Foundational Courses

TEND 1022 Math I **2 Credits / 60 Clock-Hours**

This course offers an introduction to basic mathematics, including operations with whole numbers, fractions, and decimals, as well as proportions, averages, and percentages. Students are prepared for more advanced mathematics.

Objectives:
- Use operations on whole numbers, decimals, fractions, percents, and averages.
- Recognize when to use appropriate operations in a word problem.
- Distinguish written language and math language correlations.
- Interpret statistical graphs.
- Use math in real-world setting.

TEND 1026 Introduction to Non-Destructive Inspection/Industrial Safety and Health **1 Credit / 30 Clock-Hours**

This course will explore general applications and scope of inspection as it pertains to non-destructive inspection, how NDI methods are applied, why they are applied, and the role they play in safe operation of transportation and manufacturing equipment that affect all aspects of society. This course introduces many methods of inspection available, how they are evaluated, used, and applied in an industry setting. explore basic manufacturing processes and introduce the importance of safety in the workplace. This course also explains general understanding of lockout/tag out procedures, operating confined spaces safely and hazardous communications. Next, this course details the importance of first aid, healthy workplace ergonomics, and appropriate lifting techniques, as well as ladder and scaffolding safety. Finally, this course provides training to meet employer expectations and requirements on the job as defined by the Occupational Safety and Health Administration (OSHA).

Objectives:
- Describe Non-destructive inspection (NDI).
- Explain basic NDI terms.
- Define material properties.
- Identify risks.
- Show all five (5) NDI methods.
- Explain personal protective equipment (PPE).
- Identify correct placement of personal protective equipment (PPE).
- Use personal protective equipment (PPE).
- Recognize the importance of safety in the workplace.
- Interpret Safety Data Sheets for all chemicals being used in class.
- Describe lockout/tag out signage and procedures.
- Identify first aid kits, fire exits, and all safety equipment in work areas appropriately.

TEND 1045 Penetrant Inspection I and II **3 Credits / 90 Clock-Hours**

The Penetrant Inspection I and II course explores the fundamentals required for qualification as a Level 1 and 2 inspectors. This course applies knowledge of the penetrant inspection method and how it's used with metals, plastics, and ceramics. Next, this course uses state-of-the-art Non-Destructive Inspection (NDI) equipment to evaluate how the penetrant inspection tests work to detect defects such as cracks, surface porosity, cold shuts, shrinkage, and many other surface defects.

Objectives:
• Compare the limitations of the penetrant inspection method compared to others.
• Explore the physics of penetrant, how it enters cracks and how abnormalities are identified.
• Identify correct conditions required to perform inspections.
• Define capillary action, cohesion, and adhesion.
• Identify the different types, methods, and sensitivities of dye penetrant inspection.
• Demonstrate the different methods of penetrant Inspection.
• Identify defects found in various test pieces.
• Discuss specifications and codes related to Penetrant inspection.

TEND 1055 Magnetic Particle Inspection I and II **3 Credits / 90 Clock-Hours**

The Magnetic Particle Inspection I and II course explores the fundamentals required for qualification as a Level 1 and 2 inspectors. This course evaluates how magnetic particle inspection works to detect surface and subsurface discontinuities in ferromagnetic materials. Next, this course details how discontinuities are formed through the process to determine if a crack or inclusion has occurred and how it will affect the service life of the part. Finally, this course uses state of the art NDI equipment to learn how the Magnetic particle inspection is used in the industry.

Objectives:
• Explore material properties and how they affect the process.
• Define the physics of magnetic fields.
• Demonstrate ability to safely use equipment.
• Identify defects found in various test pieces.
• Define hysteresis curve.
• Recognize the different methods and sensitivities of magnetic particle inspection.
• Solve algebraic equations as they pertain to magnetic particle inspection.
• Convert US units of measurement to the metric system and vice versa.

TEND 1065 Electromagnetic Inspection I **3 Credits / 90 Clock-Hours**

The Electromagnetic Inspection I course explores the basic electromagnetic physics concepts and how they apply to electromagnetic inspection. This course analyzes the impedance and electromagnetic induction that occurs within the test during inspection. Next, this course details the geometry of parts and how that affects the inspection. Finally, this course uses state of the art industry Non-Destructive Inspection (NDI) equipment for hands on lab lessons and demonstration of skills achieved.

Objectives:
- Compare the strengths and limitations of electromagnet inspection to other methods.
- Explore material properties and how they affect the process.
- Demonstrate ability to safely use equipment.
- Identify defects found in various test pieces.
- Explain techniques used for each eddy current test completed.
- Discuss specifications and codes related to electromagnetic inspection.
- Recognize quality requirements for each method.

TEND 1075 Ultrasound Inspection I **3 Credits / 90 Clock-Hours**

The Ultrasound Inspection I course explores the fundamental knowledge required for qualification as a level I Inspector. This course outlines the history and theory of sound propagation through materials during inspection. Next, this course explains basic principles of acoustics. Then, this course details test instruments, how they work, and techniques used to perform inspections properly. Finally, this course uses state of the art industry Non-Destructive Inspection (NDI) equipment used for hands on lab lessons and demonstration of skills.

