COWLEY COLLEGE
& Area Vocational Technical School

COURSE PROCEDURE FOR

VISUAL INSPECTION
NDT3452 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 3452 - INSPECTION PRACTICES (VISUAL INSPECTION) (3 hrs)
This course is devised to introduce the student to forms of discontinuities in the manufacturing and service life of a part. Provide students with an understanding of how and why a specific nondestructive testing method is chosen. To acquaint students with visual inspection techniques, and their correct use. This course is designed to meet certain Nondestructive Testing Level II certification requirements.

Prerequisites:
None

Controlling Purpose:
This course is devised to introduce the student to the forms of discontinuities formed in the manufacturing and service life of a part. Provide students with an understanding of how and why a specific Nondestructive Testing method is chosen and to acquaint students with visual inspection techniques, and their proper use.

Learner Outcomes:
Upon completion of the course, the student will be able to:
1. List and define defects that occur in manufacturing.
2. List and define defects that occur in service.
3. Demonstrate the appropriate NDT method to perform an inspection.
4. Show proficient use of visual inspection instruments.
5. State the safety requirements associated with visual inspections

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: Primary Processing-Metal Forming, Metals Processing, Casting

Outcomes: Upon completion of this unit, the student will be able to successfully explain how metals are formed and how they are primary processed.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						List and describe three materials types/properties in order from ferrow-magnetic to diamagnetic.
						State three steps aluminum makes as it is transformed into a finished product.
						List and describe the materials and processes when making carbon steel.
						List and describe furnaces used in steel production.

UNIT 2: Secondary Processing-Heat Treating, Plating, Machining, Rolling, And Forging Outcomes: Upon completion of this unit, the student will be able to successfully summarize the secondary processes.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						List and describe the effects of heat treating and age hardening on aluminum materials.
						List and describe the materials properties that are imparted to parts during various forms of heat treating.
						Understand the reason why coatings are applied to materials such as plating, anodizing, and painting.
						List and describe the defects generated in the heat treating and coating processes.
						List and describe the results of the rolling process on grain structure.
						List and describe the defects generated in the rolling process.
						Describe the chipping process as it pertains to sawing, drilling, and machining.
						Describe three types of equipment used in the machining or materials removing process.
						Explain the uses of CNC equipment in the cutting and machining process.
						List and describe defects that occur during the machining and cutting process.
						Describe the forging process and defects that occur in the process.

UNIT 3: In-Service Discontinuities

Outcomes: Upon completion of this unit, the student will be able to successfully explain service discontinuities.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Explain the origins of service discontinuities.
						Given five parts of various material properties list and describe the type of in-service discontinuities would be produced during service life.
						Given two in-service conditions choose the one most likely to produce failure in the component.
						Given four parts choose the most appropriate method of inspection for in-service defects.

UNIT 4: Joining Processes-Welding, Brazing, Soldering

Outcomes: Upon completion of this unit, the students will be able to successfully list and describe the processes and uses of welding, brazing and soldering

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Develop a chart listing the common welding processes and defects that occur in application of each.
						Given two materials select the process most likely used to join the two materials.
						Explain the SMAW welding process.
						Explain the GMAW welding process.
						Explain the TIG welding process.
						Perform visual inspections of welds to D1.1 code requirements.

UNIT 5: Dimensional Inspection Introduction Outcomes: Upon completion of this unit, the students will be able to successfully state the particular equipment needed to measure dimensional tolerances.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						List the uses of eight common dimensional measuring tools on parts used in industry.
						Describe the advantages of computerized measuring equipment when inspecting a part.
						Describe the visual and lighting conditions needed when performing visual inspection with measuring instruments.

UNIT 6: Applications Of Visual Inspection Equipment Outcomes: Upon completion of this unit, the students will be able to successfully apply knowledge of measuring equipment.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Demonstrate use of a CMM machine to measure components common to industry.
						Demonstrate the ability to set-up and tear down a CMM measuring machine.
						Using the CMM produce a report of measurements taken. Report will show any deviation from tolerances by +/-0.0001 inch or less.
						Demonstrate the use of weld inspection gauges by successfully measuring material preparation, fillet and butt welds before and after welding.
						Demonstrate the use of fiberscope by identifying three known areas within a part.
						List and describe techniques for performing successful visual inspection as it pertains to lightning, reflectivity, angle of viewing, etc.
						Explain the need for testing inspector's eyes for visual acuity and color blindness.

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.