PowerAmerica

VIRTUAL SHORT COURSE

February 3 - 5, 2026

WIDE BANDGAP DEVICES & APPLICATIONS

(Participants will receive an IEEE PDH or IEEE CoP certificate)

COURSE BENEFIT

Attendees will gain comprehensive insight into power SiC and GaN materials, devices, and insertion of these technologies into power electronics systems.

WHO SHOULD ATTEND

- Power Electronics Applications Engineer
- Power Device Engineer
- SiC & GaN Technical Marketing Professionals
- Power Electronics Business & Product Line Managers

COURSE FEE

$50 Students
$500 PowerAmerica Members
$1100 PowerAmerica non-members

REGISTRATION

poweramericainstitute.org/2026-short-course/

SCHEDULE

Feb. 3rd : 10:50 AM - 5:15 PM
Feb. 4th : 11:00 AM - 5:15 PM
Feb. 5th : 11:00 AM - 5:15 PM

Sponsor

AEHR TEST SYSTEMS

REGISTER ONLINE: poweramericainstitute.org/2026-short-course/
For questions, email poweramerica@ncsu.edu.

INSTRUCTOR & COURSE OUTLINE

Instructor: Dallas Morisette, Ph.D.

Research Professor, Purdue University

Topic: Fundamentals of SiC Power MOSFET Design

- Physics of avalanche breakdown
- Relationship between breakdown voltage and on-resistance
- SiC MOSFET design optimization
- Unique aspects of SiC power device design and fabrication compared with silicon
- Planar and trench devices
- Edge termination
- Layout considerations

Instructor: Johann W. Kolar, Ph.D.

Researcher

Topic: Next-Generation Bidirectional GaN/SiC Switch Power Electronics

- Basic Properties and Multi-Step Commutation of Bidirectional Switches
- T-Type Voltage Source and Current Source Variable Speed Motor Drives
- Ultra-Compact Bidirectional Three-Phase EV Chargers
- Ultra-Efficient AI Datacenter Power Supplies
- Single-Stage MVAC/LVDC Solid-State Transformers
- Solid-State Circuit Breakers

Instructor: Matteo Meneghini, Ph.D.

Professor, University of Padova

Topic: GaN Power Devices: Technology and reliability-limiting processes

- Overview on GaN technology and advantages
- Charge trapping phenomena in GaN-based devices
- Advanced methodology for stability investigation for GaN FETs

Instructor: Mike MacMillan, Ph.D.

Consultant

Topic: Silicon Carbide Epitaxy Technology

- SiC epitaxy – basics of growth
- Substrates and growth parameters
- SiC epitaxy tools
- Next-generation tools and techniques
- Characterization techniques and requirements for commercial epitaxy
- Thickness and doping accuracy and uniformity
- Defect types and control

Instructor: David Levett, Ph.D.

Consultant

Topic: Paralleling SiC MOSFETs

- Overview of the challenges of paralleling SiC MOSFETs
- Power layout optimization
- Gate drive design guidance
- Converter testing for reliable operation in the field

Instructor: Elif Balkas, Ph.D.

CTO, Wolfspeed

Topic: Silicon Carbide Substrates: Advantages, Challenges and Solutions

- Motivation for SiC
- SiC advantages in power electronics
- SiC substrate technologies and processing
- SiC defects, surface quality, flatness

Instructor: Don Gajewski, Ph.D.

Sr. Director, Wolfspeed

Topic: SiC Power Device Reliability

- Intrinsic reliability failure mechanisms & models
- Dynamic reliability – new methods & results
- Radiation hardness - terrestrial neutrons
- Product-level qualification & reliability
- Reliability for high voltage and high humidity environments
- Industry consortia guidelines & standards development

Instructor: Sandeep Bahl, Ph.D.

