

# ECE 5047: High Voltage Engineering and Laboratory

## Course Description

Dielectric strength and breakdown of gases, liquids, and solids, electric field design problems in power system equipment; laboratory study of high voltage insulation.

**Prior Course Number:** 747

**Transcript Abbreviation:** High Voltage Lab

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Undergrad, Graduate

**Student Ranks:** Junior, Senior, Masters, Doctoral

**Course Offerings:** Spring

**Flex Scheduled Course:** Never

**Course Frequency:** Every Year

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 2.0 hr Lec, 2.0 hr Lab

**Expected out-of-class hours per week:** 5.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** Prereq: 3040 (341), and enrollment in ECE major, or Grad standing in Engineering, Biological Sciences, or Math and Physical Sciences.

**Exclusions:** Not open to students with credit for 747.

**Cross-Listings:**

**Course Rationale:** Existing course.

**The course is required for this unit's degrees, majors, and/or minors:** No

**The course is a GEC:** No

**The course is an elective (for this or other units) or is a service course for other units:** Yes

**Subject/CIP Code:** 14.1001

**Subsidy Level:** Doctoral Course

## Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

## Course Goals

Apply the knowledge of mathematics and engineering, especially in the areas of high voltage engineering, electromagnetics, and power engineering
Be able to design and conduct high voltage experiments through their experience in the High Voltage Laboratory
Be able to interpret data by the use of statistics
Be able to design a system, component or process, and apply simultaneously high voltage criteria

Work and write reports together as team members
Develop an ability to recognize, formulate and solve high voltage engineering problems
Understand professional responsibility through meticulous safety procedures
Communicate more efficiently, since weekly lab reports are required; and will practice report writing, programming, plotting and editing skills necessary for engineering practice
Use modern simulation and programming tools to solve problems related to contemporary engineering issues, such as high voltage transmission line design for wind power

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Introduction to high voltage engineering	3.0							
High voltage generation/measurements	3.0		3.0					
Electric and magnetic fields	3.0		3.0					
Breakdown in gases	3.0		3.0					
Breakdown in liquids	3.0		3.0					
Breakdown in solids	3.0		3.0					
Insulators, artificial aging	3.0		3.0					
Corona discharges	3.0		3.0					
Partial discharges	3.0		3.0					
Surge generators	3.0		3.0					

## Representative Assignments

Lab report
Homework

## Grades

Aspect	Percent
Lab reports and homework	35%
Quizzes	20%
Exams	45%

## ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
**	a	An ability to apply knowledge of mathematics, science, and engineering.
***	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
**	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
***	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.

Course Contribution		College Outcome
**	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

### CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences
**	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
***	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
**	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

### EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences
**	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
***	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
**	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

### Additional Notes or Comments

Updated prereqs and exclusion to match university format.

Change grading weights 1/9/ 2017 BLA

New stars 6/4/2019- BLA-

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