



2019 National Science Foundation (NSF) Research Experiences for Undergraduates (REU) Site

IMMERSIVE RESEARCH
IN ENERGY GENERATION,
STORAGE/CONVERSION
AND POWER TRANSMISSION



College of Engineering
TENNESSEE TECH

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Center for Energy Systems Research (CESR)

This NSF REU Site, funded by the Division of Engineering Education and Centers, focuses on providing cutting-edge research in the areas of energy generation (solar, biomass, piezoelectric, generation from salinity gradients, etc.), energy storage/conversion (lithium-ion and lithium-air batteries and formic acid fuel cells) and power grid integration (solar and electric vehicle to grid integration).

PROJECT OBJECTIVES

- Opportunities to conduct high-quality immersive research in the areas of energy generation, storage and power transmission.
- Train top national research talent in key emerging areas of energy, critical for maintaining national preeminence.
- Nurture student professional growth and train them on intelligent research approaches including: maintaining a daily diary, interpreting data and information, effective research outcomes dissemination and ethical decision making.
- Encourage students in energy-related careers and to pursue graduate studies through targeted field trips to Oak Ridge National Laboratory, guest seminars by industrial partners and cutting-edge research immersion.



JUNE 3 - AUGUST 9

Application Deadline

March 15

Awards Announced

April 15

Get Application: <https://www.tntech.edu/engineering/research/cesr/reu-irest>

All qualified applicants are encouraged to apply, including minorities, women, veterans and individuals with disabilities.

Award Information

- \$5,000 stipend for 10 weeks
- On-campus housing included
- Food allowance
- Round-trip travel expenses up to \$500
- Research supplies up to \$400

Eligibility

- U.S. citizen or permanent resident
- Electrical engineering, chemical engineering, mechanical engineering, physics, chemistry, mathematics and other related disciplines
- Sophomores, juniors and seniors from 2-year or 4-year institutions
- Must graduate after September 2019

Application Process

- Transcripts
- Application form
- Two recommendation letters (at least one from a discipline-specific faculty)
- Personal statement on interest in energy-related topics and future goals
- Resume (2 pages)
- See website for more details

Contacts



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Activities

- Energy-related, cutting-edge, immersive research and training
- Intelligent research and professional development seminars and workshops
- Hands-on training with real equipment
- Field trips to Oak Ridge National Laboratory (ORNL) and industrial partner sites
- Preparation of research papers and posters
- Picnic and social activities
- Saturday afternoon outreach session

Topic Areas

- Solar photovoltaics optical and electrical modeling
- Biomass pyrolysis, renewable and alternative energy resources
- Selectively gas permeable anode flow field for direct formic acid fuel cells
- High-energy-density lithium ion batteries
- Energy harvesting with embedded piezoelectric transducers in additive manufacturing
- Electricity generation from salinity gradients
- Solar heat localization using nanoporous medium
- Minimal-energy computational models
- Development of control system for enabling a highly efficient gasoline engine



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