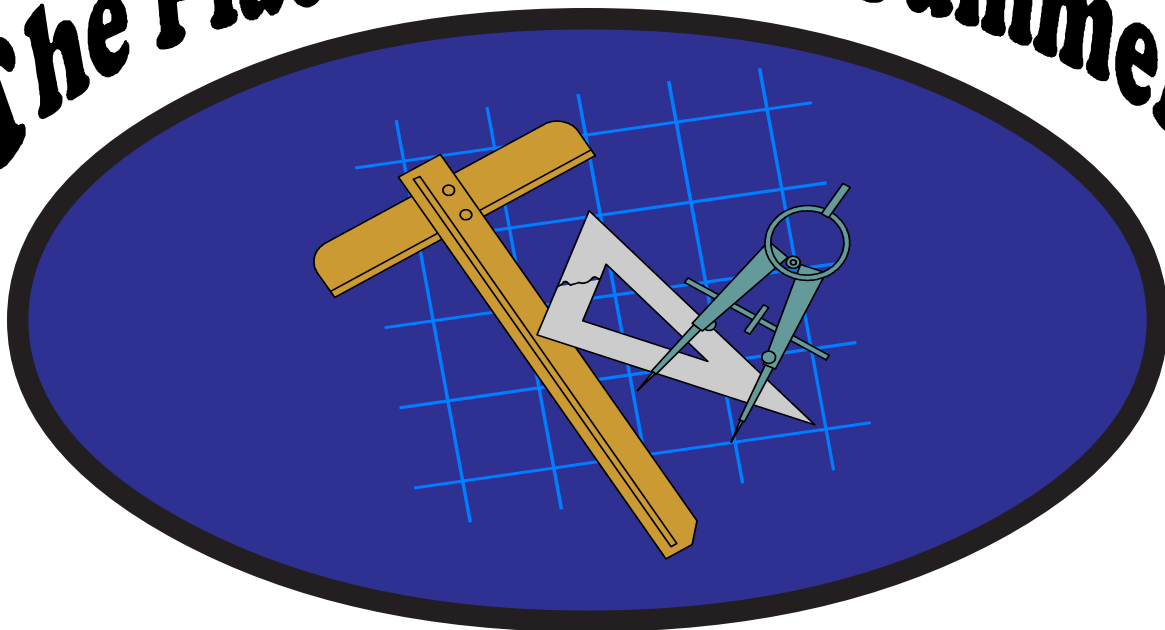


Piedmont Technical College Engineering Technology Camp

The Place To Be This Summer!



The Learning Experience of a Lifetime!
Open to 7th, 8th, and 9th Graders

June 2004

Piedmont Technical College
P. O. Box 1467 • Greenwood, South Carolina 29648

Need Help With A Particular Event?

If you have questions about the rules or instructions for one of the projects, you may contact the following people:

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The Engineering Technology Camp program was created to provide middle school students with the unique opportunity of participating in real engineering projects that offer both adventure and learning opportunities. Regardless of the career a child may choose in the future, he or she will be dealing with technology on a variety of levels. The camp is designed to expose children to technology that will help them recognize their talents and make them more comfortable with technology. With the demand of qualified technicians and technologists on the rise, the Engineering Technology Camp is a great career exploration and motivational experience for participating students. The Engineering Technology camp is held from June 21 through June 24, 2004, through a sponsorship from *Partnership for a Greater Greenwood County*.

The camp is modeled after the College's Advanced Technological Education (ATE) program where students are exposed to problem solving and teaming skills required for today's workplace. The students participating are drawn from surrounding upstate counties. Students work in teams on projects while instructors guide them through many confidence-building activities, linking academic concepts to technology and preparing them for the future.

Eggs Can Fly

Objective:

To study concepts such as inertia, mass, primary and secondary impacts, gravity, and dissipation of force. To create a container that will cushion as best it can the impact of an egg dropped from a height of more than ten feet.

Number of Participants:

2-4 per team; as many teams as are needed to include everyone.

Time Required:

Short form: Brief discussion of concepts and procedure, 10 minutes; building the egg container, 30 minutes; competition in which eggs are dropped and results are determined, 15 minutes. (Total: one hour.) If needed, the project can be expanded to include research on the science concepts and test drops. (Total for expanded project: two hours.)

