

## Syllabus for ECE 4330: Power Electronics

Fall 2026



### Course Information:

This course will introduce students to the broad, interdisciplinary field of power electronics – the study of techniques for converting electrical power from its available form to the desired form using power semiconductor switches. Power electronics has become ubiquitous – from the wall-warts that power smartphones, to computers, electric vehicles, renewable energy conversion, energy storage, industrial factory automation, robotics, trains, planes, and grid control – power electronics is everywhere. If you plan to specialize in power and energy, this course will provide the foundation and first principles that will allow you to succeed in your career. Even if you do not plan to specialize in power, this course will provide you with the basics to talk knowledgeably about energy and its relationship to diverse fields, from equipment design to power grid operations.

**Instructors:** Dr. Richard Asiamah, [asiamah@gatech.edu](mailto:asiamah@gatech.edu)

**Lecture time & place:** Tue/Thu 09:30–10:45, Van Leer C240

**Office hours:** TBD

**Textbook (required):** N. Mohan, S. Raju, “Power Electronics – A First Course”, Wiley, 2<sup>nd</sup> ed. 2023. ISBN 978-1-119-81856-4

**Online resources:** Canvas™ Learning Management System: <http://canvas.gatech.edu>. Check daily for updates or set notifications to push to email/messenger.

## Syllabus

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|-----------------|-----|----------------|
| <b>Grading:</b> | 20% | Homework       |
|                 | 20% | First Midterm  |
|                 | 20% | Second Midterm |
|                 | 15% | Design Project |
|                 | 25% | Final Exam     |

**Attendance:** You are strongly encouraged to keep up with the rhythm of lectures and assignments. Missed lectures make it very difficult to catch up. Lectures will not be recorded, and there is no plan to allow for remote participation. While lecture attendance is **very strongly** encouraged, it will not be verified.

If, for some extremely important, verifiable reason (i.e., written excuse from a doctor, etc.), you cannot take any of the exams at the scheduled time, the instructor must be notified **prior** to the exam time, so proper arrangements can be made to administer the exam. *No excuses after the date of the exam will be considered. No makeup exams will be given unless you notify Dr. Asiamah via email prior to the scheduled time and have a legitimate excuse for absence.* There will be no dropping of any exam grades. Failure to complete an exam will result in a score of zero.

**Course Objective:** This course covers the fundamentals of power electronics. It is intended to enable students to understand a wide range of existing and emerging power conversion techniques, to move toward a specialization in the area, and/or to effectively specify and utilize power converters.

**Prerequisites:** The topics covered in Electrical Energy Systems (ECE 3072), especially AC analysis, 3-phase power, power transformers, and synchronous generators. In addition, we expect you to be very familiar with time-domain and frequency-domain circuit analysis, and with the basics of semiconductor devices.

**Homework:** Homework due dates will be announced on Canvas™ and submitted on Canvas™. Homework may be solved in groups, provided that all in the group participate fully. Copying is not permitted. If copying on homework is suspected, no credit will be given. Late homework will incur a grade penalty (-10 pts for every 24 hours). No homework will be accepted after the solutions have been posted.

**Academic Honesty:** Suspected cases of academic misconduct, as defined in the Georgia Tech Student Honor Code, will be turned over to the Office of Student Integrity (OSI).

**Student-Faculty Expectations Agreement:** At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectations that you can have of us and that we have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the

environment we seek. Therefore, we encourage you to remain committed to the ideals of Georgia Tech while in this class.

**Accommodations for Students with Disabilities:** At Georgia Tech, we strive to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please contact Dr. Hughes to discuss options. If you have already established accommodations with the Offices of Disability Services, please communicate your approved accommodations at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through Disability Services, you are welcome to contact that office at 404-894-2563, [dsinfo@gatech.edu](mailto:dsinfo@gatech.edu), or <http://disabilityservices.gatech.edu>.

**ECE 4330 - Course Outline (see also detailed schedule):**

1. Introduction to Power Electronics (textbook chapter 1)
2. Mathematical Fundamentals and Physics (not in textbook)
3. DC-DC Converters (chapter 3)
4. Devices and Components, Without Transformers (chapters 2 & 3)
5. Rectifiers (chapter 5)
6. Switched-Mode Power Supplies (chapter 8)
7. Magnetic Circuits and Transformers (chapters 7 & 9)
8. Inverters (chapter 12)

## Appendix: Support Services and Resources:

In your time at Georgia Tech, you may find yourself in need of support. Below you will find some resources to support you both as a student and as a person.

### *a) Academic support*

- Center for Academic Success <http://success.gatech.edu>
  - 1-to-1 tutoring <http://success.gatech.edu/1-1-tutoring>
  - Peer-Led Undergraduate Study (PLUS) <http://success.gatech.edu/tutoring/plus>
  - Academic coaching <http://success.gatech.edu/coaching>
- Residence Life's Learning Assistance Program <https://housing.gatech.edu/learning-assistance-program>
  - Drop-in tutoring for many 1000 level courses
- OMED: Educational Services (<http://omed.gatech.edu/programs/academic-support>)
  - Group study sessions and tutoring programs
- Communication Center (<http://www.communicationcenter.gatech.edu>)
  - Individualized help with writing and multimedia projects

### *b) Personal Support (Georgia Tech Resources)*

- The Office of the Dean of Students: <http://studentlife.gatech.edu/content/services>; 404-894-6367; Smithgall Student Services Building 2nd floor
    - You also may request assistance at [https://gatech-advocate.symplicity.com/care\\_report/index.php/pid383662?](https://gatech-advocate.symplicity.com/care_report/index.php/pid383662?)
  - Counseling Center: <http://counseling.gatech.edu>; 404-894-2575; Smithgall Student Services Building 2<sup>nd</sup> floor
    - Services include short-term individual counseling, group counseling, couples counseling, testing and assessment, referral services, and crisis intervention. Their website also includes links to state and national resources.
    - Students in crisis may walk in during business hours (8am-5pm, Monday through Friday) or contact the counselor on call after hours at 404-894-2204.
  - Students' Temporary Assistance and Resources (STAR): <http://studentlife.gatech.edu/content/need-help>
    - Can assist with interview, clothing, food, and housing needs.
  - Stamps Health Services: <https://health.gatech.edu>; 404-894-1420
    - Primary care, pharmacy, women's health, psychiatry, immunization and allergy, health promotion, and nutrition
  - OMED: Educational Services: <http://www.omed.gatech.edu>
  - Women's Resource Center: <http://www.womenscenter.gatech.edu>; 404-385-0230
  - LGBTQIA Resource Center: <http://lgbtqia.gatech.edu/>; 404-385-2679
  - Veteran's Resource Center: <http://veterans.gatech.edu/>; 404-385-2067
- Georgia Tech Police: 404-894-2500