



Ride the Wave

Contact Information

Mr. Harley Young, MS, MAT

Email: harley.young@ileadonline.org

Office: (218) 302-5075

Virtual Office: [Office Space](#)

Please feel free to contact me if you get confused or have any other issues. I will reply within 24 hours on weekdays. I facilitate multiple courses so please include your name and the class name when you contact me.

Course Requirements

- Describe the force in an elastic spring.
- Determine the energy stored in an elastic spring.
- Compare simple harmonic motion and the motion of a pendulum.
- Identify how waves transfer energy without transferring matter.
- Contrast transverse and longitudinal waves.
- Relate wave speed, wavelength, and frequency.
- Relate a wave's speed to the medium and refracted at boundaries between media.

- Apply the principle of superposition to the phenomenon of interference.
- Demonstrate the properties that sound shares with other waves.
- Relate the physical properties of sound waves to our perception of sound.
- Identify some applications of the Doppler Effect.
- Describe the origin of sound.
- Demonstrate an understanding of resonance, especially as applied to air columns and strings.
- Explain why there are variations in sound among instruments and among voices.
- Develop the ray model of light.
- Predict the effect of distance on light's illuminance.
- Solve problems involving the speed of light.
- Describe how diffraction demonstrates that light is a wave.
- Predict the effect of mixing colors of light and pigments.
- Explain phenomena such as polarization and the Doppler Effect.
- Explain the law of reflection.
- Distinguish between specular and diffuse reflection.
- Locate the images formed by plane mirrors.
- Explain how concave and convex mirrors form images.
- Describe properties and uses of spherical mirrors.
- Determine the locations and sizes of spherical mirror images.
- Solve problems involving refraction.
- Explain total internal reflection

Course Goals

- Students will investigate the nature of waves and wave phenomena, building upon prior knowledge of motion.
- Students will analyze simple harmonic motion and its connection to wave behavior.
- Students will gain a comprehensive understanding of wave properties, including frequency, wavelength, and wave speed.
- Students will explore the characteristics of sound waves and their interaction with the human ear.
- Students will investigate the electromagnetic spectrum and the wave nature of light.
- Students will analyze various light phenomena and their practical applications.

Block Goals: Ride the Wave

Block 1: Harmonic Motion

- Goal: Understand the concept of simple harmonic motion and its graphical representation.
- Discussion: "Are you in Harmony?" could explore real-world examples of harmonic motion or its applications in technology.

Block 2: Waves

- Goal: Define and analyze various wave properties like wavelength, frequency, and wave speed.
- Discussion: "Which is more Important?" could delve into the advantages and disadvantages of different wave types (sound, light, radio) for specific applications.

Block 3: Frequency and Resonance

- Goal: Understand the relationship between frequency and wave behavior, including resonance.
- Discussion: "What's your Frequency?" could explore the impact of different frequencies on various materials (e.g., sound waves shattering glass).

Block 4: Sound

- Goal: Analyze the properties of sound waves and human perception of sound.
- Discussion: "Irritating Sounds" could explore the science behind unpleasant sounds and potential solutions for noise control.

Block 5: Applications of Sound

- Goal: Analyze and explore the practical applications of sound in various fields.
- Discussion: "Sound in Space" could delve into the challenges and possibilities of using sound in space exploration. (Sound requires a medium to travel, which is limited in space)

Block 6: EM Spectrum

- Goal: Understand the electromagnetic spectrum and its different components (radio waves, light, X-rays, etc.).
- Discussion: "Dominos" might be a metaphor for exploring how different parts of the EM spectrum interact or influence each other.

Block 7: Visible Light and Color

- Goal: Analyze the wave nature of light and the science of color perception.
- Discussion: "Beyond Science" could explore the artistic, cultural, or philosophical aspects of light and color.

Block 8: Optics

- Goal: Understand the principles of light interaction with materials and its practical applications in optics.
- Discussion: "Laser Applications" could delve into the diverse uses of lasers in various fields (medicine, communication, manufacturing).

