



UNIVERSITY OF
SOUTH CAROLINA
College of Engineering
and Computing

Civil and Environmental Engineering Enhanced Learning Experience

September 12, 2011

Dear High School Teachers,

The College of Engineering and Computing at the University of South Carolina is hosting a one day Enhanced Learning Experience for all high school students interested in learning more about engineering and computing. This unique experience will provide students a hands-on learning experience on a real college campus with real college students and actual college professors.

The day will focus on Civil and Environmental Engineering; please see below for a detailed list of activities. The program will begin at 10 am with a brief introduction and welcome to the College and then the students will begin their experience with the department of Civil and Environmental Engineering. Sessions will run for 1.5 hours (10:00am-11:30am and 12:30pm-2pm) with a lunch break from 11:40am-12:20pm. Dates for the learning experiences will vary and will be determined after the application date on a school by school basis.

The College of Engineering and Computing is offering reimbursement for expenses associated with the trip, including the costs for a South Carolina bus (charter buses will not be reimbursed), the bus driver, bus mileage reimbursement and substitute teachers. Lunch will also be provided at no cost to the school or students. Each session will be limited a maximum of 30 students.

The enhanced learning experiences will begin in October and will continue through November. Only a limited number of schools will be selected. Enhanced Learning Experience days will vary and will be determined after all schools have been selected on a school by school basis. If you are interested in bringing a group to USC please fill out and return the below application by **5pm on September 30, 2011** to: University of South Carolina, College of Engineering and Computing, Attn: Stefanie Pirwitz, Columbia, SC 29208. Applications may also be e-mailed, pirwitz@cec.sc.edu, or faxed, (803) 777-3818.

I look forward to hearing from you. If you have questions or concerns please contact me at pirwitz@cec.sc.edu or (803) 777-2706.

Sincerely,

Stefanie Pirwitz
Outreach Coordinator
College of Engineering and Computing



Civil and Environmental Engineering Enhanced Learning Experience Application

The College of Engineering and Computing is accepting proposal submissions for high school students to participate in the Civil and Environmental Engineering Enhanced Learning Experience (ELE) at the University of South Carolina. This one day experience is designed to work in conjunction with the South Carolina educational standards to provide students with hands experiences in Civil and Environmental Engineering.

Please complete the following application. Applications must be received no later than 5pm on **September 30, 2011**. Applications will not be accepted after the deadline. Please email completed application as an attachment to pirwitz@cec.sc.edu. Applications may also be faxed to (803) 777-3818) or mailed to: University of South Carolina, College of Engineering and Computing, Attn: Stefanie Pirwitz, Columbia, SC 29208.

General Information

School Name: _____

School Address: _____
Street City Zip code

Contact Name: _____ E-mail Address: _____

Phone Number: _____ Fax Number: _____

Class Type: _____ AP ____ Honors ____ Adv. ____ Other _____
(physics, chemistry, calculus, computing, etc.)

Purpose

Please type your answers to the following questions in a Word document and attach upon submission.

1. What impact will the Enhanced Learning Experience have on your students?
2. What educational standards can be applied to the Enhanced Learning Experience?
3. What do you hope your students will learn from the Enhanced Learning Experience at USC?
4. How many students do you hope to bring to USC? From what grades?
5. How much money will be needed for the Enhanced Learning Experience?

Signature: _____ Date: _____



Civil and Environmental Engineering

Civil and Environmental Engineering transforms the world around you by designing and building the physical and natural environment. Civil Engineering is the oldest of the Engineering disciplines and it has many focus areas such as water resources, environmental engineering, structural engineering, geotechnical engineering and transportation engineering. Geotechnical engineers study the properties of the soil and are fundamental for the design and construction of tunnels, levees and foundations of bridges and buildings. Transportation engineers design highways to provide mobility for the number of vehicles that are anticipated to use it in a safe fashion. Environmental engineers design water wastewater and groundwater treatment systems to purify water prior to consumption or discharge into a receiving body of water. Water resources engineers study the flow and management of water and design and construction of dams for hydroelectric power and recreation and channels to transfer water from one location to another. Structural engineers design and build buildings and bridges such as the beautiful Cooper River Bridge in Charleston, South Carolina among other structures.

Activities

What is the tallest K'nex water tower that you can build? ... but can your structure withstand an earthquake?

Civil structures such as stadiums, bridges and buildings are subjected to a wide variety of forces. These forces include the self weight of the structure, forces created by people, the contents in the structure and other large forces created by nature such as wind and snow loads. One of the stronger forces created by a natural phenomena is those of earthquakes and Engineers play an important role in designing and constructing earthquake resistant buildings. Engineers select the type of material, geometry of structural elements and many other parameters during the design process.



Charleston Earthquake, 1886

Did you know
that the 1886
Charleston
earthquake
damaged an
estimated of
2,000 buildings?

You are a civil engineer working in a design company. Your firm has been hired to do a seismic design of a water tank in the north-east. **What is the tallest tank that you can design considering seismic forces? Are you up to the challenge of building the water towers with K'nex and testing it on an earthquake simulator?**

Can you build a filter that improves water quality?

Environmental engineers design water, wastewater, and groundwater treatment systems to purify water prior to consumption or discharge into a receiving body of water. Treatment systems contain numerous processes to achieve a desired final water



Aerial view of a water treatment plant.

quality. Examples of these processes include particulate removal by gravity settling, coagulation and flocculation to increase particulate size prior to settling, biological treatment to degrade organic compounds, and disinfection. Filtration is a process where the choice of filter materials dictates the entities that can be removed from a water stream. These filter materials can be sand, gravel, anthracite, activated carbon, diatomaceous earth, etc.

You are an environmental engineer working in a design company that has been hired to create a filter to remove trace organic contaminants from a river that contains high concentrations of organic compounds. **Can you build a filter to remove the contaminant? How much contaminant can you remove?**

Can you design a terminal to move goods efficiently?

Transportation engineers apply scientific principles in the planning, design, operation, and management of transportation systems which are designed to move people and goods from an origin to a destination in the most efficient, cost-effective, and safe



manner. Goods go through a series of transportation modes (e.g. truck, train, vessel) and facilities (e.g. distribution centers, intermodal facilities, seaport terminals). A bottleneck in this process occurs at the seaport container terminals. Delays to vessels and trucks result in congestion, emissions, and higher costs for stakeholders and consumers. There is a need to make our seaports more efficient so that the U.S.

can be competitive in the global marketplace.

You are a transportation engineer with specialization in intermodal logistics and are working in a design company that has been hired to design a new seaport container terminal. **Can you design a terminal that can handle the expected number of containers within the specified budget? How efficient is your terminal?**