

ME 597: Distributed Energy Resources – Spring 2026

Tuesdays and Thursdays from 9 to 10:15 AM ET
ME G003 and/or [on Zoom](#)
Instructor: Kevin J. Kircher, kevinjkircher.com
TA: Arash J. Khabbazi, ajkhabbazi.github.io



Image credit: [DOE Loan Programs Office](#)

Distributed energy resources (DERs) are controllable electrical devices that plug in at the edge of the power grid, typically through buildings. DERs – such as electric vehicles, heating and cooling equipment, energy storage systems, and rooftop solar photovoltaics – will play an increasingly important role in future energy systems that decarbonize, digitalize, and decentralize their operations. In this class, students will learn to model a variety of DERs, optimize DER designs, and control DERs to reduce costs, pollution, and impacts on the power grid. This class will involve a mix of coding and mathematical analysis. Students will do semester projects on current DER topics.

Format: In-person and online

Grading: 20% homework, 35% midterm exam, 45% semester project

- Homework, the exam, and semester projects will involve a mix of math and coding.
- Students can code in Matlab or Python. The course staff will support both.
- Students may work together on homework, but each student must submit their own solutions.
- The TA will grade homework quickly on a three-tier scale (full, half, or zero credit) based on how much of the solution is present, clear, and correct.
- Each student gets one free three-day homework extension. No questions asked; just email the TA.
- For any other extensions, students must go through the [Office of the Dean of Students](#).

- Each student will individually take a midterm exam about halfway through the semester.
- Students can do projects individually or in teams of two to four. Expectations scale with team size.
- Each team will submit one final project report, written in \LaTeX in a conference paper format.
- Each team will give two talks: One project idea pitch and one final project presentation. Both will be formatted like conference presentations, made in \LaTeX using Beamer.
- Only one student from each team will present, but the whole team should help them prepare.
- Online students should join Zoom in real time if possible for their teams' presentations.
- Each student will assess their own project contributions in a final meeting with me and their team. We will grade each team's project as a whole then adjust individual grades based on self-assessments.

Tentative schedule

- Introduction to energy, electricity, and DERs (~3 classes)
- Modeling and simulating DERs (~10 classes)
- Optimization, control, and machine learning for DER applications (~6 classes)
- Project pitches (~2 classes)
- Final project presentations (~4 classes)
- Facility tours and guest lectures (~3 classes)

Prerequisites

- Required: Linear algebra, ordinary differential equations, and facility with programming in a language such as Matlab, Python, or Julia.
- Not required, but may enhance appreciation: Thermodynamics, optimization, control systems, probability, statistics, machine learning.

Textbook: None

Office hours

- Kevin: Fridays from 1-3 PM ET in HLAB 1022 or [on Zoom](#)
- Arash: Tuesdays from 1-2 PM ET and Wednesdays from 6-7 PM in HLAB 1012 or [on Zoom](#)

Websites

- [Kevin's website](#) will host lectures slides, homework assignments, etc.
- [Brightspace](#) will host lecture videos.
- Students will upload assignments to [Gradescope](#).
- Students can discuss with each other and the TA on [Discord](#).