

## Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC)

WEMPEC is an organization of sponsoring companies fostering innovation by supporting research and educational programs in electric machines and power electronics at the University of Wisconsin–Madison College of Engineering. The knowledge gained in WEMPEC-sponsored research is then transferred to the global industry network of engineers who work for WEMPEC sponsoring and non-sponsoring companies. Our alumni are employed in government labs, in the private sector (both national and international), and in academic careers.

WEMPEC's objective is to perform the highest quality long-term research resulting in technology advancements that lead to future industrial growth. Our research seeds long-term technological developments and discoveries that are years ahead of commercially available products. Cutting-edge research is conducted on:

- **Advanced machines**
- **Power converters**
- **Controls & sensor technology**
- **Utility applications, and**
- **Energy storage and power transfer.**

Significant groundbreaking advances have been made in over three dozen notable areas since WEMPEC's founding in 1981. WEMPEC leads the world in pushing the envelope in machines, converters, and controls in unique synergistic relationships to achieve new and innovative technology. Check us out at [wempec.wisc.edu](http://wempec.wisc.edu).

### STAND OUT AS AN INNOVATIVE ENGINEER

Our advanced degree programs will prepare you for leading-edge positions in industry. Graduate students will learn both theoretical as well as hands-on applied knowledge in power electronic converters, machine design, power converter controls, and alternative energy. As a WEMPEC student, you will have plenty of opportunity to develop your technical presentation skills. During weekly research group meetings, on a rotation basis, you will be asked to present the progress of your research project to your faculty advisor and student colleagues. In addition, during our annual review meeting with sponsors, you will have an opportunity to discuss your research during the poster session.

The education you receive at UW–Madison is directly applicable to a career in industry and is suitable for a new or recent college graduate, as well as experienced professionals who seek the necessary (re)training to change or advance their careers. **WEMPEC students receive job offers before they graduate!**



### WEMPEC IN THE CLASSROOM

The UW–Madison College of Engineering is recognized for excellence in research, instruction, and service to the profession. Our curriculum is ranked among the top in national surveys, consistently producing talented graduates whose skills are highly respected throughout the nation and around the world.

The education you receive at UW–Madison is directly applicable to a career in industry or academia.

The WEMPEC faculty have developed and continue to evolve a full range of semester-long courses in the fields of:

- **Electric machines**
- **Power electronics**
- **AC drives, power systems**
- **Renewable energy, and**
- **Real-time control of electromechanical systems.**

Many students planning a career in industry enroll in the Wisconsin Entrepreneurial Bootcamp (WEB), a one-week intensive training program in technology entrepreneurship.

Those planning a future in academia should consider the DELTA program. Here graduate students, postdocs, and faculty come together to explore issues in teaching learning, and academics. The courses Research Mentor Training, Expeditions in Learning, and Creating a Collaborative Learning Environment all count toward the learning-community requirement of the Delta Certificate.

We currently teach 21 courses in these fields for both undergraduate and graduate students. The majority of these courses are also offered as digitally recorded lectures through our Online Degree program developed for practicing engineers. These recorded lectures are made available for on-campus students as a learning resource.

WEMPEC faculty have also been engaged in teaching courses that offer undergraduates the opportunity to gain hands-on experience building power converters and renewable energy sources. These courses have helped attract new students into the power-engineering field.

### RESEARCH FACILITIES

The WEMPEC research labs are equipped for 50 to 60 graduate students to work on:

- **Machines**
- **Motor drives**
- **Power electronics circuits**
- **Microgrids**
- **Battery systems**
- **Electric traction systems**
- **Wireless power transfer, and**
- **Machine and power electronics packaging research.**

We recently installed three high-speed dynamometers for development of EV motors and converters, two of which are 170 kW, 15,000 RPM machines that provide WEMPEC students with lab facilities that are unmatched at any other university.

The WEMPEC labs are also outfitted with a variety of commercial and specially constructed power converters, and DSP-based controllers are available for general-drives and power-converter research activities. Printed circuit board assembly/disassembly equipment includes a pick-and-place machine, inspection microscope, and a variety of current technology soldering and de-soldering equipment. A large range of test and measurement instruments needed for power electronics and machines research are available in the lab, including state-of-the-art power meters, 12-bit oscilloscopes, dynamic signal analyzers, high-power DC and



# WEMPEC

Wisconsin Electric Machines & Power Electronics Consortium

Graduate Study and Research in Advanced Machines, Power Converters, and Controls & Sensor Technology

AC supplies, more than 60 differential voltage probes, and a correspondingly high number of current probes.

We continue to expand and upgrade our facilities with recent acquisitions of new lab space and the conversion of a graduate student office into a fourth research lab with seven benches. Our labs now include more than 34 maple-surface movable work-stations for researchers to build and test equipment. In addition, we installed a new E-stop safety system in all of our labs to shut down power from all three-phase receptacles in the event of an emergency.

