



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Continuous Time Optimal Control

## ECE 8250

**Credit Hours:**

3.00 - 3.00

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**Course Levels:**

Graduate (5000-8000 level)

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**Course Components:**

Lecture

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**Course Description:**

Embraces the three historical trends in dynamic optimization: Calculus of Variations, Pontryagin's Minimum Principle, and Bellman's Principle of Optimality. Not only mathematical aspects of the three principles will be taught, but also their strengths and weaknesses - it is often less important to know how to apply a given principle than to know when.

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**Prerequisites and Co-requisites:**

Prereq: 5551 or MechEng 5372, or permission of instructor.

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**Course Goals / Objectives:**

- The objective of the course is to give students background in the main mathematical principles for designing optimal control systems.
  - Demonstrate the basic concepts of the conventional calculus of variations and their application for dynamic optimization.
  - Demonstrate why the conventional calculus of variations is not applicable for designing optimal control for the processes of modern technology.
  - Demonstrate the new mathematical methods intended for systems with different types of constraints
  - Teach students to apply the methods of optimal control theory for such well known problems as minimization of transient time and fuel consumption, maximization of flight distance for air and space crafts etc.
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**Course Topics:**

- Linear optimal systems
  - Calculus of variation (CV)
  - CV for optimal control
  - Minimum principle
  - Dynamic programming
  - Singular problems
  - Applications of optimal control
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**Designation:**

Elective