

WELDENG 7001 (Approved): Physical Principles in Welding Processes I

Course Description

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

Prior Course Number: 500, 600

Transcript Abbreviation: Phy Prn Wld Proc I

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Graduate

Student Ranks: 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: Graduate standing or permission of instructor.

Exclusions: Not open to students with credit in 500, 600 or 4001.

Cross-Listings:

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: 14.9999

Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
WELDENG	Welding Engineering

General Information

This is a graduate level course that will be taught at the same time as 4001. Lecture content will be the same as 4001, but graduate students will be required to conduct detailed review of research papers related to resistance welding provide brief class presentations.

Course Goals

Understand how the physical laws affect the observed phenomenon in welding processes.

Through an understanding of the physical laws and the observed welding phenomenon, 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

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Electrical energy sources, power distribution	4.0							
Arc electrical circuit characteristics	5.0							
Arc heat generation	5.0							
Electrical welding power supply designs	14.0							
GTAW, PAW, GMAW, FCAW, SAW	14.0							

Grades

Aspect	Percent
MT 1	20%
MT 2	20%
HW, labs	20%
Final exam	40%

Representative Textbooks and Other Course Materials

Title	Author
<i>Lecture Notes Physical Principles in Welding Engineering I</i>	Richardson, R.W., Farson, D.F.

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.

WELDENG ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
	l	an ability to select and design welding materials, processes and inspection techniques based on application, fabrication and service conditions
	m	an ability to develop welding procedures that specify materials, processes and inspection requirements
	n	an ability to design welded structures and components to meet application requirements

Prepared by: Dave Farson