

## University Physics Summer Assignment for GSIP Seniors 2020/21

The summer assignment consists of two separate assignments, i.e. the conceptual questions and the response paper. You will staple both assignments together and bring the entire summer assignment to class on Friday, August 28.

### (1) Conceptual Questions

The conceptual questions are 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>

**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!