



**COWLEY COLLEGE
& Area Vocational Technical School**

COURSE PROCEDURE FOR

<p>MAGNETIC PARTICLE/LIQUID PENETRANT TESTING NDT3455 3 Credit Hours</p>

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 3455 - MAGNETIC PARTICLE/LIQUID PENETRANT TESTING (3 hrs)

This course is devised to give the student a complete introduction through hands-on experience in the magnetic particle and liquid penetrant methods within the field of nondestructive testing. This course is designed to meet certain NDT level II requirements in accordance with A.S.N.T. SNT-TC-1A & NAS-410.

Prerequisites:

NDT3451 Introduction to Nondestructive Testing or instructor approval.

Controlling Purpose:

This course is designed to impart the fundamentals of magnetic particle and liquid penetrant testing, their applications, techniques, process controls and terminologies such that the student could pass a typical industrial certification examination in accordance with A.S.N.T SNT-TC-1An or NAS-410.

Learner Outcomes:

Upon completion of this course the student will be able to successfully perform entry-level magnetic particle and liquid penetrant inspections as required by industry.

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 And Terms In Penetrant Inspection						
Outcomes: Upon completion of this unit, the student will be able to successfully explain history and uses of penetrant inspection						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						List and describe changes that have occurred since 1902 in penetrant inspection.
						List and describe the twenty most common terms used in penetrant inspection.
						List and describe the nature and properties of penetrant.
						State three areas penetrant is widely used in industry.
						List five advantages and five disadvantages of penetrant inspection.

UNIT 2: Fluorescent And Visible Inspection Methods

Outcomes: Upon completion of this unit, the student will be able to successfully list and describe the uses of fluorescent and visible penetrant.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						List and describe three advantages and three disadvantages of visible and fluorescent penetrant inspection.
						Describe the difference between and uses for visible and fluorescent penetrants. List three examples of where each would be used and why.
						List five factors that adversely affect fluorescent penetrant inspections.
						List and describe the difference in "see ability" between visible and fluorescent penetrants.
						Perform five inspections using the visible penetrant inspection method.
						Perform five inspections using fluorescent penetrant inspection method.
						List and describe the properties penetrant materials must have.
						Describe and demonstrate wetting ability, and contact angle.

UNIT 3: Penetrant Removal

Outcomes: Upon completion of this unit, the student will be able to successfully remove penetrant.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Successfully remove water removal penetrant from two parts.
						Successfully remove post emulsified penetrant from two parts.
						Successfully remove solvent removal penetrant from two parts.
						List and describe "background and false" indications

UNIT 4: Developer, Application, Inspection, And Removal

Outcomes: Upon completion of this unit the student will be able to successfully demonstrate knowledge of developers.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						List and describe differences between dry, wet, and non-aqueous wet developers.
						Demonstrate application of dry developer
						Demonstrate application of non-aqueous wet developer
						List and describe development times for the three forms of developer as listed in ASTM E-1417.
						Demonstrate inspection of five parts with known defect using non-aqueous wet developer.
						Demonstrate inspection of five parts with known defects using dry developer.
						Evaluate defects per. MIL. STD. 1907 on the above ten parts with a 80 percent accuracy rate.
						List and describe the ways parts are cleaned after penetrant inspection.
						Perform cleaning of ten parts after penetrant inspection.
						Successfully complete ten reports form for penetrant inspection per. industry standards.
						Successfully complete general and specific penetrant tests with a score of 80 percent or better.

UNIT 5: Magnetic Particle History

Outcomes: Upon completion of this unit the student will be able to successfully demonstrate knowledge of particle testing terms.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						List and describe origins of Magnetic particle testing.
						List and define terms used in Magnetic Particle inspection

UNIT 6: Electrical And Magnetic Theory

Outcomes: Upon completion of this unit the student will be able to successfully demonstrate knowledge of electrical calculations.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						List and describe production of magnetic fields.
						List and describe electrical current (AC, DC, HWDC, and FWDC).
						Identify and describe the points on a hysteresis loop.
						Successfully perform electrical calculations as they relate to magnetic particle inspections. Score of 80 percent or better.

UNIT 7: Magnetic Particles

Outcomes: Upon completion of this unit the student will be able to successfully demonstrate and list knowledge of magnetic particles.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						List and describe material properties of magnetic particles.
						List and describe application media for wet magnetic particles.
						Demonstrate application of wet and dry magnetic particles.

UNIT 8: Magnetic Particle Inspection Procedures

Outcomes: Upon completion of this unit the student will be able to successfully perform system checks before inspection.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Perform particle concentration/contamination test.
						Perform visible and black light checks.
						Demonstrate use of report forms for system checks before performing magnetic particle inspection.
						Demonstrate safety procedures when performing magnetic particle inspection.

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.

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DISCLAIMER: THIS INFORMATION IS SUBJECT TO CHANGE. FOR THE OFFICIAL COURSE PROCEDURE CONTACT ACADEMIC AFFAIRS.

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.