

Nondestructive Examination Technology

The Nondestructive Examination (NDE) Technology curriculum prepares students for careers in non-destructive testing of materials, equipment and/or components. NDE test methods assess an object's integrity without affecting its function. NDE is used in many industries, including construction, petrochemical, pulp and paper, power generation and aerospace.

Coursework includes ultrasonics, radiography, liquid penetrant, visual, magnetic particle and eddy current examination. Students gain knowledge of these methods through applied theory and hands-on applications.

The NDE curriculum meets classroom and laboratory training requirements of Recommended Practice No. SNT-TC-1A of the American Society for Nondestructive Testing (ASNT), permitting graduates the opportunity to obtain method-specific NDE certification after a few months of on-the-job experience with their employers. Career opportunities exist in applied NDE, material sciences, technical sales and quality control in many industries.

Many of the courses are offered through a Fast Track program (any semester course offered in less than a 16 week semester). When creating a class schedule, pay particular attention to the start/end dates and times of the courses.

For specific information about potential positions and wages in NDE employment, visit the Central Piedmont Career Coach website.

Non-Destructive Examination Technology (A50350)

Degree Awarded

An Associate in Applied Science Degree in Non-Destructive Examination Technology is awarded by the college upon completion of this program.

Admissions

- Completion of a high school diploma or equivalent is required.
- Many courses have prerequisites; check the Courses section for details.

Contact Information

Non-Destructive Examination Technology is in the Skilled Trades Division. To receive a suggested sequence of courses, contact instructors through the NDE Technology program office at 704.330.4434. For more information, contact the Skilled Trades Division at 704.330.4413.

General Education Requirements

ENG 111	Writing and Inquiry	3.0
Select 3 credits of the following:		3.0
ENG 112	Writing and Research in the Disciplines	
ENG 113	Literature-Based Research	
ENG 114	Professional Research & Reporting	
COM 110	Introduction to Communication	
COM 231	Public Speaking	
Take 3 credits from the following:		3.0

MAT 121	Algebra/Trigonometry I	
MAT 171	Precalculus Algebra	
Select 3 credits of the following:		3.0
ART 111	Art Appreciation	
ART 114	Art History Survey I	
ART 115	Art History Survey II	
DRA 111	Theatre Appreciation	
DRA 111	Theatre Appreciation	
HUM 120	Cultural Studies	
HUM 130	Myth in Human Culture	
MUS 110	Music Appreciation	
PHI 215	Philosophical Issues	
PHI 240	Introduction to Ethics	
REL 110	World Religions	
Select 3 credits of the following:		3.0
ECO 251	Principles of Microeconomics	
ECO 252	Principles of Macroeconomics	
HIS 111	World Civilizations I	
HIS 112	World Civilizations II	
HIS 131	American History I	
HIS 132	American History II	
POL 120	American Government	
PSY 150	General Psychology	
SOC 210	Introduction to Sociology	

Major Requirements

ACA 122	College Transfer Success	1.0
WLD 141	Symbols and Specifications	3.0
NDE 110	Intro to Nondestructive Examination	3.0
NDE 111	NDE Codes and Specifications	2.0
NDE 142	Visual Testing-1,2	2.0
NDE 143	Liquid Penetrant Testing-1,2	2.0
NDE 152	Magnetic Particle Testing-1,2	2.0
NDE 121	Principles of Ultrasonic Examination-UT Level I	4.0
NDE 122	Angle Beam Examination	4.0
NDE 131	Radiation Safety and Principles of Radiographic Testing	4.0
NDE 132	RT Industrial Applications	3.0
NDE 153	Eddy Current Testing-1	3.0
NDE 221	UT Industrial Applications	4.0
NDE 231	Advance Radiographic Testing Techniques	3.0
NDE 252	Eddy Current Testing (ET)	2.0
CIS 110	Introduction to Computers	3.0
Select one of the following:		4.0
PHY 110 & PHY 110A	Conceptual Physics and Conceptual Physics Lab	
PHY 131	Physics-Mechanics	
PHY 151	College Physics I	

Technical Electives

Select 2.0 credits from the following:		2.0
DFT 151	CAD I	
DFT 170	Engineering Graphics	

