The Pre-College for Engineering Systems (PCES) Summer Outreach Program
Center for Energy System and Controls (CESaC)
College of Engineering, Architecture, and Computer Science (CEACS)
Howard University, Washington, DC

The PCES Outreach Program is an outgrowth of the Energy Expert Systems Institute (EESI) program. The success of the five-week EESI summer outreach program, offered by CESaC at Howard University, led to several women and minority students considering ECE as a viable college major. The program was a huge success; however, it was abandoned over the last five years with no other program, at Howard University or the surrounding area, to replace it. As a result, underrepresented youth are neither equipped nor developed to handle the grand challenges of the technological revolution in energy such as smart grid; in addition, enrollment in Science, Technology, Engineering and Mathematics (STEM) fields among women and minorities has declined while technological challenges in smart grid, Renewable Energy Resources (RER), nanotechnology and wireless communication revolution. In efforts to increase the number of underrepresented students acquiring degrees in STEM fields, the team at CESaC has devoted their time to developing PCES.

Electrical engineering consists of several specialization areas such as: Communications Theory, Signal Processing, Microprocessor, Digital Systems, Microwave and Antenna Applications, Power and Energy Systems. Electrical and Computer Engineers are involved in a wide array of industries from the design of cellular technology, to the development of the information highway technology, the creation of smart materials such as conductors and microchips for the computer, and to the control and delivery of Electrical Energy for homes, offices and even space stations.

Students having strong backgrounds in Mathematics, Science and English and above all, an interest in the field of Electrical and Computer Engineering are selected to attend lectures and engage in hands-on research activities. Campus housing and meals will be provided for the students during the five-week period of the program. Underrepresented high school juniors and seniors will be given priority.

CESaC, Howard University
2300 6th Street NW, Suite 1105
Washington DC, 20059
Tel: (202) 806-5350 • Fax: (202) 806-6588
Email: jmomoh@howard.edu
PURPOSE
- To introduce pre-college minority students to research in power industry using modern state-of-the-art technology in applications, Energy Revolution, Nanotechnology and Wireless Communication.
- To involve minority students in developing core competency with Engineering and Science.
- To generate an interest in career options in Engineering Systems.
- To give minority students an opportunity to experience problem solving in a research/project-based teamwork environment consisting of faculty, senior research associates, graduate and undergraduate students.

PROGRAM DETAILS
Students having a strong Mathematics and Science background are selected to live on the campus of Howard University, attend workshops, conduct research, take field trips, and participate in cultural and recreational activities. Rooms, meals and transportation will be provided.

QUALIFICATIONS
Must be a junior or senior in high school. Must have 3.0 or the international equivalent. Must exude strong academics in the areas of Science and Math.

APPLICATION PROCEDURES
To apply, (i) please complete enclosed application, include official transcript, two science/math teacher recommendations; and (ii) mail your completed application package to:

PCES Summer Outreach Program
Center for Energy Systems and Control (CESaC)
Howard University
2300 6th Street, NW, Suite 1105
Washington, DC 20059
Howard.PCES@gmail.com

US Application Deadline: April 15, 2014
*International Application Deadline: March 24, 2014

*International students may email the components of their applications to expedite acceptance. The Center will grant preliminary acceptance on the condition that we receive the full application by April 15, 2014.
The Pre-College for Engineering Systems (PCES) Application
Center for Energy Systems and Controls (CESaC)
College of Engineering, Architecture, and Computer Science (CEACS)
Howard University, Washington DC
June 22 - July 18, 2014

1. PERSONAL INFORMATION
Name ___________________________________________ Phone No. ________________

FIRST NAME MI LAST NAME

Address ________________________________________________________________

Social Security No. ____________________________ US Citizen? Yes ____ No _____

If no, type of Visa __________________________________________________________

Ethnic Origin: Black/African American ____ African ____ Hispanic ____ Other ____

Date of Birth ______ Email: ________________________________________________

MM/DD/YY

2. EDUCATIONAL INFORMATION
School Name: ___________________________ Phone No.: __________________

School Address: __________________________________________________________

If you plan to attend Howard in the Fall 2012, check here____

I have completed or I am currently enrolled in the following courses: (please indicate the grades received thus far)

Algebra I ______ Algebra II ______ Trigonometry ______ Computer Science_____
Physics _______ Geometry _______ Chemistry ________ English _______
Other __________________________________________________________

GPA (Junior Year/Overall) ______ SAT Scores: Math ______ English _______

3. List briefly your program-related experience (e.g. courses, work experience, language etc).
____________________________________________________________________

4. List your extra curricular activities (e.g. sports, clubs, team, hobbies etc)
____________________________________________________________________

5. Check area of interest
   _____ Electrical Engineering _____ Computer Science/Engineering
   _____ Chemical Engineering _____ Mechanical Engineering
The Pre-College for Engineering Systems (PCES) Application

6. WRITTEN ESSAYS

Complete each of the following.

a. Write a 500-word essay on a separate sheet of paper on why you want to study engineering (Chemical, Civil, Computer Electrical, Mechanical or other)

b. If you are a high school senior planning to attend Howard University in Fall 2012, write a 200 word statement in support of your decision to attend Howard University for your Bachelor of Science degree or other.

c. Explain briefly your reasons to participate in the PCES Summer Outreach Program.