Project Outcome:

Students will study the concepts of gravity, drag, impact, and teaming skills. Observation of results will lead to conclusions about designs to limit collision impact. Applications of this field of knowledge will be discussed.

Facilitators:

Only one instructor is required; an extra person (instructor or student helper) will facilitate the process.

Materials:

- 1 brown lunch bag
- 1 plastic sandwich bag
- 4 pieces of twine/yarn
- 1 large dinner napkin
- 1 8-oz. plastic cup
- 4 plastic straws
- 1 large paper clip
- 1 raw egg per group
- small amount of masking tape

Design constraints and specifications:

1. The concepts of primary and secondary impacts and dissipation of force are introduced. Students will volunteer practical applications of these topics.
2. Students are divided into groups of 2-4. They are asked to pick a timekeeper, a reporter, a teamwork facilitator, and a coach. Group roles are explained. (If groups are made up of fewer than four members, roles may be combined.)
3. The competition is explained: Groups are to use the materials in their bags (including the bags themselves) to construct an egg holder that will keep the egg from breaking when it is dropped from a height of greater than ten feet. Students will have 30 minutes to build the holder. Students are given their bags.
4. Students build their egg holders.
5. When time is called, students walk to the testing site (perhaps the third-floor walkway of the 5000 building). One team member drops the egg. Results are reported.
6. Students return to the classroom and report on their strategies. Instructor summarizes what was learned.

Safety:

There are no safety concerns with this project.

Room Preference:

The classroom will need tables for groups to work on. If students do the expanded version of the project, they will need computer access for research.

8 Note Tunable Electronic Organ Kit

Engineering Technology Skills Learned:

The summer camp student will learn how to solder, recognize resistors, potentiometers, capacitors, Integrated Circuits, read schematic diagrams, be introduced to the operation of a Fluke digital multi-meter and an Oscilloscope, and learn basic safety rules for working in an electrical laboratory.

Objectives:

Upon completion of this block of instruction, the student will have:

- identified resistors, capacitors, potentiometers and Integrated Circuits
- read and interpreted a schematic diagram
- assembled (via soldering) an electronic organ following instructions
- participated in a “theory of operation” discussion
- participated in a “troubleshooting” discussion
- used an Oscilloscope to “tune” the electronic organ
- observed and practiced safe laboratory rules

Number of Participants:

Each summer camp student will have his or her own electronic organ to build and keep. This project can run smoothly with six to eight students.

How Much Time:

This project will require two and a half hours broken down as follows:

- 60 minutes for construction time
- 45 minutes for discussions and explanations
- 45 minutes for tuning the organ with the Oscilloscope

Project Outcome:

The summer camp student will gain an understanding of what types of activities he or she would be participating in if he or she were to pursue an education in Engineering Technologies.

Facilitators:

Farhad Mohajer will be available to assist with the students and any “personal problems” that the summer camp student might encounter. Farhad will also be available to assist with the project. I will have a minimum of two students (one male and one female) to assist with my project.

Materials:

Each summer camp student will require an 8 Note Tunable Electronic Organ Kit. These kits can be purchased from Chaney Electronics, Inc. P.O. Box 4116 Scottsdale, AZ 85261. 1-800-227-7312 The part number is C4736 and the cost is \$9.95 each.

Each Organ Kit will also require a 9 volt battery.

I have all other needed equipment in my lab.

Safety:

The students will have to obey all laboratory rules and regulations and must wear safety glasses during soldering. I have safety glasses available in my laboratory.

Room Preference:

I prefer to conduct this project in room 197A.

3D House Plan and Model

Engineering Technology Skills Learned:

The student will learn the basics of a CAD system. They will also learn how to read a scale and draw a basic floor plan.

Objectives:

Upon completion of this activity, the student will have:

- the knowledge of what CAD is and how it works
- what CAD is used for
- the knowledge of how to read a floor plan and a scale
- how to use a 3D CAD software

Number of Participants:

Each student will have his/her own computer station and if time permits, will build their own model of the house plan they layout on CAD. Each student will have a print out of the floor plan and a model of their house to take with them. This project will work well with six to eight students.

How Much Time:

This project will take approximately three hours.

Project Outcome:

The student will gain the knowledge and understanding of some of the activities that a CAD operator might take part in and the basics of architectural drawing.

