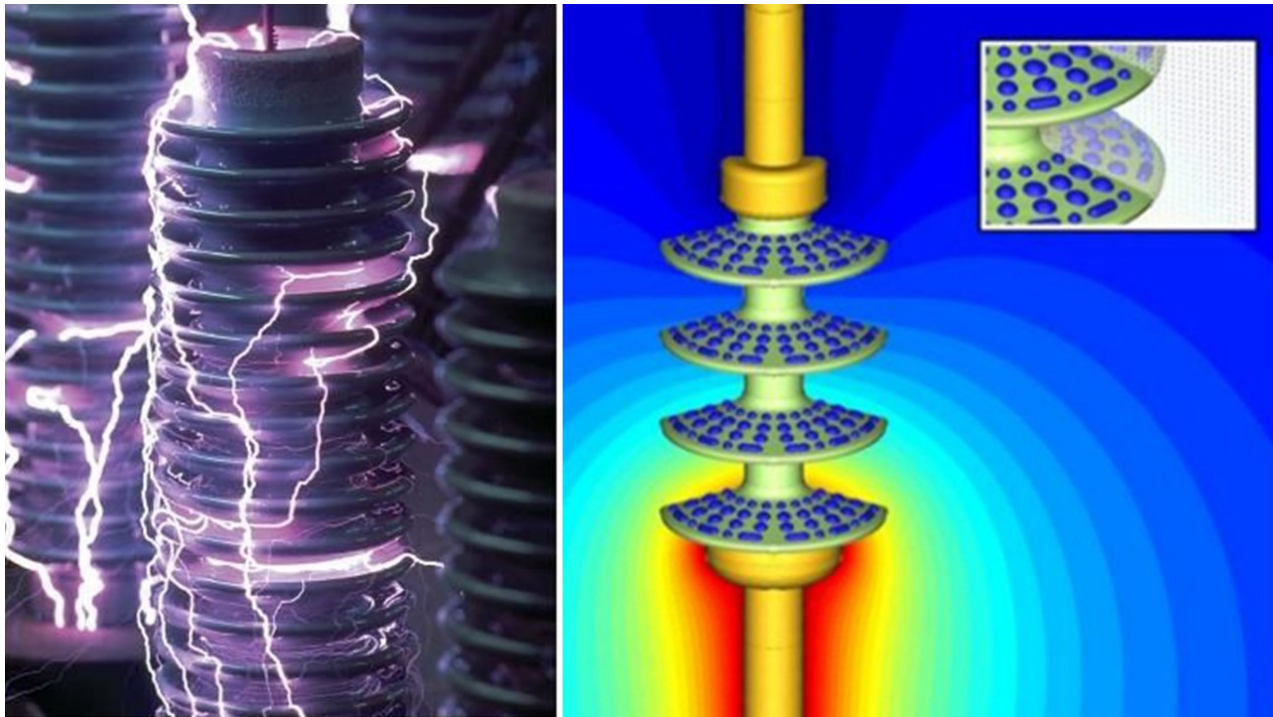


# ECE 8883 – High Voltage Engineering

Spring 2019, Dr. Lukas Graber



- Description:** This course provides an introduction to the fundamental phenomena with solid, liquid, and gaseous dielectrics. High voltage design aspects of power system apparatus as well as modern testing and monitoring techniques are analyzed.
- Pre-requisites:** ECE 3072
- Time and place:** MF 10:10–11:00, van Leer C241  
W 09:55–10:45, Klaus 2440 (08:00-10:45 for labs at NEETRAC; check detailed course schedule for more information)
- Instructor:** Dr. Lukas Graber
- Email:** [lukas.graber@ece.gatech.edu](mailto:lukas.graber@ece.gatech.edu)
- Online resources:** Canvas Learning Management System: <http://canvas.gatech.edu>. Check daily for updates or set notifications to push to email/messenger.
- Office phone:** 404-894-2726 (van Leer) or 404-675-1826 (NEETRAC)
- Office hours:** MF 11:00–12:00, van Leer W327

**Textbook (required):** Kuffel, Zaengl, Kuffel, "High Voltage Engineering Fundamentals," 2<sup>nd</sup> ed., Newness, 2000 [ISBN 978-0-7506-3634-6]. *Instructor might provide additional notes for some topics.*

**Grading policy:** 30% Lab reports  
30% Project (presentation + one page summary; in groups of 2)  
20% Midterm exam  
20% Final exam

**Extra credit opportunity:** 2 bonus points (on a scale of 100) towards the final exam can be obtained by attending 75% of the seminars offered by the IEEE PES Student Chapter. More information will be announced in class.

**Course evaluations:** There will be a Georgia Tech CIOS evaluation at the end of the semester. One or two additional informal evaluations are planned throughout the semester. Participation is highly encouraged.

**Exams:** The midterm exam and the final exam are closed book and closed notes. One formula sheet (both sides of 8.5" x 11" paper) is allowed for the midterm exam and two for the final exam. The formula sheet(s) should be handwritten originals; not photocopied. The final exam is comprehensive. It will cover all the material presented in the course. Questions concerning a grade given for any assignment or exam must be presented to the instructor within 5 days after the grade is received. No exceptions to this rule will be permitted at any time, for any reason.

**Laboratory Sessions:** There will be a total of three laboratory sessions at NEETRAC, 5351 Kennedy Rd, Forest Park, GA 30279. Shuttle bus service or rides from main campus will be provided. Grading will be based on the lab reports, which also contain simulation results from the computer lab sessions. The schedule will be announced in class and on T-Square.

**Computer Laboratory:** Computer simulations will be based on the scientific computing package COMSOL Multiphysics. Georgia Tech holds enough licenses for everyone to run their simulations from terminal servers. The license agreement does not permit the installation of COMSOL Multiphysics on private computers.

**Attendance:** Class attendance is very strongly encouraged, but will not be verified. It is the student's responsibility at all times to keep abreast of course procedural announcements, obtain handouts, etc. All homework, solutions, handouts, etc., will be posted on the T-Square web site. If, for some extremely important, verifiable reason (i.e., written excuse from doctor, etc.), you cannot take any of the exams at the scheduled time, the instructor must be notified prior to 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 at any time, for any reason. There will be no dropping of any exam grades. Failure to complete an exam will result in a score of zero.

**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). See also: <http://policylibrary.gatech.edu/student-affairs/academic-honor-code>

**Topics:**

1. Generation of high voltages
2. Measurement of high voltages
3. Fundamentals of electrostatic fields and field stress control
3. Electrical breakdown in gases and vacuum
4. Electrical breakdown in solid and liquid dielectrics
5. Insulation test techniques, testing procedures, and insulation coordination
6. Applications: Dielectric design of power apparatus

## 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