



The Center for Energy Systems and Control (CESaC),
Department of ECE, Howard University Presents :
**Howard University Residential Pre-College STEM
Program for Engineering Systems**

It is our pleasure to introduce to you the Pre-College for Engineering Systems (PCES) summer outreach program, offered by the Center for Energy Systems and Control (CESaC) at Howard University. This program focuses on specialized career options in Science, Technology, Engineering and Mathematics (STEM) and is intended to increase the number of underrepresented students acquiring advanced degrees in STEM fields. Students will be introduced to engineering lecture series with special emphasis on electrical systems, applications of systems theory, power and energy, wireless communications and nanotechnology, other engineering professions, invited guest speakers, SAT preparation, Mathematics, English and design projects to bridge the gap between secondary education and university research.

Requirements:

- Rising Seniors or a recent high-school graduate
- 1 Completed Application Package, including:
 - Essays on three specific topics
 - Two (2) Recommendations
 - Official Transcript
 - Resume
 - Parent Consent Form

All required documents should be completed and post-marked by the

APPLICATION DEADLINE: May 15, 2018

Mailing Address:

Howard University Residential Pre-College STEM Program for Engineering Systems,

Center for Energy Systems and control (CESaC)

Howard University, 2300 6th Street, NW, Suite 1105, Washington, DC 20059

This application form can be downloaded from:

<http://cesac.howard.edu/outreach/pces2016/>

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

The Howard University Residential Pre-College Program for Engineering Systems is aimed at bridging the gap between secondary education and university research. The program has graduated students who have gone on to pursue careers in STEM areas and have done exceptionally well in standardized tests. This proposal is aimed at developing a residential summer outreach program for rising seniors and recent high-school graduates. Specifically, we plan to provide training on research projects derived from topics in engineering systems, and in order to give a detailed picture, here are the activities proposed:

- Enhance basic science and pre-engineering courses in Calculus, Harmonic Oscillator, Light and Waves, Software Programming, Networks, Electronics, Energy Systems and Economic Analysis.
- Develop research-based topics in areas of energy, power, controls, communication, and embedded systems and photonics.
- Develop strategies to use and integrate the basic fundamentals learned with proposed projects to implement mainstream engineering courses, as well as innovative simulation technologies such as MATLAB and SimuLink for validating hands-on experiments.

In addition to the above-mentioned activities, the participants will learn concepts like cost-benefit, customer-friendly approach, and safety, among others. Moreover, students learn soft skills, teamwork, and techniques to communicate effectively while doing research.

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 Nanotech, Energy Power Systems, Computer Engineering, Communication and signal processing and Photos/electrons
- Retain students in engineering programs through hands on experiments, problem-solving in college level calculus, physics, chemistry and pre-engineering courses
- Ease transition from secondary education to STEM/Engineering education through mentoring and group discussions.
- Highlight how engineers utilize creativity and design process to solve problems

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 rising senior or a high school graduate.
- Must have 3.0 or the international equivalent.
- Must exude strong academics in the areas of Science and Math.

APPLICATION PROCEDURES

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

Howard University Residential Pre-College STEM Program for Engineering Systems
Center for Energy Systems and Control (CESaC)
Howard University
2300 6th Street, NW, Suite 1105
Washington, DC 20059
HowardUCesac@gmail.com

US Application Deadline: May 15, 2018

***International Application Deadline: March 24, 2018**

***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 24, 2018.**

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College of Engineering, Architecture, and Computer Science (CEACS)
Howard University, Washington DC

June 24 - July 22, 2018

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 2018, check here ___

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

Algebra I ___ Algebra II ___ Trigonometry ___ Computer Science ___
Physics ___ Geometry ___ Pre-Calculus ___ Chemistry ___ English ___
Other _____

GPA (Jr. year/Overall) ___ SAT Scores: Math ___ English ___ PSAT scores: _____

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

4. List your extra-curricular activities (e.g. sports, clubs, team, hobbies et cetera)

5. Check area of interest

_____ Electrical Engineering _____ Computer Engineering/ Computer Science
_____ Chemical Engineering _____ Mechanical Engineering

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6. Essay questions

Complete **each** of the following.

- a. Write a 500-word essay on a separate sheet of paper explaining why you want to study engineering (Chemical, Civil, Computer, Electrical, Mechanical or other). Please also provide a basic description of a typical STEM research you have undertaken.
- 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 in 200-words your reasons to participate in the PCES Summer Outreach Program.

7. Attach your resume and an official transcript.

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Parent/Guardian Consent Form

I hereby grant permission to my son/daughter to participate fully in the PCES Summer Outreach Program during the summer of 2018.

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:

Howard University Residential Pre-College STEM Program for Engineering Systems
Center for Energy Systems and Control (CESaC)
Howard University
2300 6th Street, NW, Suite 1105
Washington, DC 20059

US Application Deadline: May 15, 2013
***International Application Deadline: March 24, 2013**

For more information, please call us at (202) 806-5350 or email us at HowardUCESAC@gmail.com.

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To the Recommending Science or Math Teacher

Howard University Residential Pre-College STEM Program for Engineering Systems 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.

Howard University Residential Pre-College STEM Program for Engineering Systems
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Teacher Recommendation Form

Student's Name:
Last First M.I.

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
- 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

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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.
6. Nanotechnology, MEMS and wireless communication.
7. Special topic: Entrepreneurship, E-Commerce.
8. Energy Systems (i.e. Photovoltaic, Windmill, Power Systems, et cetera), 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 Nanotech, Energy Power Systems, Computer Engineering, Communication and signal processing and Photos/electrons
13. Mini- and Major project presentations during the closing of the program.