

## Principles of Engineering Design Course Syllabus

	What	How
<b>Monday</b>		
Morning	-Ice Breakers, -Class Rule (5,4,3,2,1) -Expectations	-Favorites List, Questionnaire, Introductions
Afternoon	-Unit Conversion -Team Building, -Brainstorming, -Planning, -Construction	-Students Convert units (eg: convert 6miles into cm) -Show the “Cross” Method for dimensional analysis (Students will do at least 10 practice problems) -Students have one hour to construct a tower from 3 sheets of paper and 1 foot of masking tape
Study Session	-Construction Techniques -Testing Prototypes	-Balloon Car Lab- Students create a car powered by a balloon. Benchmark- 9 meters
<b>Tuesday</b>		
Morning	-Conservation of Energy -Friction	-Mousetrap cars- Benchmark 10 meters
Afternoon	-Conservation of Energy -Friction	-Mousetrap cars- Benchmark 10 meters
Study Session	-Hooke’s Law -Construction Techniques -Flight	-Analysis of springs -Balsa Wood Gliders
<b>Wednesday</b>		
Morning	-Testing Prototypes -Modifying prototypes	-Balsa Wood Gliders – Test for straight flight and modify.
Afternoon	-Air Resistance -Construction -Brainstorming -Group design	-Parachute Lab- Students get tissue paper, string, tape, cardboard, and construction paper
Study Session	-Intro to Engineering Design Process	-Engineering Design Process (8 steps: Identify Problem, research the need, brainstorm, design, build prototype, test prototype, modify prototype, re-test until goals are met.)
<b>Thursday</b>		
Morning	-Conservation of Energy	-Skyrails – Roller Coaster activity – Students work in groups and build a coaster with at least 1 loop and one spiral in it
Afternoon	-Conservation of Energy	-Skyrails – Roller Coaster activity – Students make as many loops or spirals as possible
Study Session	-Team Building, -Brainstorming, -Planning, -Construction -Lab Proposal	-Mail-a-Chip: Students must mail a pringle unbroken to Easton, Pa site -Students will write proposal to CEO stating good points of design.

	What	How
<b>Friday</b>		
Morning	-Elasticity -Drilling -Team Building	-Build Catapults in groups of two
Afternoon	-Testing and modification of prototypes	-Catapults launch ping pong ball into a bucket ten feet away
Sunday Evening	-Soldering	-Solar Powered Cars -Students must build their solar powered cars
<b>Monday</b>		
Morning	-Testing and modification of prototypes -Technical drawing	-Students must continue to build, test, and modify their solar powered cars -When finished they must do pros + cons and a technical drawing
Afternoon	-Circuits -Soldering -Testing and Modification of prototypes -Technical Drawing	Battery powered Cars
Study Session	-Same as Afternoon	-Same as Afternoon
<b>Tuesday</b>		
Morning	-Creative modification	-Solar and Battery Powered Cars -Students add engines, battery packs, solar panels, and axels to improve previous designs
Afternoon	-Same as Morning	-Same as Morning
Study Session	-Graphing	-Students use cars to gather data (time and distance to be used to make a graph) - Velocity vs. Time graph – slope is acceleration and area under is distance
<b>Wednesday</b>		
Morning	-Team Building, -Brainstorming, -Planning, -Construction, -Budgeting	-Toothpick bridges
Afternoon	-Computer Aided Design	-West Point Bridge Design Program in the Computer lab. -Warren Through truss (12m high)- less than \$200k -Warren Deck Truss (24m high) – Less than \$240k -Pratt Arch (24m with 8m arch) – Less than \$225k
Study Session	-Construction, -Budgeting	-Toothpick Bridges

	What	How
<b>Thursday</b>		
Morning	-Construction, -Budgeting	-Toothpick Bridges
Afternoon	-Same as Morning	-Same as Morning
Study Session	-Construction, -Budgeting, -Proposals	-Toothpick Bridges -Write a letter to fictitious mayor explaining why he/she should purchase your bridge
<b>Friday</b>		
Morning	-Technical Drawing -Bridge Construction	-Students show me their design. If it meets qualifications, then they can get their wood and glue -hints for success -use wax paper on top of drawings -use a double roadbed -colored glue so students can see where the glue is more easily
Afternoon	Same as Morning	Same as Morning
Sunday Night	-Oral Presentations -Test toothpick bridges -Analysis	-Students must give a 1-2 minute oral presentation -Test Bridges -Where and why did it break?
<b>Monday</b>		
Morning	-Continue Bridge Construction	-Continue Bridge Construction
Afternoon	-Same as Morning	-Same as Morning
Study Session	-Same as Morning	-Same as Morning
<b>Tuesday</b>		
Morning	-Flight or buoyancy	-Rise off ground airplanes or sailboat -Students work in pairs
Afternoon	-Flight or buoyancy	-Rise off ground airplanes or sailboat -Students work in pairs
Study Session	-Creative Design -Independent Study	-Students Design their own Project
<b>Wednesday</b>		
Morning	Bridge Testing	-Students load their bridge by hanging weights from the roadbed
Afternoon	-Creative Design -Independent Study	-Students Design their own Project
Study Session	Same as Afternoon	Same as Afternoon

	What	How
<b>Thursday</b>		
Morning	-Creative Design -Independent Study	-Students Design their own Project
Afternoon	-Creative Design -Independent Study	-Students Design their own Project
<b>Friday</b>		
Morning	-Farewell	-Distribute Certificates -Exchange of Addresses