COWLEY COLLEGE
& Area Vocational Technical School

COURSE PROCEDURE FOR

ULTRASONIC TESTING II
NDT3462 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 3462 - ULTRASONIC TESTING II (3 hrs)
This course is a continuation of Ultrasonic Testing I with emphasis on advanced theory and practical skills required in the application of ultrasonic evaluation methods. The course is designed to meet certain Nondestructive Testing Level II requirements in accordance with A.S.N.T., SNT-TC-1A, & NAS-410.

Prerequisites:
NDT3461 Ultrasonic Testing I or instructor approval.

Controlling Purpose:
This course is designed to impart applied advanced methods and applications of ultrasonic inspection.

Learner Outcomes:
Upon completion of this course the student will be able to:

1. List and describe the principles of wave propagation.
2. List and describe and demonstrate the ability to locate and sizes defects.
3. Distinguish between types of test methods.
4. Choose a specific test procedure and follow it in inspection of a material.
5. List and describe the variables affecting a shear wave inspection.
6. Apply an understanding of the ultrasonic method to defect location and evaluation using contact and immersion inspections.
7. Correctly apply safety attitudes and procedures associated with ultrasonic testing that will insure a safe work place environment.

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: Properties Of Sound In An Object

Outcomes: Upon completion of this unit, the students will be able to successfully determine the content of an object by evaluating the return signals.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Assess return signals from a material and determines size and location in relationship to a known defect standard.
						Evaluate defect location by application of calculations.

UNIT 2: Wave Mode And Generation

Outcomes: Upon completion of this unit, the students will be able to successfully list and demonstrate wave mode generation.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Apply calculations to develop a shear wave in a material using immersion inspection.
						Apply calculations to determine a shear wave in a material when the incident angle is given using water as a coupling medium.

UNIT 3: Selection And Set-Up Of Equipment

Outcomes: Upon completion of this unit, the students will be able to successfully select and calibrate two pieces of ultrasonic equipment.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Demonstrate the ability to calibrate a five and ten inch shear wave screen.
						Demonstrate the ability to calibrate a surface wave mode on steel.

UNIT 4: Selecting The Correct Method Of Inspection

Outcomes: Upon completion of this unit, the students will be able to successfully locate and select the correct transducer instrument combination.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Modify existing plan of inspection when required to change transducers yet produce the same inspection results.
						Given a material, defect size and location, apply knowledge to determine the correct inspection method.

UNIT 5: Limiting Variables

Outcomes: Upon completion of this unit, the students will be able to successfully list and describe variables that affect shear waves.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Use calculations to limit variables, list those that could be determined before the inspection begins.
						Categorize variables that affect ultrasonic inspection in a list from the most problematic to the least problematic.

UNIT 6: Standard Reference Books

Outcomes: Upon completion of this unit, the students will be able to successfully demonstrate the use of reference blocks.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Demonstrate the use of area amplitude and distance amplitude blocks when setting up a DAC.
						Demonstrate the use of the IOW and the IIW blocks when using shear wave inspection.
						Demonstrate use of the resolution block.
						Demonstrate use of the mini-angle beam block, the DSC, and the SC block.

UNIT 7: Locating Defects With Shear Waves

Outcomes: Upon completion of this unit, the students will be able to successfully calculate, analyze and predict the location of defects in a material.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Calculate depth and defect location when using shear wave inspection.
						Calculate size of a defect when inspecting with shear waves.

UNIT 8: Reflecting Characteristics Of Sound

Outcomes: Upon completion of this unit, the students will be able to successfully calculate the amount of sound reflected at a defect or interface.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Compute the amount of sound returned from a defect and equate it with size and type of defect.
						Compute the amount of sound returning to the transducer if no defect is present.

UNIT 9: Sizing And Mapping Of Defects

Outcomes: Upon completion of this unit, the students will be able to successfully illustrate the location of defects.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Diagram sound traveling in a part, showing all areas of reflection and refraction.
						Assess the returning signal then draw a schematic of the part showing location and orientation of defect or defects.

UNIT 10: Acceptance Standards

Outcomes: Upon completion of this unit, the students will be able to successfully list standards used in ultrasonic inspection.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Interpret D1.1 ultrasonic inspection listing size and amount of defects allowed in the weld inspected.
						Using the API Code. Create an inspection of a pipe sample. List and describe all defects located in the inspection.

UNIT 11: Reports And Part Identification Outcomes: Upon completion of this unit, the students will be able to successfully write and explain defect location in a report.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Write a standard report on ultrasonic inspection per the requirements of D1.1.

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.