Oregon Episcopal School
SY 2021-2022

Advanced Electricity and Magnetism (E&M)

Teacher: Taposhi Biswas **Room: DC-122**
Email: biswast@oes.edu

COURSE DESCRIPTION AND CLASS INFORMATION

Course Description: This semester-long course will delve deeply into Electricity and Magnetism, and explore some modern physics. Through projects and data collection, students will build theoretical concepts and utilize trigonometry and differential and integral calculus to help explain and understand natural phenomena.

OES Science Strands and Learning Outcomes

The OES Science curriculum has identified 4 major themes of learning in all courses. These "strands" are overarching themes (Communication, Design, Analysis, and Synthesis) under which all learning in all courses will occur. Within the strands are more specific learning outcomes (L.O.), as shown in the table below.

I.	**Strand: Communication** a. L.O. Ask questions and define problems b. L.O.Obtain, evaluate, and effectively communicate information in a variety of methods
II.	**Strand: Design** a. L.O. Develop and use models b. L.O. Plan and carry out investigations
III.	**Strand: Analysis** a. L.O. Analyze, evaluate, and interpret data and information b. L.O Use mathematics and computational thinking
IV.	**Strand: Synthesis** a. L.O. Construct explanations and design solutions from existing models, theories, and understandings b. L.O. Engage in appropriate argument from evidence

Learning Outcomes are big topics, therefore, each unit and assessment will have specific INDICATORS to help break down the learning outcomes into student-friendly and measurable parameters. These indicators will be communicated with students at the beginning of each unit.

Assessment and Feedback: There will be three major assessments (projects, labs, or tests) each quarter that will contribute to your quarter grade. You will be assessed on the skills you demonstrate in each of these major assessments, and these will be used to inform your final quarter grade. Corrections and revisions may be offered when appropriate for each assessment. Each skill will be rated on a scale of 0-4:

0 - Little to no expertise shown in this skill.
1 - Effort is made to follow instructions, but with limited understanding or effectiveness
2 - Instructions for building skills are followed, but interpretation/conclusions are flawed or incomplete
3 - Student shows strong use of skills throughout the assignment, and largely interprets correctly with some small errors
4 - Student shows strong use of skills; if small errors are made, they are able to identify and troubleshoot results that don't make sense.

Prior to each major assessment, you will also receive feedback on skill-building assignments, which will allow you to build and practice your skills.

Communication: I will use the Google classroom platform to communicate information and to disseminate materials, to communicate, and to collect your assignments. When you are not sure about an announcement, assignment due date or requirements, you must look at the Google classroom. If you are still unsure, please feel free to email me at biswast@oes.edu . Clear communication is very important. Please make sure you check our Google classroom regularly.

Additional help outside of class:
I will be offering office hours during the Office Hour blocks and during my open blocks (A, C, D, and G).

How Will We Learn?

This course will emphasize how science is actually done and not just in the unique opportunity afforded by the independent science research project (SRP). We will learn the content of physics while developing the skills of doing good science using the inquiry cycle.

The course philosophy centers on you! You will be developing content mastery through the construction of your own understanding, and the development and improvement of important learning skills such as information processing, communication, critical thinking, problem-solving, metacognition, and analysis. Our role as a teacher is that of a facilitator of learning rather than a source of information. We will provide specific physics content presented as data, or via labs/demonstrations and/or student observations in order to facilitate the development of important process skills, including higher-level thinking and the ability to learn and to apply knowledge in new contexts.

Explore: Engage through labs, data collection, demonstrations, and guided inquiry.
Connect: Make meaningful connections between content, data, and the outside world
Create: Graphs, reports, presentations, relationships
Commit: Share your ideas with your peers, the school, or the wider community
Reflect: Through continual reflection, better iterations and deeper understandings emerge

Essential Questions:

1) How do the behavior of circuits relate to universal conservation laws?
2) How can the model of fields and forces allow us to predict the behavior of charged particles?
3) How can we describe the relationship between electricity and magnetism?
4) What are the full implications if the speed of light is a universal constant, and how do we know if it is?