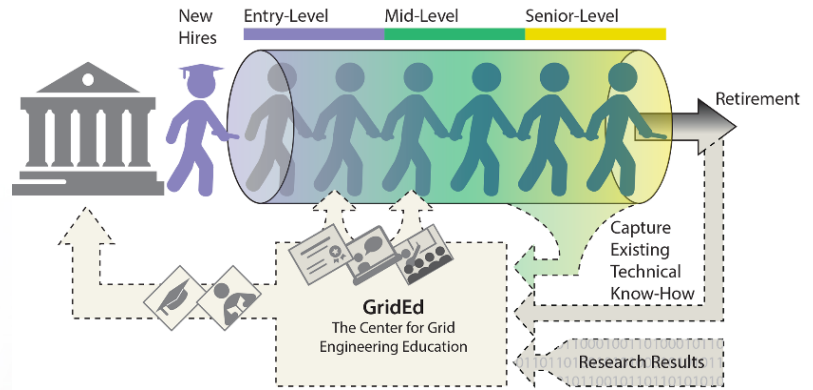


GRIDEd

The Center for Grid Engineering Education

2016 GridEd Report

In 2013, the Department of Energy (DOE), through its SunShot Initiative, awarded to EPRI a project known as Grid Engineering for Accelerated Renewable Energy Deployment (GEARED). In response EPRI created what is known as GridEd—The Center for Grid Engineering Education. In 2016 the DOE granted EPRI and expansion for a formal program in the western U.S. known as STEP—Solar Training and Education for Professionals. The two grants resulted in an eastern U.S. initiative and subsequently a western U.S. initiative. The respective names for these efforts are GridEd-East and GridEd-West. Separate organization efforts reflect the regional differences in the philosophies of eastern and western organizations. GridEd is comprised of EPRI, our seven (7) partner universities (Arizona State University, Clarkson University, Georgia Institute of Technology, Portland State University, University of California—Riverside, University North Carolina—Charlotte, and University of Puerto Rico Mayaguez), and participating utility sponsors.



GridEd-West Utility Advisors	GridEd-East Utility Advisors
Arizona Public Service	Central Hudson
Bonneville Power	CPS Energy
Pacific Gas & Electric	Consolidated Edison
Portland General Electric	Duke Energy
Salt River Project	EcoElectrica
Snohomish PUD	Entergy
Southern CA Edison	FirstEnergy
Tri-State Utilities	LG&E and KU
Western Area Power Authority	Lincoln Electric System
Xcel Energy	National Grid
	New York Power Authority
	Southern Company

Leveraging the Industry

GridEd is anchored by 22 utility advisors and leverages electric industry research through EPRI and university engagement to educate a future electric grid workforce. The objective is to empower new and continuing education students not only to become competent and well-informed engineers but also to participate and influence major technological, social, and policy decisions that address critical global challenges. Additionally, GridEd connects its utilities, universities, and students with the larger GEARED network consisting of an additional 16 universities, 15 utilities, 12 industry representatives, and 2 national labs. Collaboration within the GEARED network is coordinated by the National Network Administrator and the GEARED Executive Council to unify the effort and satisfy program objectives through shared student conferences, innovation boards, and networking events.

Affiliate Universities

The GridEd approach to expanding the knowledge base through a network is to provide ready access to state-of-the-art training materials to a wide university audience. The electric utility industry has a historical practice of hiring employees from local and/or regional universities. The GridEd approach is to improve the quality of future employees and create a partnership between the utility and its area and regional universities. As such, one of the most exciting aspects of GridEd is the establishment of an Affiliate university program through our utility sponsors as an extension of the university network. In 2016, GridEd welcomed 13 new Affiliate universities into GridEd-West, for a total of 29, fostering new and enhancing established utility-university connections. Affiliate universities have many opportunities to engage the GridEd program through shared course materials, Student Innovation Boards, discounts to GridEd short courses (sometimes at no cost), and GEARED student conferences

GridEd-West Affiliate Universities	GridEd-East Affiliate Universities
Arizona State University	Clarkson University
Portland State University	Georgia Institute of Technology
University of California-Riverside	University of North Carolina-Charlotte
California Polytechnic State University	University of Puerto Rico-Mayaguez
Colorado School of Mines	Case Western Reserve University
New Mexico State University	Clemson University
Oregon Institute of Technology	Louisiana State University
Oregon State University	North Carolina State University
Sacramento State University	Rensselaer Polytechnic Institute
University of California-Irvine	SUNY - New Paltz
University of California-Los Angeles	SUNY Buffalo State
University of Colorado-Denver	Syracuse University
Washington State University-Pullman	University of Akron
Washington State University-Vancouver	University of Alabama-Birmingham
West Texas A&M University	University of Louisville
Western Washington University	University of Nebraska
	University of New Orleans
	University of Texas - San Antonio
	University of the Incarnate Word
	Worcester Polytechnic Institute

