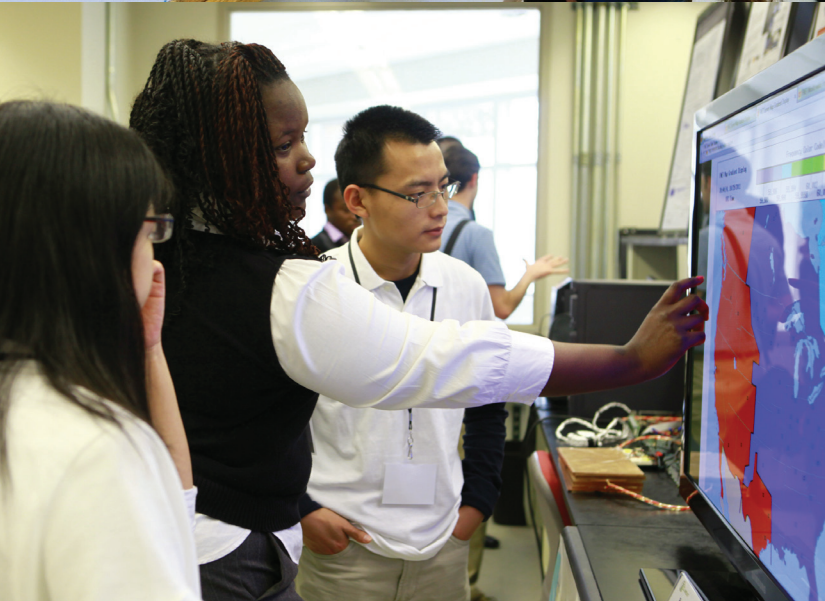




University Education

2012-13



From the Director:

It is my pleasure to share with you our recent accomplishments in education and diversity program at CURENT.

The education, outreach and diversity program at CURENT focuses on an interactive and challenging academic environment, where ERC students working with faculty, postdoctoral research associates, graduate students and industry experts from diverse background can gain the experience they need to be leaders in the field. The education program offers a holistic approach to meet the educational needs for K-12 students and teachers, undergraduate and graduate students, and the industry community. Education programs are purposefully designed to enhance students' adaptability and creativity to enable them to thrive in a global environment.

I view engineering education as an effort among educators, parents, community, and industry that goes beyond just any one individual's influence. CURENT's education program values partnership and collaboration from the community. We are thankful for your support.

Best Wishes,

Dr. Chien-fei Chen
Co-Director of Education
& Diversity Programs

Education Team:

Dr. Fran Li
Director of Education & Diversity

Dr. Chien-fei
Co-Director of Education & Diversity

Erin Wills
Education Coordinator

Adam Hardebeck
Communications & Outreach

Partner Institutions:

Claire Duggan
Northeastern University

Elizabeth Herkenham
RPI

Dr. Jesmin Khan
Tuskegee University

facilities



16,000 sq. ft.

CURENT's facilities have recently expanded to include new lab space for Hardware Testbeds, a Large Scale Testbed, a Multimedia and Visualization Center, and a large conference room.

This expansion gives CURENT more than 16,000 sq. ft. of research space.

The education leadership team has established a variety of programs and activities to meet the educational goals across the four campuses. Major accomplishments of the university program from February 15th, 2012 through January 31st, 2013 include:

- 16 students participated in the inaugural Summer REU program
- Power and Energy System certificate programs are now approved at the undergraduate and graduate level
- CURENT's Student Leadership Council Seminar was upgraded into one-credit graduate level course;
- The SLC and education team arranged Continued Training Excellence with 2 IP trainings, 3 innovation and entrepreneurship seminars, and a variety of industry related seminars;
- 22 faculty members from the four campuses co-taught the new CURENT core course;
- The **IMPACT Program** for developing students' skill sets has been implemented;
- A manuscript about fostering college students' engineering creativity was submitted to the *Journal of Engineering Education*

