

AATA 106A: VISUAL TESTING LEVEL 1 & 2

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Fall 2026
Units:	3
Hours:	40 lecture per quarter (40 total per quarter)
Prerequisite:	This course is limited to students admitted to the Nondestructive Testing Technician Apprenticeship Program.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	None
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

Student Learning Outcomes

- Identify defects using vision
- Use Vernier calipers, micrometer, fillet weld gauges, and borescopes, and make an inspection report as a visual inspection trainee
- Use rulers, gauges, or micrometers to measure discontinuities
- Identify, evaluate, and report discontinuities in welds, castings, and wrought products according to established procedures, and produce compliant inspection documentation following standards such as AWS D17.1

Description

Designed for individuals seeking entry-level or advanced roles in the field of Non-Destructive Testing (NDT), including students, veterans, and career changers pursuing certification in accordance with SNT-TC-1A and NAS-410 standards. The intended audience includes those aiming to work in aerospace, manufacturing, construction, energy, or quality assurance industries. Visual testing (VT) is the most fundamental and widely used NDT method. This course provides comprehensive classroom instruction in both Level I and Level II visual inspection techniques. Topics include the principles of visual inspection, lighting requirements, surface conditions, visual acuity, evaluation of indications, and the use of direct and remote visual aids such as borescopes, mirrors, and gauges. Students also study applicable codes, standards, and acceptance criteria. Successful completion of this course fulfills the classroom training hours required for VT Level I and II certification and prepares students for on-the-job training in compliance with industry-recognized certification schemes. The course supports students' educational and career goals by enabling them to pursue roles as certified NDT technicians and meet workforce needs in safety-critical industries.

Course Objectives

The student will be able to:

1. Identify the basic principles and limitations of visual testing as a non-destructive testing method

2. Demonstrate an understanding of lighting, resolution, and contrast requirements in visual inspection
3. Perform direct and indirect visual inspections using mirrors, borescopes, cameras, and other visual aids
4. Assess the effect of surface conditions, cleanliness, and geometry on the detectability of discontinuities
5. Evaluate visual indications against applicable codes, standards, and acceptance criteria
6. Calibrate and verify the performance of visual testing equipment and accessories
7. Measure discontinuities using appropriate dimensional tools such as rulers, gauges, or micrometers
8. Maintain inspection records, interpret inspection results, and generate visual inspection reports
9. Apply proper safety practices when performing visual inspections in industrial environments
10. Meet the classroom training requirements for Level I and Level II certification in accordance with SNT-TC-1A and NAS-410

Course Content

1. Introduction to visual testing
 - a. Tips before getting started
 - b. Definition and purpose of visual testing
 - c. History and evolution of visual testing
 - d. Applications: Capabilities and limitations
 - e. Chapter summary and review quiz
2. Physics and fundamentals of visual testing
 - a. The nature of light and light sources
 - b. Measurement of illumination and interaction with matter
 - c. Light intensity, luminance, and reflectivity contrast
 - d. Environmental factors and safety considerations
 - e. Visual perception and optical illusions
 - f. Chapter summary and review quiz
3. Visual testing techniques
 - a. Overview of VT techniques
 - b. Direct visual testing
 - c. Tactile testing
 - d. Indirect or remote visual testing
 - e. Translucent visual testing
 - f. Examples and applications
 - g. Chapter summary and review quiz
4. Basic visual testing equipment
 - a. Mirrors and magnifiers
 - b. Rigid and flexible borescopes
 - c. Fiber and video borescopes
 - d. Lighting tools and accessories
 - e. Measurement tools (rulers, calipers, micrometers, gages)
 - f. Field applications and demonstrations
 - g. Chapter summary and review quiz
5. Visual testing of welds
 - a. Welding processes overview (SMAW, GMAW, GTAW, FCAW)
 - b. Weld discontinuities (e.g., porosity, incomplete fusion)
 - c. Visual inspection of welds
 - d. Inspection tools and gages

- e. Weld replicas and documentation
 - f. Chapter summary and review quiz
- 6. Visual testing of castings and wrought products
 - a. Casting processes and types
 - b. Common casting discontinuities
 - c. Rolling and wrought product evaluation
 - d. Chapter summary and review quiz
- 7. Visual testing procedures
 - a. Developing and following visual testing instructions
 - b. Inspection objectives and checkpoints
 - c. Sampling plans and timing
 - d. Classification of discontinuities
 - e. Reporting and documentation
 - f. Chapter summary and review quiz
- 8. Elements of vision
 - a. Anatomy and function of the human eye
 - b. Visual limitations and perception
 - c. Visual acuity and vision testing charts (Snellen, Jaeger, Ishihara)
 - d. Color differentiation and shading
 - e. Chapter summary and review quiz
- 9. Elements of lighting
 - a. Fundamentals of light and lighting
 - b. Types of light sources (LED, incandescent, lasers)
 - c. Light characteristics, glare, and fatigue
 - d. Chapter summary and review quiz
- 10. Optics
 - a. Refraction and prism mechanics
 - b. Lenses and magnification
 - c. Fiber optics and image transmission
 - d. Digitization and charge-coupled devices
 - e. Chapter summary and review quiz
- 11. Advanced visual testing equipment
 - a. Digital video borescopes
 - b. Pipe crawler and subsea ROV systems
 - c. Equipment selection checklists
 - d. Chapter summary and review quiz
- 12. Service-induced discontinuities
 - a. Inherent vs. service-related discontinuities
 - b. Mechanical and thermal damage
 - c. Fracture types: Ductile vs. brittle
 - d. Chemical and environmental effects
 - e. Chapter summary and review quiz
- 13. Evaluation
 - a. Evaluation criteria for visual discontinuities
 - b. Surface comparators and visual standards
 - c. Size-based rejection/acceptance rules
 - d. Chapter summary and review quiz
- 14. Final review
 - a. Comprehensive review of all chapters
 - b. Final quiz and general knowledge test

Special Facilities and/or Equipment

When taught via Foothill Global Access, on-going access to computer with email software and hardware; email address.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Results of a written test

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Discussion

Slideshow

Video

Demonstration

Representative Text(s) and Other Materials

American Society for Nondestructive Testing. Personnel Training Publications: Visual Testing Classroom Training Book. 2017.

This text is still widely used within the industry and is the most current text used for training.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Reading: Read Chapter 5 - Visual Testing of Welds
2. Writing: Solve Quiz 5 at the end of the chapter. Quiz results will be reviewed in class as a group

Discipline(s)

Industrial Maintenance

Lab Content

Not applicable.