EGR 120	Engineering and Design Graphics
EGR 125	Appl Software for Tech
EGR 150	Intro to Engineering
ELC 111	Introduction to Electricity
ELC 117	Motors and Controls
ISC 110	Workplace Safety
ISC 112	Industrial Safety
ISC 131	Quality Management
ISC 212	Metrology
MEC 180	Engineering Materials
NDE 221	UT Industrial Applications
NDE 222	Advanced Ultrasonic Testing Including Phased Array
NDE 231	Advance Radiographic Testing Techniques
NDE 242	Advanced Visual Testing (VT)
NDE 261	Performance Demonstration Initiative -1, Ultrasonic Testing, Carbon Steel Pipe Welds
NDE 262	Performance Demonstration Initiative -2, Ultrasonic Testing, Stainless Steel Pipe Welds
NDE 263	Perf Demonstration Initiative -3, Ultrasonic Testing, Thru Wall Sizing, Carbon Steel/Stainless Steel
NDE 264	Perf Demonstration Initiative -8, Ultrasonic Testing, Weld Overlay and Dissimilar Metal Thru Wall Sizing
NDE 265	Performance Demonstration Initiative -10 Ultrasonic Testing, Dissimilar Metal Detection and Length Sizing
NUC 110	Nuclear Reactor Systems
WLD 110	Cutting Processes
WLD 111	Oxy-Fuel Welding
WLD 112	Basic Welding Processes
WLD 115	SMAW (Stick) Plate
WLD 143	Welding Metallurgy
WBL 112	Work-Based Learning I
WBL 114	Work-Based Learning I

Total Credits 66

No diplomas offered.

Non-Destructive Examination Technology Certificates (C50350)

- Non-Destructive Examination Technology Certificate with a Specialization in Ultrasonic Examination (C50350-C1) (p. 2)
- Non-Destructive Examination Technology Certificate with a Specialization in Visual and Penetrant Examination (C50350-C2) (p. 2)
- Non-Destructive Examination Technology Certificate with a Specialization in Radiographic Examination (C50350-C4) (p. 2)
- Non-Destructive Examination Technology Certificate with a Specialization in Eddy Current Examinations (C50350-11) (p. 2)
- Non-Destructive Examination Technology Certificate with a Specialization in Testing and Measurement (C50350-12) (p. 3)

These are special, short-term certificates offered in the NDET program. The courses listed are taken from the NDET diploma and 0 degree programs. These certificates are issued in accordance with Central Piedmont policy and certify that students have successfully completed

the courses (GPA of 2.0 or higher) within the certificate program. These are not certificates to perform NDE. These certificates, along with the process of NDE qualification and testing, are performed by the employer, not Central Piedmont.

Students may earn certificates which build to earning a diploma or degree. Students may earn certificates in the same semester that they earn a degree or diploma.

Non-Destructive Examination Technology Certificate with a Specialization in Ultrasonic Examination (C50350-C1)

Major Requirements

MAT 121	Algebra/Trigonometry I	3.0
NDE 110	Intro to Nondestructive Examination	3.0
NDE 121	Principles of Ultrasonic Examination-UT Level I	4.0
NDE 122	Angle Beam Examination	4.0

Total Credits 14

Non-Destructive Examination Technology Certificate with a Specialization in Visual and Penetrant Examination (C50350-C2)

Major Requirements

NDE 110	Intro to Nondestructive Examination	3.0
WLD 141	Symbols and Specifications	3.0
NDE 142	Visual Testing-1,2	2.0
NDE 143	Liquid Penetrant Testing-1,2	2.0
CIS 110	Introduction to Computers	3.0

Total Credits 13

Non-Destructive Examination Technology Certificate with a Specialization in Radiographic Examination (C50350-C4)

Major Requirements

NDE 110	Intro to Nondestructive Examination	3.0
NDE 131	Radiation Safety and Principles of Radiographic Testing	4.0
NDE 132	RT Industrial Applications	3.0
MAT 121	Algebra/Trigonometry I	3.0

Total Credits 13

Non-Destructive Examination Technology Certificate Specialization in Eddy Current Examinations (C50350-11)

NDE 110	Intro to Nondestructive Examination	3.0
NDE 153	Eddy Current Testing-1	3.0
NDE 252	Eddy Current Testing (ET)	2.0
WLD 141	Symbols and Specifications	3.0

Select one course from the following options:

ISC 110	Workplace Safety
ISC 112	Industrial Safety
ISC 131	Quality Management

Total Credits 12

Non-Destructive Examination Technology Certificate Specialization in Testing and Measurement (C50350-12)

Major Requirements

MEC 180	Engineering Materials	3.0
MEC 161	Manufacturing Processes I	3.0
ISC 212	Metrology	2.0
NDE 110	Intro to Nondestructive Examination	3.0
NDE 121	Principles of Ultrasonic Examination-UT Level I	4.0
NDE 142	Visual Testing-1,2	2.0
Total Credits		17