- **Faculty, staff and peer students who are supportive and committed to your success**
- **Rigorous coursework that will prepare you to achieve your goals**
- **An environment highly conducive to collaboration**
- **Faculty with a broad range of research interests and connections both on campus and around the world**
- **Worldwide network of WEMPEC alumni**

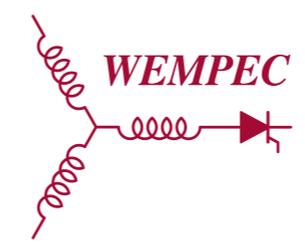
Madison is consistently ranked as one of the best cities to live. With more than 40,000 students representing 50 states and 124 countries, our campus community is diverse, energetic, and constantly in motion. Jump around with 80,000 Badgers fans at Camp Randall Stadium and witness athletic feats from our 23 Big Ten varsity teams. Join one of the nearly 900 student organizations—or start a new one. Stroll down Madison’s vibrant State Street and experience the largest farmers’ market of its kind as you walk around Capitol Square. Relax over live music and a stunning sunset at the Memorial Union Terrace. Build a lifelong community of support including a global network of WEMPEC alumni.

### WEMPEC SOCIAL EVENTS

Faculty, staff and students get together twice a semester for social events: fall picnic, end-of-semester get-togethers and our spring international potluck dinner. A different sponsor company comes to campus every Friday to present a seminar and to socialize with students. Many WEMPEC students receive internships and/or full-time employment opportunities as a result of these interactions. Students are free to coordinate social outings, group dinners and any other activity they choose. These events help to strengthen the bonds of friendship within our community. WEMPEC students have also organized a bike club and intramural soccer team. **Plan to join us!**

Can you see yourself as a part of our WEMPEC family?

You are invited to apply online at:  
<https://grad.wisc.edu/admissions/process/>



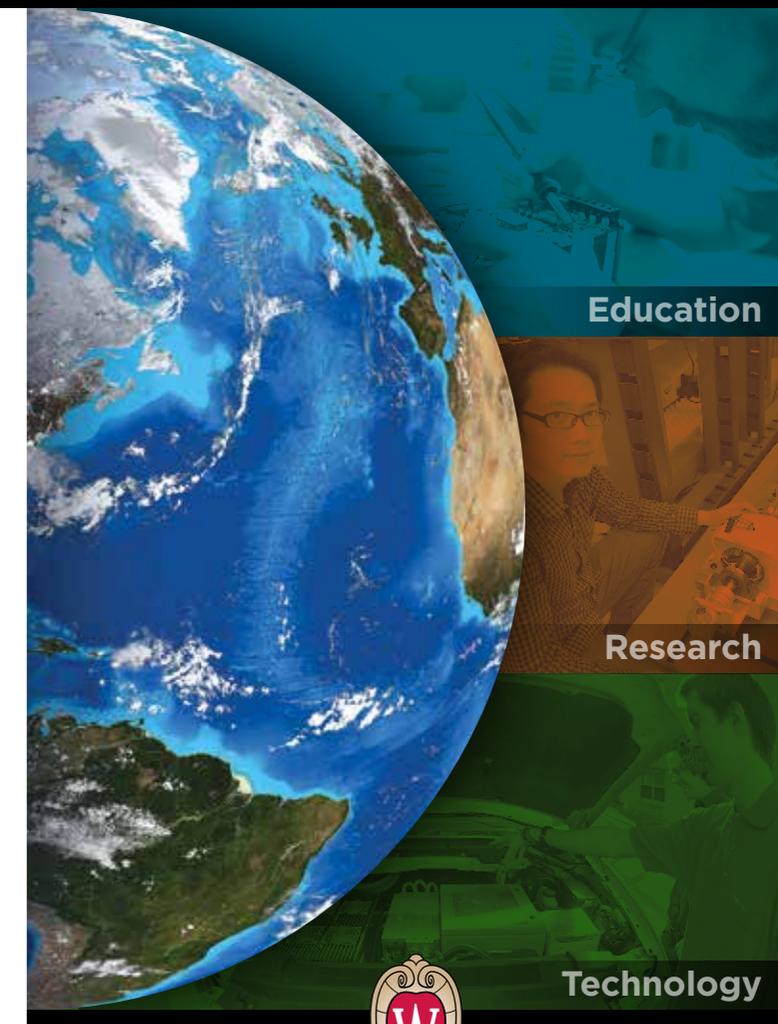
**WEMPEC.WISC.EDU**  
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### CAMPUS LIFE

The UW–Madison College of Engineering is an international leader in research and education. Our graduate academic programs are highly ranked and our faculty are widely respected as leaders in their fields. Here you will find:



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[WWW.WEMPEC.WISC.EDU](http://WWW.WEMPEC.WISC.EDU)