Course Description

In Ride the Wave, Students will investigate the nature of vibrational motion in the form of waves and wave phenomena. This unit will build on prior knowledge gained in the previous unit on motion by analyzing simple harmonic motion as a natural outgrowth of prior knowledge. Students will examine systems such as a pendulum and a mass on a spring, and will be able to describe how simple harmonic motion relates to wavelike behavior. Building on this knowledge with specialized vocabulary, students will be able to determine how a wave moves through space, what the various forms of waves are, and how those waves can be generated. Ideas of period, frequency, wavelength, and wave speed will be crucial to this development. In addition, students will examine the nature of sound waves, and how sound propagates through space via a medium. Students will be able to describe and explain the nature of sound and the human perception of sound through various phenomena such as reverberation, echo, resonance, pitch, harmonics, timbre, and loudness. Finally, students will investigate the nature of light as a wave and how it moves through space. Students will be able to describe and explain the wave theory of light, the ray model of light, the nature of color and pigment, and various light phenomena such as Doppler Effect and reflection in mirrors.

Course Outline

- Block 1. Harmonic Motion
 - SUBMIT: Harmonic Motion Graphs
 - DISCUSS: Are you in Harmony
- Block 2. Waves
 - SUBMIT: Wave Calculations
 - SUBMIT: Wave Diagram
 - DISCUSS: Which is more Important
- Block 3. Frequency and Resonance
 - SUBMIT: Wave Application
 - DISCUSS: What's your Frequency
- Block 4. Sound
 - SUBMIT: Ear drawing
 - SUBMIT: Animal Sound processing Summary
 - DISCUSS: Irritating Sounds
- Block 5. Applications of Sound
 - DISCUSS: Sound in Space
 - SUBMIT: Sound of Science Creative project
- Block 6. EM Spectrum
 - DISCUSS: Dominos
 - SUBMIT: EM Spectrum
- Block 7. Visible Light and Color
 - DISCUSS: Beyond Science
 - SUBMIT: Bioluminescence

- Block 8. Optics
 - DISCUSS: Laser Applications
 - SUBMIT: Jello Optics Lab

Standards:

Block 1: Harmonic Motion

- **HS-PS4.A - Wave Properties** (Possible connection)
 - HS-PS4-1 - Use mathematical representations to describe a relationship between the frequency of a wave and its wavelength. (This might be introduced in Block 1 as preparation for Block 2)

Block 2: Waves

- **HS-PS4.A - Wave Properties** (Main Focus)
 - HS-PS4-1 (Covered more in-depth)
 - HS-PS4-2 - Evaluate questions about the advantages and disadvantages of using different types of waves (e.g., sound, light, radio) for different applications.
 - HS-PS4-3 - Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.

Block 3: Frequency and Resonance

- **HS-PS4.A - Wave Properties** (Main Focus)
 - HS-PS4-1 (Continued from Block 2)
 - HS-PS4-4 - Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.

Block 4: Sound

- **HS-PS4.A - Wave Properties** (Main Focus)
 - HS-PS4-1 (Continued from Block 3)
 - HS-PS4-2 (Covered in more detail for sound waves)

Block 5: Applications of Sound

- **HS-ETS1.A - Engineering Design**
 - HS-ETS1-1 (Connection to projects using sound)
 - HS-ETS1-2 (Connection to project evaluations)

Block 6 & 7: Electromagnetic Spectrum and Light

- **HS-PS4.A - Wave Properties** (Connection to Light as a Wave)

- HS-PS4-1 (Continued from Block 4)
- HS-PS4-3 (Deeper exploration in the context of light)

Block 8: Optics

- **HS-PS4.C - Wave Interactions**

- HS-PS4-C.1 - Use applications of light refraction and diffraction such as in lenses, telescopes, microscopes, and optical communications.