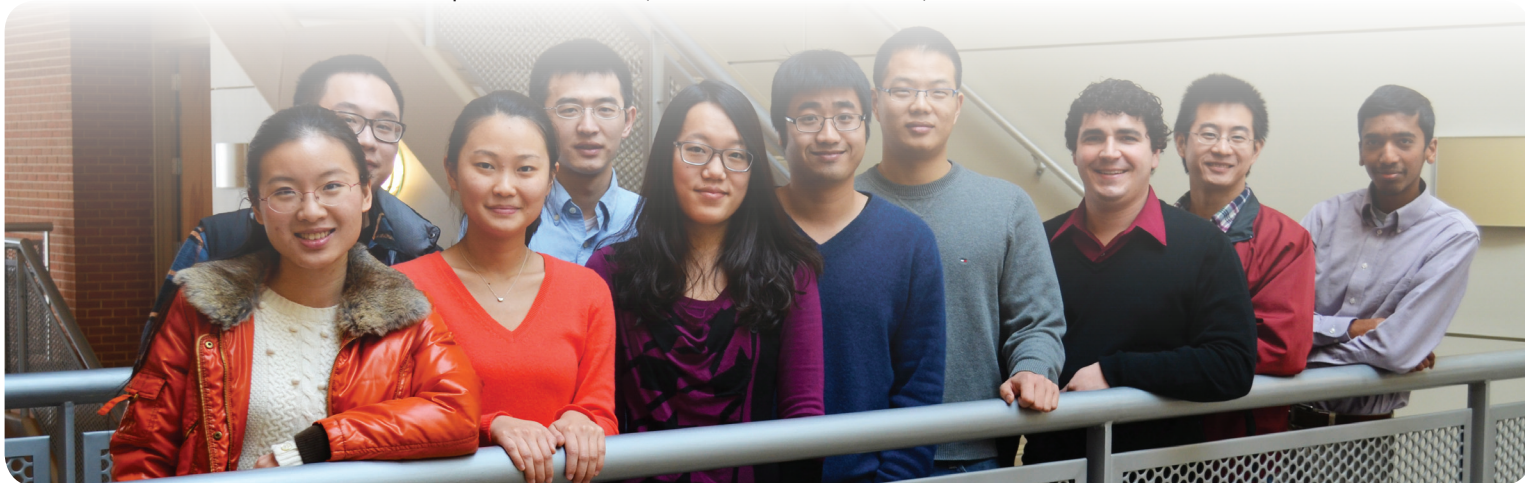


Student Leadership Council

The SLC is built as a team of graduate students who serve as a liaison between the center and the National Science Foundation. SLC serves roles such as serving as a voice for all students affiliated with CURENT, providing critical feedback such as SWOT analysis regarding the center's strategic plan, initiating collaboration with partner school, and coordinating the center's student activities. Members also assist the center's annual meeting, site-visit, and education outreach activities. This year the SLC had 17 members from four campuses.

One of the important events hosted by the SLC is the student seminar. In addition to informing students about various research activities in the center, these seminars allow students to practice their presentation skills and learn about industry knowledge or research from other academic experts based on the IMPACT program's goal. The technical webinars offer participants a well-rounded experience and a range of applicable information regarding center activities and the latest in smart grid research. The non-technical webinars include intellectual property and entrepreneurial training as well as communication and technical writing workshops.

All CURENT students and faculty are encouraged to attend these events, and the students at partner universities are invited to attend the seminars via WebEx. During the 2013 spring semester, the student seminars became a one hour credit course called **ECE 691: CURENT Seminar** at UT, which is held weekly instead of biweekly. The SLC seminars are video-recorded and posted online (CURENT Confluence) for students to review.



CURENT Course

The new course with ERC-specific content, *Ultra-wide-area Resilient Electrical Energy Transmission Networks*, was team-taught by 22 CURENT faculty members across four campuses in Fall 2012.

This is a real-time webinar for partner universities, and a regular course offered to UT students. The class had an enrollment of 41 students in Fall 2012.

The content of the course covers a variety of topics including: ultra-wide-area monitoring, measurement, situational awareness analysis, visualization, actuation and control, modelling, simulation and fast computation for power system analysis, power system state estimation and

prediction, transmission network architecture, multi-level flat control architecture, market effect, communication and cyber security, large-scale system test bed, and hardware test bed, and social-psychological factors of energy conservation.

