**Advanced Placement Physics 2**

**2023-2024**

**Northwest Guilford High School**

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**Text**: *College Physics*, Freedman, Ruskell, Kesten and Tauck; 2th Ed. Bedford, Freeman and Worth, NY, 2018

**Course Overview:** AP Physics 2 is an algebra-based, introductory college-level physics course that explores topics such as fluid statics and dynamics; thermodynamics with kinetic theory; PV diagrams and probability; electrostatics; electrical circuits with capacitors; magnetic fields; electromagnetism; physical and geometric optics; and quantum, atomic, and nuclear physics. Through inquiry based learning, students will develop scientific critical thinking and reasoning skills.

This course requires that 25 percent of the instructional time will be spent in hands-on laboratory work, with an emphasis on inquiry based investigations that provide students with opportunities to apply the science practices.

Students should have completed geometry and be concurrently taking pre-calculus or an equivalent course. The course is based on six Big Ideas, which encompass core scientific principles, theories, and processes that cut across traditional boundaries and provide a broad way of thinking about the physical world. The following are Big Ideas:

* Objects and systems have properties such as mass and charge. Systems may have internal structure.
* Fields existing in space can be used to explain interactions.
* The interactions of an object with other objects can be described by forces.
* Interactions between systems can result in changes in those systems.
* Changes that occur as a result of interactions are constrained by conservation laws.
* Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.
* The mathematics of probability can be used to describe the behavior of complex systems and to interpret the behavior of quantum mechanical systems.

Students establish lines of evidence and use them to develop and refine testable explanations and predictions of natural phenomena. Focusing on these disciplinary practices enables us to use the principles of scientific inquiry to promote a more engaging and rigorous experience for AP Physics students. Such practices require that students:

• Use representations and models to communicate scientific phenomena and solve scientific problems;

• Use mathematics appropriately;

• Engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course;

• Plan and implement data collection strategies in relation to a particular scientific question;

• Perform data analysis and evaluation of evidence;

• Work with scientific explanations and theories; and

• Connect and relate knowledge across various scales, concepts, and representations in and across domains.

Twenty-five percent of instructional time is devoted to hands-on laboratory work with an emphasis on inquiry-based investigations. Investigations will require students to ask questions, make observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting, where they direct and monitor their progress.

**Labs:** Lab work will include both experiments and computer simulations. Some labs will include full formal lab reports and others will be guided data collection.

**Student Evaluation:** The school grade will be determined using the following rubric:

**Laboratory work: 20%**

Individual grades will be assigned based on experimental work and written documentation. Computer simulations will be included in this category. Some quizzes may focus on lab skills such as graph analysis and will be included in this category.

**Other graded work, including classwork and homework: 20%**

Students will turn in their work on Mondays for the previous week. These will be graded mostly for completion as solutions are usually gone through in class. Some homework will be from AP Classroom or other online platforms, such as Sapling Learning.

**Tests: 60%**

Unit tests will include multiple choice and free response questions. The latter includes short answer, multiple part response and paragraph writing.

**Late Work Policy:** Late work is accepted with a 20% penalty, up to a week late.

**Student Absences and Make-Up Work:** Students will have three days to make up work due to excused absences. If missing experimental work, they may be required to use sample data to complete their experimental analysis.