

**CAPSULE STUDENT PRE-SURVEY
SY 2012-2013**

Note: The purpose of this survey is to gather information about changes in student knowledge due to the CAPSULE program. It should take about 20 minutes to complete. Your responses are confidential and have no impact on your grades in this class.

Please create your own anonymous identification code so the independent evaluator can match this survey with other surveys you will complete.

_____ The first letter of your mother's first name (Example: If her name is Jane, write "J")

_____ The second letter of your last name (Example: If your last name is Doe, write "O")

_____ The final digit of your birth year (Example: If you were born in 1977, write "7")

School: _____ **Course:** _____

The capstone (open-ended) problem or project: _____

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Please indicate how much you agree with these statements.					
Interest					
I like my science classes (Chemistry, Biology, Physics, etc.)	O	O	O	O	O
I like my math classes (Algebra, Geometry, Calculus, etc.).	O	O	O	O	O
Learning about Science (e.g. Chemistry, Physics, Biology) is interesting.	O	O	O	O	O
Learning about Math (e.g. Algebra, Geometry, Calculus) is interesting.	O	O	O	O	O
Learning about Engineering and/or Technology is interesting.	O	O	O	O	O
I would enjoy working as an engineer (e.g. designing cars, sneakers or cell phones).	O	O	O	O	O
I would enjoy working as a mathematician (e.g. tracking the statistics of major league baseball players).	O	O	O	O	O
I would enjoy working as a scientist (e.g. developing a cure for cancer).	O	O	O	O	O
I would enjoy having a summer job working in a science lab (e.g. Biogen company) or product design lab (e.g. Reebok shoe company).	O	O	O	O	O
I would consider a career in math, science, or engineering after I graduate from college.	O	O	O	O	O
I would apply for college to study math, science, or engineering.	O	O	O	O	O
Process					
I enjoy finding out how things work.	O	O	O	O	O
I enjoy finding solutions to open-ended problems.	O	O	O	O	O
I enjoy working in teams to solve open-ended problems.	O	O	O	O	O
I am confident in my ability to work in teacher-assigned teams.	O	O	O	O	O
I am confident in my ability to give presentations on project I have worked on.	O	O	O	O	O
I am able to manage my workload with this project.	O	O	O	O	O
I enjoy learning how classroom concepts and theories are used in the real world.	O	O	O	O	O

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Please indicate how much you agree with these statements.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I find classroom teaching and learning to be more effective with capstone (project) experience than without it.	○	○	○	○	○
Designing an experiment (not just doing the experiment) helps me to understand underlying concepts.	○	○	○	○	○
Doing projects helps me to understand concepts in math, science and/or engineering courses.	○	○	○	○	○

What is your preferred mode for learning hard sciences (engineering, math, physical science)?

- Lecture-based (teacher presents material in front of class)
- Project-based (learning through hands-on projects and experiments)
- A combination of the two

Please indicate how much you agree with these statements.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Awareness					
I know what an Engineer does.	○	○	○	○	○
I know what a Scientist does.	○	○	○	○	○
I know what a Mathematician does.	○	○	○	○	○
I understand what types of jobs and projects scientists and engineers work on.	○	○	○	○	○
I understand that math, science, and engineering exist in my everyday life.	○	○	○	○	○
I feel that math and science are important (in any career, in a good job/career, etc.).	○	○	○	○	○
I know what the EDP (Engineering Design Process) is.	○	○	○	○	○
I know how the EDP is used.	○	○	○	○	○
I know what an open-ended problem is.	○	○	○	○	○
I know what a capstone project/experience is.	○	○	○	○	○
I understand why science and engineering are important to our country's economic future	○	○	○	○	○

Content

Label the steps of the Engineering Design Process in order of 1-7 below:

- | | | |
|---|---|---|
| <input type="checkbox"/> Develop Possible Solutions | <input type="checkbox"/> Create a Prototype | <input type="checkbox"/> Define the Problem |
| <input type="checkbox"/> Re-Design | <input type="checkbox"/> Choose the Best Solution | <input type="checkbox"/> Test and Evaluate |
| <input type="checkbox"/> Research | | |

In the design process, a trade-off occurs when a problem is solved but a feature is sacrificed. Which of the following is an example of a trade-off?

- A car's gas mileage is increased but the engine has less power
- An airplane uses a more efficient engine and has higher performance
- A sports drink's taste is improved and maintains the same nutritional content
- A computer company upgrades the hardware and the price remains unchanged.

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A company is making prototypes for a new computer system. Which of the following statements best describes an advantage of making several different prototypes?

- They can be tested at the same time
- They can be produced in large numbers
- They will be bought by many different users
- They will be sold for more than they cost to build

Before releasing a newly designed video game to the public, the developer distributes the game to a few hundred people free of charge. After playing the game, the people complete a survey and return it to the developer. What part of the Engineering Design Process does this scenario represent?

- Redesign
- Testing and Evaluation
- Selection of a Solution
- Constructing a Prototype

A manufacturer has developed a textured surface for plastic cups. These cups are designed for small children. The manufacturer has produced prototypes. Which of the following is the next step in the Engineering Design Process?

- Marketing the new textured cups
- Developing new textures for the cup surfaces
- Testing and evaluating the textured prototypes
- Redesigning the textured surface on the prototypes

Advances in military technologies have often led to the development of everyday applications. Early radar systems operators noticed that objects near the radar were often heated when the radar was in use. This observation led to the development of which of the following:

- Microwave ovens
- Motion Detectors
- Nuclear Reactors
- Solar Panels

An assignment for the design of an emergency light is: "Design and build an emergency light. It must have its own battery, provide a bright light, and have a built-in charger. It must be capable of operating while being charged. It must have a watertight enclosure with a handle on the top." After receiving this assignment, which of the following most likely would be the next step in the Engineering Design Process?

- Testing and evaluation
- Selecting the best solution
- Investigation and Research
- Construction of a prototype

An automobile company plans to develop an electric car to sell in urban areas. Which of the following will help the company evaluate the potential market for these cars?

- Field Tests
- Scale Models
- Prototype Designs
- Consumer Surveys

A company sent prototypes of a newly designed hair dryer for trial use to 100 homes along with a satisfaction survey. A month later the company received 82 completed surveys. This process is part of which of the following steps in the Engineering Design Process?

- Developing possible solutions
- Communicating the solution
- Researching the problem
- Evaluating the solution

Demographics

Please answer the following questions to the best of your ability. All of the information will be kept confidential, and your identity will remain anonymous.

What is your sex? Female Male

What is your race / ethnicity? (Check all that apply)

- African American / Black
- Asian
- Caucasian / White
- Hispanic / Latino(a)
- Native American / Alaska Native
- Pacific Islander
- Other (please specify) _____

What subject(s) have you already studied in High School? (Check all that apply)

- Mathematics
- Biology
- Chemistry
- Physics
- Environmental science
- Engineering
- Technology
- Other STEM (please specify) _____

What is your school grade?

- 9th grade
- 10th grade
- 11th grade
- 12th grade
- Other (please specify) _____

THANK YOU FOR COMPLETING THIS SURVEY!