Distinguished Member of Technical Staff
Texas Instruments

Topic: Reliable GaN FETS for Power Supply Applications

- Motivation for the GaN FET
- The meaning of traditional qualification
- Intrinsic reliability of the GaN FET
- Achieving application-reliable GaN
- Surge robustness without avalanche

Instructors: Gregory Ratcliff and Brian Heber

Chief Innovation Officer, Vertiv

Topic: Advancing Wide Bandgap Power Electronics: SiC and GaN Innovations for Next-Generation Energy Systems

- Today's Architectures
- Future Architectures
- Challenges vs. Benefits
- Market Adoption & Future Gazing

Instructor: Rambabu Adapa, Ph.D.

Technical Executive, EPRI

Topic: Role of Wide Band Gap power electronic devices in Power Grid Modernization with Renewables

- Power Grid Architectures with renewable generation
- Meeting the power requirements for new loads such as AI data centers
- WBG device power requirements for Power Grid applications
- Future R&D needs for Power Grid Modernization and the role of WBG power electronics

Instructor: Thomas Jahns, Ph.D.

Faculty, University of Wisconsin

Topic: Monolithic GaN Bidirectional Switches: Where to Apply Them and How

- Matrix and cycloconverter-type single-stage converters
- Vienna rectifiers and T-type multi-level inverters
- Current source inverters/converters
- BD device switch states and gate drive technology
- Four-step commutation sequence and simplifications

Instructor: Isik Kizilyalli, PhD.

CEO and Entrepreneur

Topic: GaN and Related Materials - Device Processing and Materials Characterization for Power Electronics

- GaN material properties for power applications
- Bulk GaN substrates and epitaxial growth
- Selective area p-type GaN doping
- Vertical GaN power devices
- Novel material characterization for GaN power devices
- Future WBG directions and impact on critical applications

INSTRUCTOR & COURSE OUTLINE

Instructor: Burak Ozpineci, Ph.D.

Section Head, Oakridge National Laboratory

Topic: Electric Drive Technologies for Commercial Vehicles

- Reliable Long-Life Electric Drive Systems
- Electric drives for commercial vehicles vs. passenger vehicles
- AI and Digital Twin Integration
- Motor AI for Advanced Design

Instructor: Victor Veliadis, Ph.D.

Executive Director & CTO, PowerAmerica
Professor, North Carolina State University

Topic: SiC Fabrication in a Si Fab

- SiC material properties for power devices and applications
- SiC specific fabrication technology: Etch, Implantation, metallization and ohmic contact formation, gate oxide processing
- Edge termination techniques

Instructor: Victor Veliadis, Ph.D.

Executive Director & CTO, PowerAmerica
Professor, North Carolina State University

Topic: Basal Plane Dislocation Impact on SiC Transistor Performance

- Effect of defects on chip area and yield
- BPD generation, propagation, and expansion
- BPD induced electrical characteristic degradation
- Recovery of BPD related damage by annealing

Instructor: Peter Friedrichs, Ph.D.

Vice President, SiC, Infineon

Topic: WBG semiconductors and their impact on existing and emerging power electronics applications

- Introduction to the new landscape of power electronics
- Impact of WGB devices on energy savings and power density targets
- Novel WBG components enable new applications
- Device system interface as key to leveraging WBG potential
- Powering AI: a huge upcomig opportunity

Instructor: Victor Veliadis, Ph.D.

Executive Director & CTO, PowerAmerica
Professor, North Carolina State University

Topic: WBG Bidirectional Switches

- Introduction to WBG bidirectional switches and applications
- Lateral GaN bidirectional switches with dual-gate configuration
- Vertical SiC bidirectional switch concepts
- Bidirectional DC circuit breakers

Instructor: Victor Veliadis, Ph.D.

Executive Director & CTO, PowerAmerica
Professor, North Carolina State University

Topic: SiC Planar and Trench MOSFETs

- Components of MOSFET resistance
- Planar and Trench configurations
- Trench MOSFET Gate-oxide protection designs
- Trench fabrication specifics