Physics with Engineering

**Course Syllabus: 2018-2019**

1. **Instructor Information**

Teacher: Mr. Brian Martin

Contact Information: Please feel free to call, text, or e-mail me about any questions. If you call or

text before 10:00 pm I will try to respond that evening.

1. Phone: 484-645-6193

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1. **Course Description**

Physics is an advanced level science class designed to equip students with the knowledge, skills, and appreciation to enjoy God’s order and laws in creation and their applications in the real world via projects. It includes interactions of matter and energy, velocity, accelerations, force, energy, momentum and electromagnetism. Students will be challenged to apply their knowledge of the laws of physics to solve critical thinking problems and build models that use these principals. Students will complete a long term science project that will count for a large portion of their grade. This will culminate with a presentation on Grandparents Day.

1. **Goals and Aims**

A. **Enjoy** thinking rationally and analytically

B. Appreciate the law and order that governs the universe

C. Be prepared for college level science classes

D. Develop general problem solving abilities

E. Enable students to utilize strategies for self- assessment to build their capacity to monitor their own learning.

1. **Objectives**

A. Apply the SI in various disciplines

B. Demonstrate the factor label method

C. Summarize the composition of matter

D. Calculate speed, velocity, and motion

E. Manipulate vectors

F. Apply Newton’s laws of motion

G. Analyze momentum and energy

H. Define work

I. Apply laws of electromagnetism

J. Compare and contrast vectors and scalars

K. Utilize the design process and a variety of resources (educational technology, information, materials, tools, machines) to safely and efficiently develop solutions to problems that require integration of concepts and skills from STEM disciplines.

L. Contrast reflection and contraction

M. Apply the Laws of Thermodynamics

N. Explain (in part) Special and General Relativity

O. Demonstrate proper use of shop tools

P. Discuss trade-offs associated with technological solutions

Q. Apply mathematical and scientific formulas, principles, reasoning, and precise language to predict outcomes and solve technological and engineering problems.

1. **Textbooks and Instructional Recourses**

*Physics* – Abeka

*Conceptual Physics* – Addison Wesley

Stephen Ressler DIY engineering

1. **Equipment and materials**

A. Scientific Calculator

B. Notebook

C. Table saw, spindle sander, band saw, drill press, shop vacuum, vise, clamps, hand tools.

D. Various construction material (see project plans for specifics)

1. **Course Requirements**

The prerequisites to this course are a …

* + - 70% or higher in Physical Science
    - 70% or higher in Geometry
    - 70% or higher in Algebra II
    - Basic woodworking and metalworking skills
    - Basic computer and research skills

A. **Logistics**

1. Keep a binder of all course material. (graded homework, class notes, tests, engineering notebook)

2. There will be approximately 9 exams throughout the year.

**Test fix-up procedures:** After a test has been returned and you would like to improve your score, you may ask me for a test make-up plan. If you follow the plan you can earn full credit for the fix-up. Plans may vary by test.

3. Absent students are responsible for all catch-up work.

4. Create an engineering notebook including table of contents, notes, sketches, and glossary/index.

B. **Projects**

Project #1 Golf Ball Launcher

Project #2 Hydraulic Arm, Sailboat, or Water Turbine

Project #3 Airplane, Blimp, or Helicopter

Project #4 Bridge or Tower

Project #5 Rocket and Electronic controller

1. **Procedures**
   1. Homework will be due when specified.
   2. Late homework will be penalized according to PVMS policy.
   3. Headings must include student’s name and lesson/assignment/page numbers. **All homework must be done in pencil.**
   4. Student should record assignments.
2. **Methods**

A. Teaching Methods

1. Lectures 2. Demonstrations 3. Cooperative learning

4. Projects 5. Multimedia 6. Discussions

7. Field Trips

B. Assessment

1. Exams 2. Quizzes 3. Review 4. Homework

5. Projects 6. Presentation

1. **Grading Policies**

A. Tests 50% B. Homework 15% C. Projects 35%

**Intermediate work, if needed, must always be shown to get full credit, even if you use a calculator.  I generally give partial credit on tests and quizzes for correct work even if the final answer is incorrect.**

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