Nondestructive Examination Technology Suggested Course Sequence

The following is the suggested plan for when to take each course to complete the Associate in Applied Science degree, based on the program requirements of the 2023-2024 catalog. This is only a recommendation — you may take courses in another order upon consultation with your advisor. This plan is based on you starting with college-level math and English courses, starting your program in the fall, and attending full-time. You can also follow this sequence if you attend part-time. Speak with your academic advisor about the plan and any questions. This program might also offer diplomas or certificates; visit the catalog or contact the program for details. Visit the Academic Advising page for instructions on locating your assigned advisor: <https://www.cpsc.edu/academics/academic-advising>

Term I		Credits
ENG 111	Writing and Inquiry	3.0
MAT 121 or MAT 171	Algebra/Trigonometry I or Precalculus Algebra	3.0
NDE 110	Intro to Nondestructive Examination	3.0
NDE 143	Liquid Penetrant Testing-1,2	2.0
NDE 152	Magnetic Particle Testing-1,2	2.0
ACA 122	College Transfer Success	1.0
Credits		14
Term II		Credits
NDE 142	Visual Testing-1,2	2.0
NDE 153	Eddy Current Testing-1	3.0
NDE 252	Eddy Current Testing (ET)	2.0
WLD 141	Symbols and Specifications	3.0
PHY 110	Conceptual Physics	3.0
PHY 110A	Conceptual Physics Lab	1.0
Technical Elective		2.0
You may have completed program certificate C50350-C8. Confirm eligibility with your academic advisor.		
Credits		16
Term III		Credits
English/Communications		3.0
NDE 111	NDE Codes and Specifications	2.0
NDE 131	Radiation Safety and Principles of Radiographic Testing	4.0
NDE 132	RT Industrial Applications	3.0
NDE 231	Advance Radiographic Testing Techniques	3.0
CIS 110	Introduction to Computers	3.0
Credits		18
Term IV		Credits
NDE 121	Principles of Ultrasonic Examination-UT Level I	4.0
NDE 122	Angle Beam Examination	4.0
NDE 221	UT Industrial Applications	4.0

Humanities/Fine Arts	3.0
Behavioral/Social Science	3.0
You may have completed a program certificate(s). Confirm eligibility with your academic advisor.	
Credits	18
Total Credits	66

NDE 110. Intro to Nondestructive Examination. 3.0 Credits. Class-3.0. Clinical-0.0. Lab-0.0. Work-0.0
This course introduces Nondestructive Examination (NDE) and its benefits, and provides a survey of the basic NDE methods and their limitations and advantages. Topics include terms and definitions associated with NDE, the basic approach to the nondestructive form of testing, and examples of industrial applications. Upon completion, students should be able to demonstrate a basic understanding of the major NDE methods and their applications.

NDE 111. NDE Codes and Specifications. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0
This course is designed to instruct the student in the correct reading and interpretation of industrial codes and procedures that are common to the nondestructive examination industry. Topics include American Society of Mechanical Engineers (ASME), American Welding Society (AWS), Naval Air Systems Command (NAVAIR), American Society for Testing and Materials (ASTM) codes and various industry procedures to familiarize the student with wording, structure, and meaning of governing documents that must be followed. Upon completion, students should be able to find relevant sections of the code pertaining to the job, correctly interpret information given, differentiate between required and nonmandatory variables, and apply the information to their job assignment.

NDE 121. Principles of Ultrasonic Examination-UT Level I. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces the student to basic principles associated with ultrasound and provides the initial elements of ASNT's SNT-TC-1A Level I, requirements for UT practitioners. Topics include sound wave modes and sound theory, and display modes are discussed and demonstrated through lab applications. Upon completion, students should be able to demonstrate a basic understanding of ultrasonics, select proper equipment, and set-up an instrument for straight beam examinations. Prerequisites: Take one from each set: Set 1: NDE 110; Set 2: MAT 121, MAT 171, MAT 172, or MAT 271
Corequisites: Take 1 group: Take PHY 110 PHY 110A; Take PHY 121 PHY 122 PHY 131 PHY 132 PHY 133 or PHY 151

NDE 122. Angle Beam Examination. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces the student to the principles associated with transverse wave examination. Topics include shear wave discontinuity location, effects of shear waves in various materials, and inspection of components. Upon completion, students should be able to select and calibrate transverse wave equipment and the equipment for shear wave inspection, using inspection procedures. Prerequisites: Take NDE 121

NDE 131. Radiation Safety and Principles of Radiographic Testing. 4.0 Credits. Class-2.0. Clinical-0.0. Lab-4.0. Work-0.0

This course introduces basic principles of radiation safety, and the limitations and advantages of the radiographic testing (RT) method. Emphasis is placed on radiation safety, interaction of radiation with matter, radiation monitoring, radiographic physics, radiographic technique, and basic RT equipment. Upon completion, students should be able to demonstrate a basic understanding of radiation safety and the operating principles of RT.