Bold = Partner University

Curriculum Sharing and Network Design

To date, the 7 GridEd partner universities have revised 10 courses and created 8 new courses in their undergraduate and graduate degree programs. At the end of 2016, a total of 785 students have enrolled in courses impacted by GridEd. Course materials such as power point slides, lecture notes, homework assignments, and exams have been uploaded to GridEd's SharePoint repository for access by Affiliate universities as well as Partner universities. Further, a technology transfer workshop for Affiliate universities was conducted in Dallas, Texas in April, 2016 where 24 university professors assembled to share GridEd products developed to date.







Power Engineering Emphasis	Undergraduate Courses	Combined Undergraduate / Graduate Courses	Graduate Courses
<i>Electric Power System Analysis</i>	<ul style="list-style-type: none"> Design of Transmission and Distribution Systems Power System Analysis Power System Engineering 	<ul style="list-style-type: none"> Electric Power Distribution Systems II Energy Markets 	<ul style="list-style-type: none"> Advanced Topics in Energy Power Systems Deregulated Power Systems Market Operation of Power Systems Power System Planning Power System Reliability Power Quality
<i>Machines & Drives</i>			
<i>Power Electronics</i>		<ul style="list-style-type: none"> Power Electronics Utility Applications of Power Electronics 	
<i>New Energy Systems</i>	<ul style="list-style-type: none"> Electrical Energy Systems Introduction to Energy Systems 	<ul style="list-style-type: none"> Distributed Generation and Energy Storage 	<ul style="list-style-type: none"> Distributed Energy Resources Renewable Electric Energy Systems

REVISED courses in BLACK; NEW courses designated in BLUE

Student Engagement

Attracting and preparing students for the electric power industry is at the core of GridEd's mission. In 2016, GridEd engaged the next generation of power engineers through a variety of mechanisms.

- The Student Innovation Board (SIB) is composed of 12 universities, with 29 undergraduate and graduate students for GridEd-East and 6 universities and 10 undergraduate and graduate students for GridEd-West. Several highlights of the SIB include conference calls, hosting and presenting at IEEE PES roundtable meeting on GridEd bi-monthly webinars and free discussion sessions. Check out the list of our SIB leaders on the GridEd website - <http://grided.epri.com>.
- Student design projects and student conferences give students the design, collaboration, and communication experiences needed to succeed in the workforce. In 2016, GridEd started offering financial support to undergraduate design projects related to the power industry at Affiliate universities. 12 project proposals were awarded up to \$5k, impacting 62 students. Further, students were encouraged to attend conferences such as DistribuTECH in Orlando, FL where students presented posters of their work and explore the conference exhibit hall.
- K-12 outreach activities such as an Energy Pathways Curriculum for high school teaches (in English and Spanish), Discover Engineering Day for children age 10 through 16 to raise STEM awareness, and other outreach seminars in the local communities.

 <p>Martin Meskin, Secretary University of Buffalo, The State University of New York Ph. D. Electrical Engineering Hometown: Buffalo, NY Read full bio</p>	 <p>Mohammad Nikkiah Mojdehi Syracuse University Electrical Engineering Hometown: Syracuse, NY Read full bio</p>
 <p>Connor Raymond Clarkson University Electrical Engineering Hometown: Bloomingburg, NY Read full bio</p>	 <p>Mortaza Rezaee, Chair Georgia Institute of Technology PHD Hometown: Atlanta, GA Read full bio</p>
 <p>George Vellaringattu, Vice-Chair Georgia Institute of Technology Electrical Engineering Hometown: Raleigh, NC Read full bio</p>	 <p>Tyrone Medina Vélez University of Puerto Rico, Mayaguez Campus Electrical Engineering Hometown: Fajardo, Puerto Rico Read full bio</p>

Professional Short Course Program

GridEd continues to provide training for practicing engineers and expanded its short course library to include Unbalanced System Analysis and IEEE Standard 762. Popular courses continue to be Applications of Power Electronics and DG Interconnection on Radial Distribution Systems. Through 2016, GridEd has educated 289 participants through 16 short courses and workshops. GridEd's library of offerings consist of 8 short courses with 4 under development and 2 additional courses slated for development in 2017.

Summary of other 2016 Outputs

Curriculum Modifications Report	2 GridEd Advisory Meeting Workshops
2 Conference Presentations	2016 Course Prioritization Survey
Syllabus for an e-learning 2-semester fundamentals of power systems course	Internship & Job Opportunity Portal

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