Sustainability Infusion:

I gave a pre/posttest on basic information relating to sustainability and talked about solar energy and how that relates to rocket propulsion in space. I will briefly discuss the results. As a major assignment on asteroid mining, the class was split into two groups. One group was a mining proponent group seeking funding and the other was an investor group. As part of the assignment, sustainability was a required topic of discussion during the group activity/funding pitch which was the assessment for the assignment. I have video of the discussion so I may show a clip. A majority of the students were business/marketing majors so I thought having them talk business would make them more interested.

PHYS 115 “It’s Only Rocket Science”

**Procedures and Syllabus**

**Instructor**
Prof. Nicholas Truncale
LSC 172
Office: 570-941-6289
E-mail: nicholas.truncale@scranton.edu

**Office Hours:**
MTWR 8:00am-9:00am
or by appointment

**Required Textbook**
- “It’s Only Rocket Science”, chapters given by instructor as needed

**Basic Course Policies**
- Attendance is mandatory. I will keep a record of your attendance. Missing any class will be detrimental to your final grade in the course. If you miss more than one class, your final grade will be reduced by ½ letter grade for each class missed. If you miss a class where there is an in-class assignment, that assignment cannot be made up. If you are late to class, or leave early you may be counted absent. If your actions are disruptive to my class, you will be asked to leave and you will be counted as absent for that day. Sleeping in class, using computers when not instructed, talking during class, texting in class, or coming in class late are examples of disruptive behavior. Only with prior consultation with the instructor or under extreme circumstances will you be excused from class.
- Make-ups for exams will be not be given unless there was prior arrangements made with me, and only if there is substantial reason for missing the exam. **Be forewarned:** Make-up exams are **ALWAYS** more difficult than the regularly scheduled exams.
- Make sure you come prepared to go outside on any given day. Depending on weather (specifically precipitation and wind conditions) outside activities will be completed on short notice.

**Grading**
Rocket Launches 5%
Class Participation 5%
Assessment and Feedback 10%
In Class Physics 15% (Total of 3)
Case Studies 30% (Total of 3)
Exams 35%

Final class letter grades will be earned as follows:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-100</td>
<td>A</td>
</tr>
<tr>
<td>90-92</td>
<td>A-</td>
</tr>
<tr>
<td>87-89</td>
<td>B+</td>
</tr>
<tr>
<td>83-86</td>
<td>B</td>
</tr>
<tr>
<td>80-82</td>
<td>B-</td>
</tr>
<tr>
<td>77-79</td>
<td>C+</td>
</tr>
<tr>
<td>73-76</td>
<td>C</td>
</tr>
<tr>
<td>70-72</td>
<td>C-</td>
</tr>
<tr>
<td>65-69</td>
<td>D+</td>
</tr>
<tr>
<td>60-64</td>
<td>D</td>
</tr>
</tbody>
</table>

Academic Code of Honesty
All students are expected to adhere to the Academic Code of Honesty
http://matrix.scranton.edu/student_handbook/policy_academic_code_honesty.html

Course Improvement Mechanism
At the end of the course, students will be given an exit survey to determine from their point of view what they learned, if the stated learning objective were met, and any improvements they believe are necessary.

Student Learning Outcomes
The student will:

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Assessment(s) Meeting Objective</th>
</tr>
</thead>
</table>
| Gain factual knowledge about rocket science and learn fundamental theories and principles used by scientists in this field, in particular the field of physics | Exams  
Case Studies  
Rocket Launches |
| Learn to apply course material to improve thinking and problem solving skills by studying historical cases involving space launches | Case Studies  
Class Participation  
Rocket Launches  
In Class Physics |
| Use basic mathematical methods to analyze a rocket launch from beginning to end and to perform analyzes relating to a formed hypothesis posed by the instructor | Exams  
Case Studies  
Rocket Launch  
In Class Physics |
| Demonstrate an understanding of the technological implications of rocket science on society and public policy | Case Studies  
Class Participation  
In Class Physics  
Exams |
| Develop skills to express and describe technical processes and terms orally and in writing | Class Participation  
Rocket Launches  
Case Studies  
In Class Physics |
| Acquire communication and team work skills by working together on a rocket launch activities | Class Participation  
Rocket Launches  
Case Studies |
Assessments

Class Participation
There will be routine discussions during class where the instructor will elicit responses from the students. The instructor will also ask questions to random students about previous reading assignments, problems, etc. This grade will depend on how well the students respond to such questions or makes an effort to answer without being prompted. Other assessments also include class participation.

In Class Physics
This assessment pertains to the following activities:

- Kinematics: Rocket Launch
- Rocket Engine Analysis
- Impulse and Momentum of a Rocket Launch

Shown on the course schedule below, these activities involve the students solving problems with the instructor using basic mathematics and basic physical concepts. This portion of the final grade will be determined based upon the student correctly solving such problems with the instructor as group work.

Exams
These will be classic assessments with both objective and free response questions that will determine student understanding, retention, and comprehension of material covered in class as well as from the readings.

Case Studies
This assessment pertains to the following topics:

- Apollo 13: Humans in Space – a mission to the moon will be discussed in terms of its scientific and historical significance. The movie Apollo 13 will be shown where the students will be required to write a movie review with an emphasis on the human interactions with space. The movie review will be the assessment for this case study.
- Physics of an Orbit – students will work together to determine the orbit characteristics of heavenly bodies and satellites. This will be done in groups. The assessment for this case study will be group solved orbit problems
- Asteroid Mining Sustainability – an introduction to asteroid mining will be given on how this relates to sustainability specifically intergenerational responsibility, systems thinking and global sustainability from the perspective of applied science and technology, and sustainability in practice. The assessment for this case study will be a class discussion where one side will take the perspective of potential skeptical investors while the other are asteroid mining proponents trying to get funding.