Prerequisites: Take all: NDE 110 and MAT 121

Corequisites: Take PHY 131 or PHY 151 or PHY 110 and PHY 110A

NDE 132. RT Industrial Applications. 3.0 Credits. Class-2.0.

Clinical-0.0. Lab-2.0. Work-0.0

This course covers advanced radiographic applications and the ASNT SNT-TC-1A Level II qualification program. Emphasis is placed on darkroom processing, image quality, geometric issues, and exposure calculations. Upon completion, the student should be able to select a proper radiographic technique and film to perform acceptable radiography to specific codes and standards.

Prerequisites: Take NDE 131

NDE 142. Visual Testing-1,2. 2.0 Credits. Class-1.0. Clinical-0.0.

Lab-2.0. Work-0.0

This course describes the principles, limitations, and advantages of non-destructive examination (NDE) visual testing as it's applied to industrial components such as pipes, pumps, valves, hangers and supports. Emphasis is placed on visual testing techniques including the use of visual aids and measuring gages. Upon completion, students should be able to demonstrate a basic understanding of NDE visual techniques and their applications.

NDE 143. Liquid Penetrant Testing-1,2. 2.0 Credits. Class-1.0.

Clinical-0.0. Lab-2.0. Work-0.0

This course describes the principles, limitations, and advantages of non-destructive examination (NDE) liquid penetrant testing as it's applied to industrial components such as pipes, pumps, valves, hangers and supports. Emphasis is placed on liquid penetrant testing techniques including the use of color contrast solvent removable and water washable penetrant techniques. Upon completion, students should be able to demonstrate a basic understanding of various NDE liquid penetrant techniques and their applications.

NDE 152. Magnetic Particle Testing-1,2. 2.0 Credits. Class-1.0.

Clinical-0.0. Lab-2.0. Work-0.0

This course describes the principles, limitations, and advantages of non-destructive examination (NDE) magnetic particle testing as it's applied to industrial components such as pipes, pumps, valves, hangers and supports. Emphasis is placed on magnetic particle testing techniques including dry and wet fluorescent particle techniques. Upon completion, students should be able to demonstrate a basic understanding of NDE magnetic particle techniques and their applications.

NDE 153. Eddy Current Testing-1. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course describes the principles, limitations, and advantages of non-destructive examination (NDE) eddy current testing as it's applied to industrial components such as pipes, pumps, valves, hangers and supports. Emphasis is placed on eddy current testing techniques including the use of different types of eddy current equipment. Upon completion, students should be able to demonstrate a basic understanding of NDE eddy current techniques and their applications.

Prerequisites: Take NDE 110

NDE 210. NDE Procedure Development. 3.0 Credits. Class-2.0.

Clinical-0.0. Lab-2.0. Work-0.0

This course provides an understanding of codes and procedure qualifications as they relate to various testing methods. Emphasis is placed on writing NDE procedures in accordance with various codes and standards. Upon completion, students should be able to demonstrate a basic understanding of code requirements for procedures and how to write field applicable NDE procedures.

Prerequisites: Take all: NDE 122 and NDE 132

NDE 221. UT Industrial Applications. 4.0 Credits. Class-3.0.

Clinical-0.0. Lab-3.0. Work-0.0

This course exposes the student to practical application of straight and angle beam techniques on actual component mock-ups and introduces automated equipment. Lab applications provide comprehensive inspection challenges and "blind" samples. Upon completion, students should be able to follow procedures to fully inspect a variety of components to differing code requirements.

Prerequisites: Take NDE 122

NDE 222. Advanced Ultrasonic Testing Including Phased Array. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces the student to principles of flaw detection and sizing using advanced inspection techniques including phased array. Topics include advanced detection, sizing techniques, and inspection criteria using AWS, ASME API and FEMA codes. Upon completion, students should be able to select and apply the proper technique to detect and locate length, size, and depth flaws using manual and automated phased array equipment.

Prerequisites: Take NDE 221

NDE 231. Advance Radiographic Testing Techniques. 3.0 Credits.

Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course provides an expert-level understanding of radiographic methods. Emphasis is placed on factors affecting image quality, RT techniques for more complex geometric situations, and enhanced film developing techniques. Upon completion, the student should be able to select a radiographic technique and film for complex geometries and enhanced film developing.

Prerequisites: Take NDE 132

NDE 242. Advanced Visual Testing (VT). 3.0 Credits. Class-2.0.

Clinical-0.0. Lab-2.0. Work-0.0

This course prepares individuals for trainee positions in performing visual examinations of pressure retaining vessels, piping, pumps, and valves for nuclear power electric generating facilities. Topics include fundamentals of visual examination with emphasis on VT-1, VT-2 and VT-3 methods. Upon completion, students should be able to demonstrate a working knowledge of ASME Code visual inspection requirements during various phases of commercial nuclear power operations.

Corequisites: Take NDE 142

NDE 252. Eddy Current Testing (ET). 2.0 Credits. Class-1.0.

Clinical-0.0. Lab-3.0. Work-0.0

This course provides practical applications of the eddy current testing (ET) method. Topics include generic and specialized applications of ET on industrial mock-ups. Upon completion, students should be able to demonstrate an understanding of ET in industrial applications.

Prerequisites: Take NDE 153

NDE 261. Performance Demonstration Initiative -1, Ultrasonic Testing, Carbon Steel Pipe Welds. 7.0 Credits. Class-2.0. Clinical-0.0.

Lab-15.0. Work-0.0

This course provides advanced ultrasonic instruction for nondestructive examination of carbon steel (CS) pipe welds. Topics include performance demonstration initiative (PDI), ultrasonic testing (UT), and longitudinal and shear wave examination techniques for carbon steel (CS) piping. Upon completion, students should be able to identify and describe the qualified detection and sizing techniques per PDI-UT-1 procedures.

Prerequisites: Take NDE 221

NDE 262. Performance Demonstration Initiative -2, Ultrasonic Testing, Stainless Steel Pipe Welds. 7.0 Credits. Class-2.0. Clinical-0.0.

Lab-15.0. Work-0.0

This course provides advanced ultrasonic instruction for nondestructive examination of stainless steel (SS) pipe welds. Topics include performance demonstration initiative (PDI), ultrasonic testing (UT), and longitudinal and shear wave examination techniques for stainless steel piping. Upon completion, students should be able to identify and describe the qualified detection and sizing techniques per PDI-UT-2 procedures.

Prerequisites: Take NDE 221

NDE 263. Perf Demonstration Initiative -3, Ultrasonic Testing, Thru Wall Sizing, Carbon Steel/Stainless Steel. 3.0 Credits. Class-1.0.

Clinical-0.0. Lab-6.0. Work-0.0

This course provides advanced ultrasonic instruction for NDE through wall sizing (TWS) in carbon steel (CS) and stainless steel (SS) pipe welds. Topics include performance demonstration initiative (PDI), ultrasonic testing (UT), and longitudinal and shear wave examination techniques for through wall sizing. Upon completion, students should be able to identify and describe the qualified TWS techniques per PDI-UT-3 procedures.

Prerequisites: Take NDE 221

NDE 264. Perf Demonstration Initiative -8, Ultrasonic Testing, Weld Overlay and Dissimilar Metal Thru Wall Sizing. 3.0 Credits. Class-1.0.

Clinical-0.0. Lab-6.0. Work-0.0

This course provides advanced ultrasonic instruction for NDE of weld overlay (WOL) and dissimilar metal (DM) welds. Topics include performance demonstration initiative (PDI), ultrasonic testing (UT), and longitudinal and shear wave examination techniques for through wall sizing (TWS) of welds. Upon completion, students should be able to identify and describe the qualified TWS techniques per PDI-UT-8 procedures.

Prerequisites: Take NDE 221

NDE 265. Performance Demonstration Initiative -10 Ultrasonic Testing, Dissimilar Metal Detection and Length Sizing. 3.0 Credits.

Class-1.0. Clinical-0.0. Lab-6.0. Work-0.0

This course provides advance ultrasonic instruction for NDE of dissimilar metal (DM) welds for detection and length sizing. Topics include performance demonstration initiative (PDI), ultrasonic testing (UT), and longitudinal and shear wave examination techniques for detection and length sizing (DLS) of DM welds. Upon completion, students should be able to identify and describe the qualified DLS techniques per PDI-UT-10 procedures.

Prerequisites: Take NDE 221