Facilitators:

Amber Blair will be available at all times during the summer camp to deal with any “personal problems” that the student may encounter. She will also be available to help with any of the projects. I will also have two EGT students (one male and one female) to help assist with the project.

Materials:

Each student will require a computer station to work on and a sturdy board to make the house model out of. The poster board can be purchased from Wal-mart for approximately \$2.00 each.

Safety:

All the students will have to obey all the laboratory rules and regulations.

Room Preference:

I prefer to conduct this project in room 172E.

Megaphone

Engineering Technology Skills Learned:

The summer camp student will learn how to identify and orient components on a circuit board, solder electronic devices safely, and adjust using a potentiometer.

Objectives:

Upon completion of this activity, the student will have:

- identified LEDs, resistors, capacitors, potentiometers, and transistors
- read and interpreted a layout/schematic diagram
- assembled (via soldering) an electronic circuit board following instructions
- participated in a “theory of operation” discussion
- participated in a “trouble-shooting” discussion
- adjusted gain control for proper operation
- observed and practiced safe laboratory rules

Number of Participants:

Each summer camp student will have his or her own Megaphone kit to build and keep. This project can run smoothly with eight to ten students.

How Much Time:

This project will require two hours and twenty five minutes broken down as follows:

- 90 minutes for construction time
- 20 minutes for discussions and explanations
- 15 minutes for calibration
- 20 minutes for trouble-shooting

Project Outcome:

The summer camp student will gain an understanding of how amplifiers are used in electronic circuits and the steps needed for circuit assembly.

Facilitators:

Farhad Mohajer will be available to assist with the students and any “personal problems” that the summer camp student might encounter. Bill Ware and Charles Dixon will be available to assist with the project. I will ask a minimum of two students (one male and one female) to assist with the project.

Materials:

Each summer camp student will require a Megaphone kit. These kits can be purchased from Chaney Electronics, Inc. P.O. Box 4116 Scottsdale, AZ 85261. 1-800-227-7312 The part number is C6746 and the cost is \$6.49 each.

Each Megaphone kit will also require a 9 volt battery.

Safety:

The students will have to obey all laboratory rules and regulations and must wear safety glasses during soldering. Safety glasses are available in the laboratory.

Soldering irons are hot so always return an unused iron to the proper holder.

Room Preference:

Room 232E.

Model Airplane Build and Fly

Objectives:

Upon completion of this activity, the student will have:

- knowledge of engineering principals governing airplane flight
- knowledge of types of materials used in airplane construction
- knowledge of how to read a blueprint
- knowledge of how to follow written instructions

Number of Participants:

Each student will have his/her own building station and will build their own flying model of a rubber band powered airplane. Each student will have the opportunity to enter their model in a flying contest with other students.

How Much Time:

This project will take approximately 6 hours.

Project Outcome:

The student will gain the knowledge and understanding of some of the basic fundamentals of flight and the engineering materials that go into the construction of airplanes.

Facilitators:

Amber Blair will be available at all times during the summer camp to deal with any “personal problems” that the student may encounter. She will also be available to help with any of the projects. I will also have two EGT students (one male and one female) to help assist with the project.

Materials:

Each student will require a flat work station approximately 3' x 3' square. The model is purchased from Midwest Inc. Each student will also require a cutter, such as an X-acto knife or retractable box cutter. The models cost \$3.95 when purchased in quantities of 24. The cutters cost \$5.95.

Safety:

All the students will have to obey all the laboratory rules and regulations.

Room Preference:

I prefer to conduct this project in the multipurpose building.

Student Camper's Survey

We need your input to ensure that future camps are as effective as possible. Please answer any applicable questions below. Use additional sheets if needed. Thank you in advance for your input.

- 1. Which activity did you like best? Please tell us why.*

- 2. Which activity did you like least? Please tell us why.*

- 3. From the list of activities you did, if you have any comments or suggestions about an activity, please write them below.*

- 4. Are there any activities that you think should be eliminated?*

- 5. Are there any activities you think should be added?*

- 6. Did you see new things and get new ideas about different careers?*

- 7. Did you enjoy working in groups and meeting students from other schools?*

- 8. Were the college's faculty and staff helpful?*

9. *Do you have any comments or suggestions about the lunches and snacks?*

10. *Overall, was the camp fun and interesting?*

11. *Would you recommend the camp to your friends?*

12. *Please write any additional comments and suggestions below?*