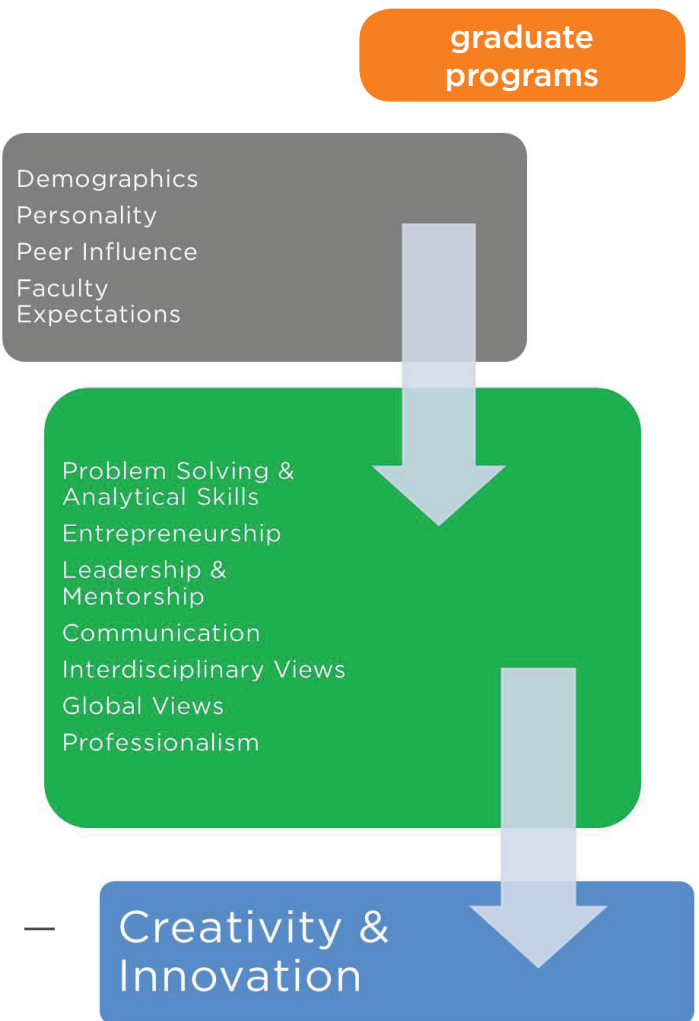


IMPACT Program

The IMPACT program is a strategy proposed by the center for producing graduate students with the desired characteristics to become creative, adaptive and innovative for a new generation of engineering students.

IMPACT stands for Innovation, Mentorship, Professionalism, Adaptation, Creativity and Technology. Students are expected to gain experience working in a team-based environment and will be exposed to professional development opportunities.

The center hopes to increase the number of graduate students who have completed the IMPACT program and enrolled in graduate certificate program in power and energy systems.



IP Training, Commercialization, and Industry Connectivity

As a supplement to the IMPACT Program, CURENT has incorporated industry related seminars, webinars, meetings, and workshops into the graduate program. All industry-related programs are shared by UT and the partner schools.

Examples of recent industry topics are:

- ***Strategic Research at TVA (TVA)***
- ***Effective Presentations for Engineers (EPRI)***
- ***Grid Research Activities (PNNL)***
- ***New Applications in Transmission Modeling (Battelle)***

Certificate Programs in Power & Energy Systems

CURENT has developed a new undergraduate and graduate certificate programs in Power and Energy Systems, which has been approved for the Fall 2013 semester at UT.

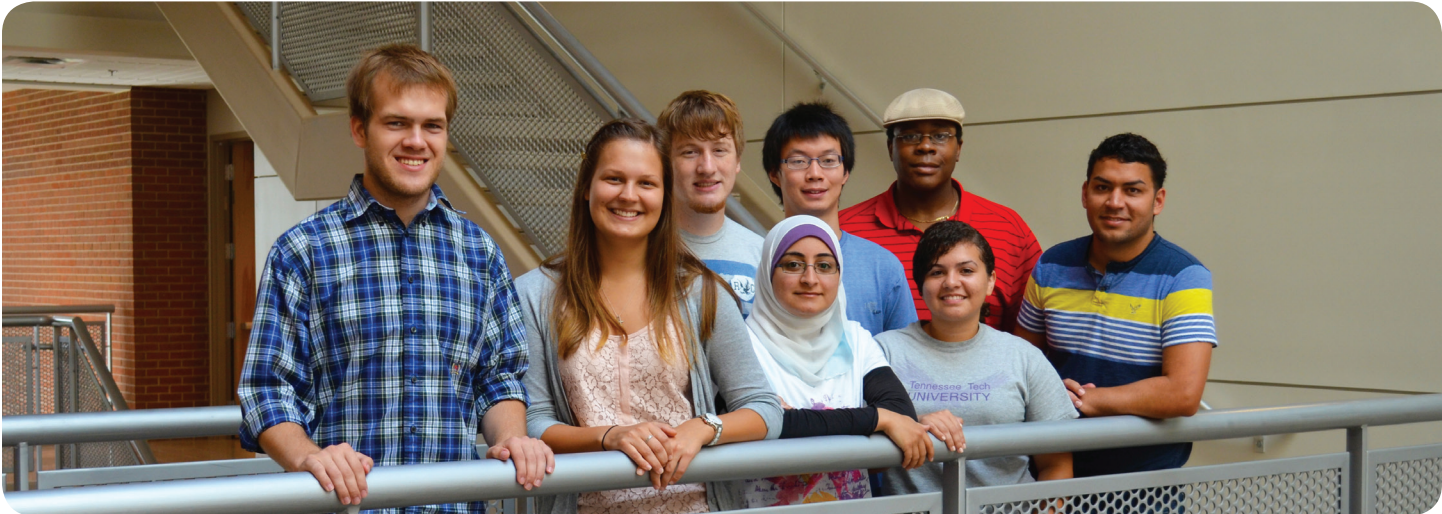
The electrical power and energy systems certificate offers students the opportunity to develop a deeper knowledge base in the fields of power systems, power electronics, renewable energy, and engineering entrepreneurship to supplement their major degree.

