

WELDENG 7406 (Approved): Welding of Plastics and Composites

Course Description

Theory and practice in welding of plastics and polymeric composites, including theory and analysis of welding processes, part and joint design, and process selection.

Prior Course Number: 706

Transcript Abbreviation: Weld Plastics&Comp

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: 620 or 4201 or permission of instructor.

Exclusions: Not open to students with credit for 706 or 4406.

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 4406. Lecture content will be the same as 4406, but graduate students will be required to submit a term project that may include a detailed design, a computer simulation or detailed review of research papers.

Course Goals

Understand structure and properties and plastics and polymeric composites.

Ability to understand theory for general plastic welding steps.

Ability to understand theory for, use simple models of, and design joints for plastic welding processes.
Ability to evaluate application and select welding process.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Introduction to structure and properties of polymers and polymeric composites.	5.0							
Hot plate welding and welding steps.	6.0							
Hot gas and extrusion welding.	4.0							
Implant resistance and induction welding.	4.0							
Ultrasonic welding.	5.0							
Vibration and spin (friction) welding.	5.0							
Radio frequency and microwave welding.	4.0							
Infrared and laser welding.	6.0							
Case studies.	3.0							

Grades

Aspect	Percent
Homework	20%
Mid-Term	25%
Final exam	30%
Term project	25%

Representative Textbooks and Other Course Materials

Title	Author
<i>Plastics and Composites Welding Handbook</i>	Edited by D.A. Grewell, A. Benatar and J.B. Park

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

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