ECE 4353: Gaseous Electronics

Credit / Contact hours: 3 / 3

Course coordinator: Hermann Krompholz


Catalog description: Kinetic theory of gases, collisions, emission processes, self-sustained discharge, Paschen law, glow discharge, arc discharge, streamers, spark discharge, corona discharge, and gas lasers.

Pre-requisite(s) or co-requisites: ECE 3342.

Designation: Elective

Course learning outcomes: Upon completion of this course students should be able to do the following:

1. Analyze and quantify basic gas discharge processes.
2. Analyze and quantify basic gas discharge applications in pulsed power and high voltage technology.

Student outcomes addressed: a, c, e, and k.

Topics covered
Kinetic gas theory - 2 hours
Structure of atoms and molecules - 3 hours
Collisions - 3 hours
Elementary theory of gas discharges and collision dominated plasmas - 3 hours
Distribution function and Boltzmann equation - 2 hours
Ionization and deionization processes - 3 hours
Electron emission - 2 hours
Behavior of charged particles in a gas - 5 hours
The self-sustaining discharge - 2 hours
Breakdown mechanisms - 9 hours
Vacuum discharges - 2 hours
Surface flashover - 2 hours
Tests and reviews - 4 hours

Publish date: 06/27/2011