This program pulls together currently offered courses to provide students with an in-depth focus in power system controls, operations, planning, system components, power electronics, and circuits. Completion requires 18 course hours.

**undergraduate
research**

Research Experience for Undergraduates

CURRENT launched its first summer REU program in 2012 at UT with a total of 12 students. Our students came from a wide spectrum of institutions and community colleges across the nation, including Cornell University, Cal Berkeley, RPI, Tennessee Tech University, NC State, and Universidad del Turabo in Puerto Rico. Among those participants, **38%** of the students were women and **38%** were from underrepresented backgrounds.



This eight-week program allows students to conduct research in the topics of power transmission, power electronics, renewable energy, smart home design, electricity market structures, and cyber security. The REU students presented their final research results at the UT STEM Symposium. In addition, students gained knowledge about professional development and career skills for industry and academia. During the program, students also visited a TVA power station, Oak Ridge National Laboratory (ORNL), the Electric Power Research Institute (ERPI), and a local wind farm.

2012 Summer Participant Universities

NC STATE UNIVERSITY

Rensselaer

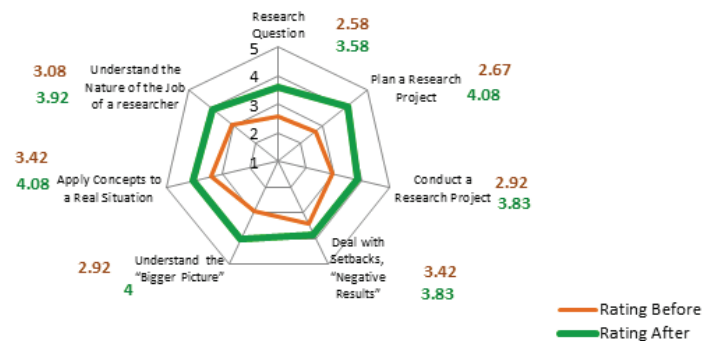
TU
TENNESSEE TECH
UNIVERSITY

Cal

Universidad del
TURABO

Cornell University

**PELLISSIPPI STATE
COMMUNITY COLLEGE**



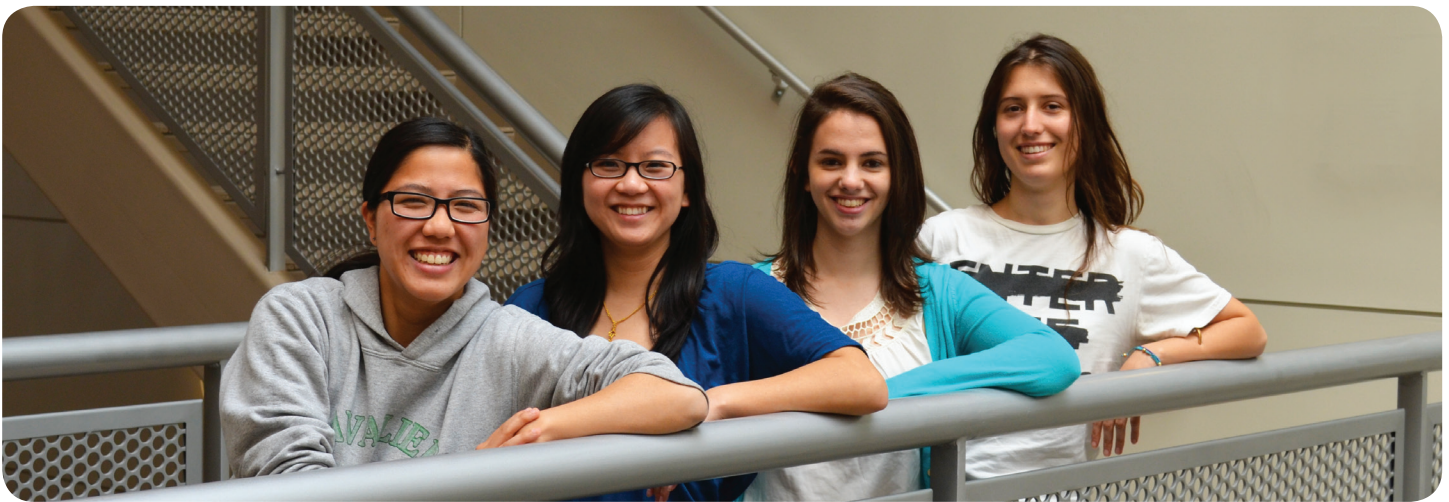
"The REU program at CURENT helped me consider going to graduate school to get my Masters in Electrical Engineering."
-REU Participant

CURRENT's Ambassador Program

The Ambassador Program at CURENT was created to enable undergraduate students to participate in a wide variety of activities that are mutually beneficial to the student and the center.

Ambassadors gain both professional and personal development experiences, engage in team-oriented activities, and develop creative collaboration skills when planning educational projects and event content.

In addition to helping with some day-to-day activities in the center, Ambassador students serve as representatives during outreach activities, lab tours, and a variety of campus and community events.



Engineering Ambassadors at RPI

RPI's Engineering Ambassador (EA) Program helps undergraduate engineering students develop important professional skills, such as communication and leadership.

This is a partnership among United Technologies Corporation (UTC), Penn State, the University of Connecticut, Rensselaer Polytechnic Institute (RPI), and Worcester Polytechnic Institute (WPI).

