

EE 452 – Power Electronics Design

Fall 2021

Instructor: Professor Brian Johnson, E-mail: brianbj@uw.edu

Office Hours: Tuesday 11:30am – 12:30pm, Friday 12:00pm – 1:00pm on Lecture Zoom link

Teaching Assistant: Ishaan Bhimani, E-mail: ishaanb@uw.edu

Office Hours: Monday 3:00pm – 4:00pm, Thursday 3:00pm – 4:00pm, ECE 137A

Lecture Time: Monday, Wednesday, Friday, 4:30-5:20pm Pacific Time

Zoom Link for Lecture & Professor's Office Hours:

- Link: <https://washington.zoom.us/j/94731318075?pwd=eGNHUWtkVmNKa3dEalQ0VnZXcUZOUT09>
- Password: 522236
- All lectures will be recorded and posted to Canvas webpage.

Location of Exams: Room ECE 045 at exam dates listed below

Lab Location and Time: Room ECE 137A

- Section AA: Tuesday 8:30am–11:20am
- Section AB: Thursday 8:30am–11:20am

Course Text: R. Erickson, D. Maksimovic, “Fundamentals of Power Electronics,” 2nd Edition

Lecture Topics

- Introduction and overview
- Steady-state converter analysis
- Converter loss modeling
- Semiconductor switching devices
- Discontinuous conduction mode
- Converter circuits
- Transformer isolated converters
- Converter models and averaging
- Magnetics design
- Losses in magnetics

Lab Overview

- Week 1: Orientation
- Weeks 2-4: Experiment 1 – Motor characterization, controlling a MOSFET, PWM
- Weeks 5-7: Experiment 2 – Sensing, magnetics, boost converter stage
- Weeks 8-10: Experiment 3 – System integration, motor drive, open-loop spinning wheel demo

Grading

- Homework 25% - Assignments roughly once per week
- Midterm exam 25%
- Final exam 25%
- Prelab assignments 5% (workload 30 minutes to 1 hour per prelab)
- Lab reports 20%

Exam Dates

- All exams will be held in-person in room ECE 045
- Midterm: Friday November 5th, 4:30pm - 5:20pm
- Final Exam: Monday December 13th, 4:30pm - 6:20pm

Course administration details

- Make-up Midterm: No make-up midterm will be offered.