Rocket Launches
The assessment for this portion of the final grade will be based on the participation in rocket launches. Based on weather conditions, we will attempt to launch rockets during the intersession. Bring your jackets and winter weather apparel.

Schedule
I will not give any additional assignments to improve your grade beyond what is offered to the entire class. At all times throughout this session, you will know your current grade average by logging into Angel. The following is a breakdown of what will be covered during the 14 meetings of intersession. Notice: The homework assignments for each class are listed. These will also be announced during the class period.

<table>
<thead>
<tr>
<th>Day</th>
<th>Topic</th>
<th>Assessments, Procedures, and Tasks</th>
<th>HW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 1/6</td>
<td>Introduction&lt;br&gt;Intro to Physics&lt;br&gt;Basic Motion</td>
<td>Syllabus/Class Procedures&lt;br&gt;Intro to Rocket Science&lt;br&gt;Simple Kinematics</td>
<td>Chapter 1, 2&lt;br&gt;Read pgs. 1-33</td>
</tr>
<tr>
<td>Tue 1/7</td>
<td>Rockets and Spacecraft&lt;br&gt;Free Fall&lt;br&gt;Orbit Shapes</td>
<td>Chapter 1 Introduction&lt;br&gt;Chapter 2 Rockets and Spacecraft&lt;br&gt;Free Fall Kinematics</td>
<td>Chapter 2, 3&lt;br&gt;Read pgs. 34-67</td>
</tr>
<tr>
<td>Wed 1/8</td>
<td>Rockets and Spacecraft&lt;br&gt;Space Missions&lt;br&gt;1st Rocket Launch</td>
<td>Chapter 2 Rockets and Spacecraft&lt;br&gt;Chapter 3 Space Missions&lt;br&gt;<strong>Kinematics: Rocket Launch</strong></td>
<td>Chapter 5&lt;br&gt;Read pgs. 115-132</td>
</tr>
<tr>
<td>Thu 1/9</td>
<td>Propulsions Systems&lt;br&gt;Basic Momentum&lt;br&gt;Rocket Engine Thrust</td>
<td>Momentum and Action/Reaction&lt;br&gt;Chapter 5 Propulsion Systems&lt;br&gt;Rocket Engine Thrust Profile</td>
<td>Chapter 8&lt;br&gt;Read pgs. 169-207</td>
</tr>
<tr>
<td>Mon 1/13</td>
<td>Rocket Engine Analysis&lt;br&gt;Basic Forces&lt;br&gt;Humans in Space</td>
<td>Momentum, Forces, and Impulse&lt;br&gt;<strong>Rocket Engine Analysis</strong>&lt;br&gt;Chapter 8 Humans in Space</td>
<td>Read Apollo 13 Articles</td>
</tr>
<tr>
<td>Tue 1/14</td>
<td>Apollo 13: Humans in Space</td>
<td>Class in LSC 133&lt;br&gt;Apollo 13 Movie: Review due Tue 1/21</td>
<td>Study for Exam</td>
</tr>
<tr>
<td>Wed 1/15</td>
<td>Review&lt;br&gt;First Exam</td>
<td>Brief Apollo 13 Discussion&lt;br&gt;Exam Review&lt;br&gt;<strong>First Exam (1.5 hours)</strong></td>
<td>Chapter 4&lt;br&gt;Read pgs. 83-114</td>
</tr>
<tr>
<td>Thu 1/16</td>
<td>Spacecraft 3D Movement&lt;br&gt;Intro to Gravitation</td>
<td><strong>Impulse and Momentum of a Rocket Launch</strong>&lt;br&gt;Chapter 4 Movement in Three Dimensions</td>
<td>Read Articles on Kepler and Orbit</td>
</tr>
<tr>
<td>Tue 1/21</td>
<td>Orbits with Kepler Gravitation&lt;br&gt;2nd Rocket Launch</td>
<td>Universal Law of Gravitation&lt;br&gt;<strong>Physics of an Orbit: Due Thursday 1/23</strong></td>
<td>Chapter 6&lt;br&gt;Read pgs. 133-150</td>
</tr>
<tr>
<td>Wed</td>
<td>Navigation in 3D</td>
<td></td>
<td>Finish Orbit</td>
</tr>
</tbody>
</table>
Policy on Students with Disabilities
The University of Scranton complies with all applicable laws and regulations with respect to the provision of reasonable accommodation for students with disabilities as these terms are defined in the law. The University will provide reasonable accommodations so that students can fully participate in curricular and extracurricular activities. Students who have a physical or learning disability and need assistance to achieve successfully their academic or extracurricular goals should contact the Center for Teaching and Learning Excellence (CTLE) Office at (570) 941-4039.

Notice of Nondiscriminatory Policy
The University of Scranton admits students without regard to their race, color, religion, national origin, ancestry, sex, sexual orientation or age to all the rights, privileges, programs, and activities generally accorded or made available to students at the school. The University does not discriminate on the basis of race, color, religion, national origin, ancestry, sex, sexual orientation or age in administration of its educational policies, admission policies, scholarship and loan programs, and athletic and other school-administered programs.
Otherwise qualified persons are not subject to discrimination on the basis of handicap or disability. If you believe you have been discriminated against because of race, color,
religion, national origin, ancestry, sex, sexual orientation, age, or handicap or disability, please contact the Director of Equity and Diversity.