



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Physical Principles in Welding Processes I

## WELDENG 4001

**Credit Hours:**

4.00

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**Course Levels:**

Undergraduate (1000-5000 level)

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**Course Components:**

Lecture

Lab

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**Course Description:**

Study of the application of physical principles in engineering of arc welding processes and equipment.

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**Prerequisites and Co-requisites:**

Prereq: 2001 or 3001, and enrollment in the WeldEng-BS major. Prereq or concur: ECE 2300; or permission of instructor.

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**Course Goals / Objectives:**

- Understand how the physical laws affect the observed phenomenon in welding processes
  - Through an understanding of the physical laws and the observed welding phenomenon, to be in a better position to predict the effects of welding variable changes on welding process behavior
  - Understand the design of electrical power supplies and systems for arc welding
  - Predict joint fill rates and nugget areas for typical arc welding processes
  - Design experiments and analyze results to develop welding process procedure specifications
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**Course Topics:**

- Electrical energy sources, power distribution
  - Arc electrical circuit characteristics
  - Arc heat generation
  - Electrical welding power supply designs
  - GTAW, PAW, GMAW, FCAW, SAW
  - Current and voltage measurements in electrical circuit
  - Lab safety and power systems
  - AC circuits
  - Rectification and filtering
  - SMA and GTA arc characteristics
  - Welding power source characteristics
  - GMA arc characteristics
  - SCR power supplies
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**Designation:**

Required