Method of Instruction

This is an online course, and while there is flexibility in how and when you do assignments, it is best to log in and complete work each day according to the posted pacing schedule. Due dates will be clearly stated for each assignment in the course calendar and the weekly schedule. It is highly recommended that learners follow the pacing schedule posted, but work may be submitted late.

This course uses project based learning to encourage an authentic, developed appreciation of the topics covered. That means that while it may include some traditional assessments, the bulk of the coursework focuses on projects that require learners to display their learning in a thorough and creative manner.

If you are struggling to complete your work or you need some assistance with an alternate schedule or workload, please contact me as soon as possible. I am more than happy to help support your success in the class!

Learner Expectations

- Check the course pages for directions and announcements every weekday.
- Check your email every weekday to see if your instructor has emailed you.
- Read the assigned readings on the weekdays you're directed to.
- Use available resources including teacher support.
- Create original work and submit it on time.

Discussion Board Posts

- Discussions are credit/no credit so just participating in them will earn you credit. If you are unable to answer the discussion questions just mention that and then share what you think of the video or ask a question about it. Your opinion matters so feel free to share it. :)
- Note: If you feel uncomfortable interacting with the other learners then please message me directly so I may accommodate you.

Netiquette

Netiquette is a set of rules for behaving properly online. The following bullet points cover some basics to communicating online:

- Use good taste when composing your responses in Discussion Forums. Swearing and profanity is also part of being sensitive to your classmates and should be avoided. Also consider that slang can be misunderstood or misinterpreted.
- Be sensitive to the fact that there will be cultural and linguistic backgrounds, as well as different political and religious beliefs, plus just differences in general.
- Don't use all capital letters when composing your responses as this is considered "shouting" on the internet and is regarded as impolite or aggressive. It can also be stressful on the eye when trying to read your message.
- Be respectful of your others' views and opinions. Avoid "flaming" (publicly attacking or insulting) them as this can cause hurt feelings and decrease the chances of getting all different types of points of view.
- Be careful when using acronyms. If you use an acronym it is best to spell out its meaning first, then put the acronym in parentheses afterward, for example: Frequently Asked Questions (FAQs). After that you can use the acronym freely throughout your message.
- Use good grammar and spelling, and avoid using text messaging shortcuts.
- I expect students to treat fellow students, their instructors, other faculty, and staff with respect. Any student or employee will tolerate no form of "hostile environment" or "harassment."

Grading:

Each assignment is given a specific number of points. The number of points earned by the student is determined and a percentage is calculated. The raw score is recorded in the grade book.

An overall grade in the course will be determined according to your school's grading scale.

Scoring Rubric

90-100	Mastered process and technique Strong composition Appropriate subject-matter Strong creative expression
80-89	Good-Very good process and technique Good-Very composition Shows some creative strength Appropriate subject-matter
70-79	Technique/composition needs improvement Fair quality composition Shows a little creativity or originality

- 60-69 Poor evidence of technique/composition
Lacks creativity or originality
Did not follow some directions
- 0-59 Incomplete
Did not follow most or all directions
Please redo and resubmit

Discussion Rubric

- 9-10 Response is long
On-topic / relevant / varied structure
No grammar / spelling errors
- 7-8 Response is ok length
On-topic / relevant
Minor grammar / spelling errors
- 5-6 Response is short
Somewhat on-topic / relevant
Many grammar / spelling errors
- 0-5 Response is too short
Off-topic / not relevant
Please redo

Honesty and Plagiarism

Plagiarism of any sort is prohibited. According to the Merriam-Webster online dictionary, to "plagiarize" means:

- to steal and pass off (the ideas or words of another) as one's own
- to use (another's production) without crediting the source
- to commit literary theft
- to present as new and original an idea or product derived from an existing source

Please review [THIS RESOURCE](#) for more information on plagiarism. Any plagiarized work will be given a zero and referred to your EF/COACH/GUIDE for review.

Privacy Policy

All work submitted is the property of the author and is not available to anyone not in the class. If work is to be submitted or viewed outside of this website, I will obtain permission from the author. [FERPA Info](#)