



**COWLEY COLLEGE
& Area Vocational Technical School**

COURSE PROCEDURE FOR

**INTRODUCTION TO NONDESTRUCTIVE TESTING
NDT3451 3 Credit Hours**

Student Level:

This course is open to students on the college level in either the freshman or sophomore year and to high school vocational students.

Catalog Description:

NDT 3451 - INTRODUCTION TO NONDESTRUCTIVE TESTING (3 hrs)

This course is designed to acquaint students with the six major nondestructive evaluation disciplines: radiographics, ultrasonics, eddy current, magnetic particle, liquid penetrants and visual inspection and provide students with an overview of less common nondestructive testing methods.

Prerequisites:

None

Controlling Purpose:

This course is designed to help the student increase their knowledge concerning the history and basic principles of Nondestructive Testing.

Learner Outcomes:

Upon completion of the course, the student will be able to:

1. Define Nondestructive Testing.
2. Differentiate between basic test methods.
3. Explain the needs for inspection.
4. Choose the Nondestructive Testing method most suited in a given part and defect.
5. Explain the major benefits of Nondestructive Testing.
6. List the primary industries that use Nondestructive Testing.
7. List codes, standards and specifications that concern themselves with Nondestructive Testing.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

Units Outcomes and Criterion Based Evaluation Key for Core Content:

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student’s achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

UNIT 1: History Of NDT						
Outcomes: Upon completion of this unit, the students will be able to successfully describe the origins of the five basic methods of Nondestructive Testing.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						List the year and industry that originated penetrant inspection.
						List the year and industry that originated magnetic particle, and eddy current inspections.
						List the year and country that originated ultrasonic inspection.
						List the year and person that discovered x-rays.
						List the industry that originated liquid penetrant.

UNIT 2: Introduction To NDT Methods

Outcomes: Upon completion of this unit, the students will be able to successfully perform a simple inspection using the basic five inspection methods.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Demonstrate the use of ultrasound in thickness gaging.
						Demonstrate the use of eddy current in crack detection.
						Demonstrate the use of radiography in locating weld defects.
						Demonstrate the use of magnetic particle in weld inspection.
						Demonstrate the use of penetrant in crack detection.

UNIT 3: Uncommon NDT Methods

Outcomes: Upon completion of this unit, the students will be able to successfully compare the uses of uncommon methods to the methods in wide use today.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Explain the use of thermal inspection in defect detection.
						Assess the value of acoustic inspection as related to cost and the use of the more common methods of defect detection.
						Summarize in a short statement, the changes taking place in the inspection field with regard to computers.

UNIT 4: Functions Of NDT

Outcomes: Upon completion of this unit, the students will be able to successfully list the uses and functions of Nondestructive Testing in industry.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Rank in order five primary forms of Nondestructive Testing used in a given industry.

UNIT 5: Applications Of NDT

Outcomes: Upon completion of this unit, the students will be able to successfully list and describe applications of Nondestructive Testing methods.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Name one application of ultrasonics in a specific industry.
						Name one application of radiography in a specific industry.
						Name one application of penetrant in a specific industry.
						Name one application of magnetic particle in a specific industry.
						Name one application of eddy current in a specific industry.
						Show how each of the above applications, if not used, could lead to a failure of materials.

UNIT 6: Quality Control/Quality Assurance

Outcomes: Upon completion of this unit, the students will be able to successfully describe the structure of quality control.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Determine the chain of command flow in quality control.
						Construct a flow diagram of a typical quality control system.
						Compare Nondestructive Testing inspection to visual inspection.

UNIT 7: Economic Factors

Outcomes: Upon completion of this unit, the students will be able to successfully judge the economic factors involved in selecting a particular Nondestructive Testing.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Select an inspection that would be of lowest cost for the company.
						Compare the costs of the five basic methods and rank in order of least to most expensive.
						Understand the economic advantages of Nondestructive Testing over not inspecting a product.

UNIT 8: Qualification Of Personnel

Outcomes: Upon completion of this unit, the students will be able to successfully list the documents that govern Nondestructive Testing inspectors.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Compare the differences between the two major documents governing Nondestructive Testing certification.
						Summarize the materials in the two documents in a two paragraph statement.
						List the most widely used qualification/certification document in the aviation industry.
						Summarize information found in three procedures that are widely used in Nondestructive Testing.

UNIT 9: American Society For Nondestructive Testing

Outcomes: Upon completion of this unit, the students will be able to successfully describe the advantages of a national society of inspection.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Construct and illustrate a flow chart showing the links in a quality control department.
						List one advantage a technician would have if he/she joined a national organization.

UNIT 10: International Involvement In Nondestructive Testing

Outcomes: Upon completion of this unit, the students will be able to successfully compare Nondestructive Testing in this country to Nondestructive Testing in other countries in the world.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						List the two countries that lead the world in Nondestructive Testing development.
						Compare inspection requirements in our country to one other country in the world.

UNIT 11: Future Growth And Expansion

Outcomes: Upon completion of this unit, the students will be able to successfully state the projected growth and expansion of Nondestructive Testing.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Point out and explain why infer structure is the fastest growing Nondestructive Testing area in the country.
						Compare three areas, assess the growth potential, and list them in order of most likely to grow to least likely to grow.

Projects Required:

As assigned

Textbook:

Contact Bookstore for current textbook.

Materials/Equipment Required:

None

Attendance Policy:

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy:

The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:

Based on classroom occupancy

Course Timeframe:

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

Disability Services Program:

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.