com/apc/public/courses/teachers\\_corner/225113.html](http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/225113.html)  
<https://apstudent.collegeboard.org/apcourse/ap-physics-1>  
<https://apstudent.collegeboard.org/apcourse/ap-physics-2>  
<http://www.howstuffworks.com>  
<http://www.howeverythingworks.org>  
<http://www.physicsclassroom.com>  
<http://www.physicscentral.com>  
<https://www.khanacademy.org/science/physics>  
<http://www.bozemanscience.com/ap-physics>  
<https://www.youtube.com/channel/UCEWpbFLzoYGPfuWUMFPSaoA>  
<https://www.flippingphysics.com/>

**Topic 1: Objects and systems have properties such as mass and charge. Systems may have internal structure.**

- Discuss how the internal structure of a system determines many properties of the system. (5 pts.)
- Explain the concept of mass and electric charge. (5 pts.)

**Topic 2: Fields existing in space can be used to explain interactions.**

- Describe the concept of a field in physics and give an example. (5 pts.)

**Topic 3: The interactions of an object with other objects can be described by forces.**

- Discuss the concept of force at the macroscopic level. (5 pts.)
- Explain the relationship between the force and acceleration. (5 pts.)
- What is a free-body diagram? Provide an example. (5 pts.)

**Topic 4: Interactions between systems can result in changes in those systems.**

- Discuss how interactions with other objects or systems can change the total linear momentum of a system. (5 pts.)
- Discuss how interactions with other objects or systems can change the total energy of a system. (5 pts.)
- Discuss how a net torque exerted on a system by other objects or systems will change the angular momentum of the system. (5 pts.)
- Discuss how the electric and magnetic properties of a system can change in response to the presence of, or changes in, other objects or systems. (5 pts.)

**Topic 5: Changes that occur as a result of interactions are constrained by conservation laws.**

- What are some conserved quantities in physics? Provide an example. (5 pts.)

**Topic 6: Waves can transfer energy and momentum from one location to another without permanent transfer of mass and serve as a mathematical model for description of other phenomena.**

- Explain the concept of a periodic mechanical wave. (5 pts.)
- Discuss the interference and superposition that lead to standing waves and beats. (5 pts.)
- Discuss the wave diffraction. (5 pts.)
- Characterize the types of electromagnetic radiation by their wavelengths. (5 pts.)
- Discuss how matter can be modeled as waves or as particles. (5 pts.)

**Topic 7: The mathematics of probability can be used to describe the behavior of complex systems and to interpret the behavior of quantum mechanical systems.**

- Discuss how the properties of an ideal gas can be explained in terms of a small number of macroscopic variables including temperature and pressure. (5 pts.)
- What does the second law of thermodynamics describe? (5 pts.)
- Discuss the probabilistic description of the microscopic world. (5 pts.)

## **(2) Physics in the News Response Paper**

Find a current (within the past year) physical science article and write a two-paragraph summary following the guidelines below.

### **Paragraph 1: Source Information (4-5 sentences) (10 pts.)**

Please address the following:

- What is the title of the article?
- Who wrote it?
- Where did the article come from?
- When was it published?
- Why did the author(s) write it?
- Who is the intended audience?
- Explain the validity and reliability of the source.

### **Paragraph 2: Summary Information (9-10 sentences) (10 pts.)**

Please address the following:

- Summarize each of the main ideas in your own words.
- Support your topic sentences with evidence from the article.
- Explain how this article connects to your junior physics class.
- What did you find interesting or why did you choose this article?
- Who would use this information?

Please make sure to include a citation of your source using your preferred format, but be sure to include the following information:

- Name of author
- Title of website, magazine, or newspaper
- Article title
- Date written
- URL

Here are some good internet sources, where you might find something interesting:

<https://www.sciencedaily.com/>

<https://phys.org/>

<https://www.sciencenews.org/>

<https://www.scientificamerican.com/>

Good luck with the assignment!