Objectives:
- Compare the strengths and limitations of Ultrasonic inspection to other methods.
- Explore the history of ultrasonic inspection.
- Explore modes of soundwave generation.
- Demonstrate ability to safely use equipment.
- Explain Ultrasonic theory for each method used.
- Identify Industrial requirements for the ultrasonic methods.
- Explain steps and technique used in the process for each method.

TEND 1086 Radiography Inspection I **4 Credits / 120 Clock-Hours**

The Radiography Inspection I course explores the fundamental knowledge required for qualification as a level I Inspector. This course outlines the history and discovery of radioactive materials and how they're used in industry. Next, this course details the types of radiation and how it interacts with matter, the different exposure devices and radiation sources used in the field and the risks of radiography inspection and how to stay safe. Topics include film processing, evaluation of weldments and discontinuities related to manufacturing processes. The course will discuss the concepts and practices for standard film-based radiography. Additionally, students will begin exploring the concepts and procedures for digital radiography and computed radiography. Finally, this course uses state of the art industry Non-Destructive Inspection (NDI) equipment for hands on lab lessons and demonstration of skills.

Objectives:
- Demonstrate radiation safety.
- Explain the principles of Radiography.
- Compare the strengths and limitations of Radiographic inspection to other methods.
- Explore different radiographic techniques.
- Conduct hands on lab exercises on components typical in the NDI workplace.

TEND 1090 Radiation Safety **3 Credits / 90 Clock-Hours**

The Radiation Safety course explores various sources of radiation, safe and unsafe exposures to radiation, proper procedures for emergency situations, and the importance of checking for radiation leaks. This course details the four factors controlling radiation exposure and explores how distance reduces exposure, ways to identify situations which require notification of the Radiation Safety Officer (RSO) and complies with As Low As Reasonably Achievable (ALARA) concept.

Objectives:
- Use proper placement of personal monitoring devices.
- Demonstrate safe monitoring.
- Use safety equipment features.
- Define situations that require RSO notification.
- Identify, define, and demonstrate:
  - Radiation barrier per codes.
  - Radiation safety mathematics.
  - Safety requirements using gamma source camera.
  - NRC and agreement guidelines.

TEND 2065 Electromagnetic Inspection II **3 Credits / 90 Clock-Hours**

The Electromagnetic Inspection II course explores advanced knowledge required for qualification as a Level II inspector. This course provides training on advanced electromagnetic physics concepts to analyze and interpret indications derived from inspection equipment. Next, this course explains material properties and how they affect test objects, conductivity and how it relates and acts under a stress load. Finally, this course uses state of the art industry Non-Destructive Inspection (NDI) equipment for hands on lab lessons and demonstration of skills achieved.

Objectives:
• Demonstrate ability to use advanced settings of equipment.
• Explain how discontinuities form from materials processing.
• Modify proper orientation of the part or equipment to obtain the best results.
• Demonstrate advanced test instruments system settings.
• Explain Electromagnetic Current Testing Theory.
• Discuss specifications and codes related to Electromagnetic inspection.
• Calculate formulas required for Eddy current inspection.

TEND 2075 Ultrasound Inspection II **3 Credits / 90 Clock-Hours**

The Ultrasound Inspection II course explores advanced knowledge required for qualification as a Level II inspector. This course provides training on advanced ultrasonic techniques including calibration of equipment, evaluation of weldments and discontinuity detection. Finally, this course uses state of the art industry Non-Destructive Inspection (NDI) equipment used for hands on lab lessons and demonstration of skills.

Objectives:
• Demonstrate ability to use advanced settings of equipment.
• Explain Ultrasonic theory for each inspection/testing method.
• Discuss specifications and codes related to ultrasonic inspection.
• Explore evaluation of base-material product forms.
• Identify size type and location of discontinuities.
• Calculate formulas required for Ultrasonic inspection.

TEND 2086 Radiography Inspection II **4 Credits / 120 Clock-Hours**

The Radiography Inspection II course explores advanced knowledge required for qualification as a Level II inspector. This course will cover a deeper understanding of radiographic evaluation and interpretation. Additionally, the practices and procedures of digital radiography and computed radiography are delved into deeper. This is a Level II class that is a follow-on to Radiography Inspection I. This course uses state of the art industry Non-Destructive Inspection (NDI) equipment for hands on lab lessons and demonstration of skills.

Objectives:
• Demonstrate competency in proper evaluation of image interpretation.
• Define standards, codes, and procedures for radiography.
• Demonstrate proficiencies with Computed Radiography (CR) and Digital Radiographic (CR) equipment.
• Explain radiographic safety principles.
• Show consistent use of safety equipment/protocols.
• Calculate formulas required for radiographic inspection.