

# ECE 5759: Optimization for Static and Dynamic Systems

## Course Description

Numerical optimization techniques as applied to selected electrical engineering application areas.

**Prior Course Number:** 759

**Transcript Abbreviation:** Optimization

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Undergrad, Graduate

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

**Course Offerings:** Autumn

**Flex Scheduled Course:** Never

**Course Frequency:** Every Year

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 3.0 hr Lec

**Expected out-of-class hours per week:** 6.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** Prereq: 3551, 5551, or 551, or Grad standing in Engineering or Math and Physical Sciences.

**Exclusions:** Not open to students with credit for 759.

**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

Computational and mathematical methods for optimization to solve engineering problems
Exposure to modern software packages for numerical optimization

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Gradient methods, unconstrained and constrained: steepest descent, Newton's method, quasi-Newton method, projection	12.0							
Problems with equality constraints, problems with inequality constraints, Lagrange methods	12.0							
Applications in electrical and computer engineering: circuit design, communications, estimation, and/or electromagnetics	6.0							
Lagrangian algorithms for optimization	8.0							
Convexity and duality	4.0							

## Representative Assignments

Homework problems from textbook
Midterm exam or project
Final exam or project

## Grades

Aspect	Percent
Homework	40%
Midterm	30%
Final	30%

## Representative Textbooks and Other Course Materials

Title	Author
<i>Nonlinear Programming, 2nd Ed., Athena Scientific, ISBN: 1-886529-00-0</i>	Dimitri P. Bertsekas

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

## Additional Notes or Comments

updated prereqs, exclusions, and goals to match university format.

Prereqs changed semicolon to comma (in university tool also) as requested by registrar

Update course goals and topics per internal ABET review 5/8/14 BLA

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