

POWERTRAIN ELECTRIFICATION, CAPSTONE CERTIFICATE

Electrification of automotive powertrains has become the main technology path to enhance fuel economy and reduce greenhouse gas emissions. The Powertrain Electrification capstone certificate is fully online and deals with systems, components and their interactions. Based on the degree of electrification, the topology of powertrain can change in complexity and controllability. This capstone certificate spans micro, mild, full and plug-in hybrid vehicle architectures, with delineations for matching performance specifications and component sizing. A deep immersion will be taken into the fundamental characteristics of engines, transmission, batteries, motors, generators and power electronics such as inverters, DC-DC converters and on-board chargers.

HOW TO GET IN

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This certificate is geared toward those with an academic background in Mechanical Engineering.

Applicants must possess a baccalaureate degree. Applications are accepted for Fall, Spring and Summer on a rolling basis. Adult Career and Special Student Services (ACSSS) is the admitting office for all University Special students, including capstone certificate students. However, the department offering the capstone certificate program makes the final admission decision upon review of all applicant materials.

ADMISSION REQUIREMENTS FOR THE CAPSTONE CERTIFICATE

1. Hold bachelor's degree in Mechanical Engineering or equivalent credential from an accredited college or university.
2. A minimum undergraduate grade-point average (GPA) of 3.00 on the equivalent of the last 60 semester hours (approximately two years of work) or a master's degree with a minimum cumulative GPA of 3.00.
 - a. Applicants from an international institution must have a strong academic performance comparable to a 3.00 for an undergraduate or master's degree.
3. Applicants whose native language is not English must provide scores from the Test of English as a Foreign Language (TOEFL). The minimum acceptable score on the TOEFL is 580 on the written version, 243 on the computer version, or 92 on the Internet version.

Exceptions to standard admission requirements are considered by the admissions committee on an individual basis. Applicants may be admitted with deficiency, but will be expected to complete the necessary leveling courses.

APPLICATION STEPS

1. Submit an online application for admission (<https://acsss.wisc.edu/apply/>) as a University Special student, selecting UNCS Capstone Certificate and the program: Powertrain Electrification. This

application is received and processed by ACSSS with final decision held for approval from the specific capstone certificate coordinator.

2. Arrange to have transcripts of all previous educational institutions sent directly to EPD Student Services: studentservices@epd.wisc.edu
 - a. **Note:** Transcripts should be sent directly by the educational institution to the program.
3. After all of application materials have been received, the admissions committee chair contacts applicants for a phone interview. After the interview, the complete application will be presented to the Admissions Committee for evaluation.

FINAL ADMISSIONS DECISION

Admission decisions are made in the order completed applications are received. The committee will make one of the following decisions:

- Recommend admission
- Decline further consideration of your application.

After a decision is made, student services will contact applicants by email to inform them of the decision and to schedule a time to discuss the decision and any next steps. The ACSSS is also notified of the final admission decision and completes the formal process for UW-Madison admissions.

REQUIREMENTS

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GRADE REQUIREMENTS

- Students must maintain a 3.00 GPA in the capstone to continue to the next class.

REQUIRED COURSES

Students must select 9 credits from the following courses:

Code	Title	Credits
E P D 620	Electrified Powertrain Systems	2
E P D 621	Batteries for xElectrified Vehicles	2
E P D 629	Powertrain Systems and Controls	3
E P D 645	Electric Machines for Traction Applications	2
E P D 646	Electric Drives for Traction Applications	2
E P D 628	Analysis of Trends in Engines	1
E P D 647	Trends in Electrification Seminar	1

MINIMUM REQUIREMENTS FOR CAPSTONE CERTIFICATE COMPLETION

- Students must earn a minimum grade of C in each course used to meet Capstone Certificate requirements.
- Courses in which a student elects the pass/fail or audit option will not count toward completion of Capstone Certificate requirements.
- All of the Capstone Certificate credits must be earned "in residence" (which includes on campus and distance-delivered courses) at UW-Madison.

- All of the Capstone Certificate credits must be earned while enrolled in the Capstone Certificate program.

Individual Capstone Certificate programs may have additional requirements for completion, which will be listed above as/if applicable.

LEARNING OUTCOMES

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1. Develop control systems for electrified powertrain systems.
2. Comprehend and be able to analyze working principles of all components in electrified powertrain systems.
3. Describe how cells are connected to make modules and packs for power and energy applications
4. Develop systems thinking at vehicle level and drive cycle analysis, by recognizing energy flows and losses in a vehicle and identify the main contributors for them, and quantifying losses and impact of specific technologies on vehicle fuel economy