Summer Program 2015

Physics of Rockets & Robotics
David Zook
Physics/Astronomy Building, Room 218

Course Description
Introduction to high school Physics and Robotics:
We will cover topics such as velocity and acceleration, force, work, energy, power and momentum. The concepts presented here are intended to be the foundation upon which greater detail could be built, and as such, we will not delve into complex situations or systems. We’ll work on reasoning and problem solving skills both in our physics work and with our robot designs.

Essential Questions
How can motion be analyzed in the context of measurements made and observations given?
How can physical situations be described mathematically and numerically?
How to solve problems in the physical world using analysis of information?

Outcomes:

Understandings:
Students will understand . . .
Kinematics, Linear Motion, Circular Motion, Energy and Power, Momentum

Students will know . . .
How to numerically analyze simple motion
How to build solid, functional structures

Students will be able to do . . .
Apply, iterative decision making skills
Apply, iterative building/design skills

Instructional Strategies
Lecture, readings, homework problems, hands-on building and labs..

Student Assessment
Quizzes and Labs will be graded.

Resources and Materials
Physics 1, Bradford Talbot, Brigham Young University
Six Easy Pieces, Richard P. Feynman
## Tentative Course Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic(s)</th>
<th>In-Class Activities</th>
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| Week 1     | - Measurement and Units  
- Newton's First Law  
- Vectors  
- Kinematics                                   | NSEW Treasure Map  
Robots-  
(basic build, wiring, driving)                  |
| 6/30-7/3   | Week 2                                                                    |                                               |
| 7/7-7/10   | - Force and Motion  
- Velocity and Speed  
Dynamics - Linear Motion  
- Newton's Second Law  
- Friction Forces  
- Analyzing Forces                                   | Elevator Weight  
Robots (on-going tournament)                         |
| Week 3     | Dynamics - Circular Motion  
- Centripetal Force  
- Work and Energy  
- Energy classification                               | Stairs and Work Lab  
Robots (on-going tournament)                            |
| 7/14-7/17  | Week 4                                                                    |                                               |
| 7/21-7/24  | - Conservation of Energy  
- Power  
- Momentum                                             | Robots (on-going tournament)  
Rockets                                                   |
| Week 5     | - Newton's Third Law and Impulse  
- Conservation of Momentum                              |                                               |
| 7/28-7/31  | Alternative / Expansion Activities                                         |                                               |
|            | Electric Current and Circuits  
- Voltage  
- Resistance  
- Circuits  
- Ohm's Law                                             | Snap Circuits  
Intrusion Detector                                      |