RPI currently has 31 ambassadors with a mixture of engineering majors: aeronautical, biomedical, chemical, civil, electrical and computer,

environmental, materials science, mechanical, and nuclear. CURENT has supported RPI's EA program during 2012-2013.

The Engineering Ambassadors also support campus-wide events such as the Exploring Engineering Day for 3rd to 6th grade students and parents, Design Your Future Day for 10th to 11th grade females, and Black Family Technology Awareness for local community members.

During the fall 2011-spring 2012, 30 EAs visited 8 school districts and interacted in total with over **2500** students total.

<http://eng.rpi.edu/engineering-ambassadors>



Northeastern

Power Night and Energy Policy Seminar



Northeastern University, one of CURENT's partner schools, recently hosted an IEEE and Power & Energy Society Power Night.

NEU Campus Director Ali Abur and graduate students presented several topics at this event including power engineering, electric market, power system structure, smart grid, power electronics, and renewable energy to undergraduate students.

In addition, NEU and IEEE Power & Energy Boston Chapter organized an interdisciplinary presentation titled "Energy Policy: Innovating a way to clean energy future or a rapid development of domestic reserves."

The presenter was Edward N. Krapels, CEO of Anbaric Transmission and member of the Department of Energy Electricity Advisory Committee. In this talk, Mr. Krapels took a non-partisan look at the manifestos of both president candidates in 2012, compared and contrasted their energy policies, and discussed the possible implications of each.



TUSKEGEE

TUBE Conference at Tuskegee

Tuskegee University hosted the TUBE Conference (Tuskegee University Business & Engineering) from March 18-20, 2013. This year's theme was "UNITE: Uplifting New Innovators to Excel," and the goal was to connect students with industry members.

TUBE educates and empowers students; and promotes teamwork, success, and leadership to encourage future leaders to make changes in the community through activism and hard work. CURENT students at Tuskegee presented posters on their smart grid research during the conference and during the Electrical Engineering Industrial Board meeting.

THE UNIVERSITY of TENNESSEE 
KNOXVILLE



Min H. Kao Building, Suite 555
1520 Middle Drive
Knoxville, TN 37996

865.974.9720 (ph.)
865.974.9723 (fax)
info@curent.utk.edu



"This material is based upon work supported by the National Science Foundation and Department of Energy under Grant No. 1041877. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation."