7. Attach your resume and an official transcript.
Parent/Guardian Consent Form

I hereby grant permission for my son/daughter to participate fully in the PCES Summer Outreach Program during the summer of 2014.

__________________________________________
Signature Parent/Guardian Date

Print name Relationship

Daytime Phone No. __________________________

Application Package to be mailed includes:

• Student application form
• Parent/Guardian Consent Form
• Two (2) Teacher’s Recommendation Forms
• Official Transcript
• Resume
• Essays

Mailing Address:
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Center for Energy Systems and Control (CESaC)
Howard University
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For more information, please call us at Tel: (202) 806-5350 or email us at Howard.PCES@gmail.com.
To the Recommending Science or Math Teacher

Pre-College for Engineering Systems (PCES) Summer Outreach Program provides selected students with exposure to emerging technologies in engineering systems. The students will have the opportunity to experience campus life at Howard University while attending workshops, and conducting research. Your assistance in the evaluation of the student is greatly appreciated. Please complete the attached form.
Teacher Recommendation Form

Student’s Name: ............................................................

Teacher Name: ......................  Teacher Phone Number:.................

Teacher Email:.................................

Please evaluate the applicant listed above by completing the following information.

Rating Scale:

(5) – Exceptionally High  (4) – Above Average  (3) – Average
(2) – Below Average  (1) - Poor  (0) – No Basis for Evaluation

ABILITY AND PERSONALITY TRAITS  5  4  3  2  1  0

1. Personal Integrity
2. Social and Emotional
3. Ability to work with Peers
4. Ability to work with Teachers
5. Leadership Qualities
6. Oral Communication Skills
7. Analytical Skills
8. Writing Skills
9. Promise of Academic Growth
10. Creativity

Indicate strength of your overall endorsement by checking the appropriate option.

_____ Not Recommend  _____ Recommend with Reservation

_____ Recommend  _____ Highly Recommend
Teacher Recommendation Form

Student’s Name: ………………………………………………………………………

Teacher Name: ……………………… Teacher Phone Number: …………………

Teacher Email: ………………………

Please evaluate the applicant listed above by completing the following information.
Ranking Scale:
(5) – Exceptionally High  (4) – Above Average  (3) – Average
(2) – Below Average  (1) - Poor  (0) – No Basis for Evaluation

ABILITY AND PERSONALITY TRAITS  5  4  3  2  1  0

1. Personal Integrity
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5. Leadership Qualities
6. Oral Communication Skills
7. Analytical Skills
8. Writing Skills
9. Promise of Academic Growth
10. Creativity

Indicate strength of your overall endorsement by checking the appropriate option.

_____Not Recommend  ______Recommend with Reservation

_____Recommend  ______Highly Recommend

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
The Pre-College for Engineering Systems (PCES) Summer Outreach Program Outline

1. Introduction to Engineering disciplines, ethics, time management, and professional requirements

2. Electrical engineering foundations involving:
   - Ohm’s Law,
   - Kirchhoff’s Laws,
   - Method of network analysis and applications,
   - Control systems and other applications

3. Hands on exercises, introduction to MATLAB, computing software, and program tools, and use of Internet for Problem Solving.

4. Tinkering and understanding of basic principles and operations of simple electrical appliances and consumer electronics.

5. Introduction to Electrical Engineering labs for verification of fundamental laws of Ohm’s and Kirchhoff’s and also diode operations.


7. Special topic: Entrepreneurship, E-Commerce.

8. Energy Systems (i.e. Photovoltaic, Windmill, Power Systems, etc), Smart Grid and Microgrid Fundamentals and Storage.

9. General Science and Mathematics
   - Introduction to Mechanics,
   - Pre-Calculus,
   - Basic Applications of Mechanics and,
   - Probability and Statistics

10. Study of artificial intelligence concepts including:
    - Fuzzy logic,
    - Expert systems and
    - Artificial Neural Networks

11. SAT Preparation

12. Project Design: This will involve design of several projects using principles of Electrical and Computer Engineering and applications of Artificial Neural Nanotechnology, Fuzzy Logic, Expert and Control Systems, Risk Assessment, Public Perception and Decision Support Tools.

13. Mini- and Major project presentations during the closing of the program.