

# WELDENG 7301 (Approved): Nondestructive Evaluation

## Course Description

Main concepts of Nondestructive Evaluation of materials as apply to inspections of joints and structures; principles of conventional methods, their capabilities and limitations.

**Prior Course Number:** 631

**Transcript Abbreviation:** NDE

**Grading Plan:** Letter Grade

**Course Deliveries:** Greater or equal to 50% at a distance

**Course Levels:** Graduate

**Student Ranks:** Masters, Doctoral

**Course Offerings:** Spring

**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:** Prerequisites: Graduate standing or permission of instructor.

**Exclusions:** Not opne to students with credit for 631 or G4301.

**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

## Course Goals

Achieve basic understanding of main concepts and aims of nondestructive evaluation (NDE).
Learn theoretical principles of NDE methods and their capabilities and limitations.
Learn applications of nondestructive material evaluation.
Learn to apply NDE for joint inspections.
Obtain some basic laboratory experience with nondestructive evaluation methods.

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Introduction to NDE.	1.5							
Introduction to Ultrasonic Testing.	1.0							
Physical Principles of Ultrasonic.	3.5							
Reflection and transmission of ultrasonic waves.	4.0							
Ultrasonic Transducers. Ultrasonic laboratory.	3.0		0.5					
Ultrasonic testing methods. Laboratory.	3.0		0.5					
Introduction to radiography.	1.0							
Generation of X-rays.	3.0							
Radiation attenuation.	3.0							
X-Ray Films.	2.0							
Selection of Exposure Parameters. Radiography laboratory.	1.5		0.5					
Factors affecting quality of radiographs	2.0							
Image quality indicators.	1.0							
Radiographs of welds and different radiographic techniques.	2.0							
Gamma Rays	2.0							
Real-Time Radiography	1.0							
Magnetic particle testing fundamentals.	1.5							
Physical principles of magnetization and inspection. Magnetic particle testing laboratory.	2.0		0.5					
Liquid penetrant testing. Liquid penetrant testing laboratory.	1.5		0.5					

## Representative Assignments

Graduate Level Homework
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## Grades

Aspect	Percent
Quizzes	5%
Laboratory	20%
MT	25%
Final	50%

## Representative Textbooks and Other Course Materials

Title	Author
<i>Class notes</i>	S. I. Rokhlin
<i>Nondestructive Evaluation and Quality Control</i>	Vol 17 Metals Handbook 9th Edition

### 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: Stanislav Rokhlin