Course Catalog

2015 - 2016

ND^3, LLC
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General Information

ND³, LLC provides the highest quality training available to individuals entering or continuing in the Nondestructive Testing and/or Rope Access industries. Our goal now, as it has always been, is to engage our students and prepare them well for a satisfying and lucrative career.

Founded in 2006, ND³ has become a leader in nondestructive inspection (NDE) and industrial rope access (RA) training by valuing every student and creating an individualized learning environment by inviting interaction between our Students and our course instructors.

The courses offered by ND³, LLC, contained in this Course Catalog conform to the stringent requirements of various documents issued by certifying agencies such as:

- ASNT SNT-TC-1A and ASNT CP-189 for nondestructive testing courses
- SPRAT Certification Requirements for Rope Access Work
- IRATA International Code of Practice
- LAC 33:15 Louisiana Environmental Regulatory Code
- US NRC 10 CFR Part 34

Our instructors are made up of industry professionals who are proven to be able to deliver information and answer questions based of their real-world experiences. All instructors are fully qualified in the methods, techniques or disciplines that they are instructing. ND³'s instructors have the competence and confidence to deliver the highest quality instruction available.

Your learning environment is designed to be comfortable and conducive to education. Distractions are kept to a minimum. You will be given a Student Handbook that outlines our rules that help to enhance all attendees learning experience.

Your safety is very important to us. As a result, you may be required to attend offsite safety orientations designed to enhance your career. When these additional courses are required, you will be notified and are expected to attend and complete all of these requirements as a part of completing the overall course.

If you have any concerns, any questions, or require additional clarification in any of the materials contained in this course catalog, please feel free to contact one of our administrative staff or one of our instructors.

Combination Courses

ND^3, LLC, with its' sister company AccessRULES, offers a combination course that fully prepares the candidate for a challenging and rewarding career in Industrial Inspection and Industrial Rope Access.

Our combination course, ***Heights of Inspection*** trains the candidate in both rope access and NDE and once enrolled, you may be placed according to past military service. We believe in our country and those that have served keeping our families and friends safe.

Every combination course candidate is enrolled into the ***Heights of Inspection*** curriculum but those who have served, as veterans, should be recognized as receiving our gratitude. Therefore we make a distinction and offer little "thank you" gestures while we have the service man or woman (or approved dependent) with us.

The ***Heights of Inspection*** program includes 7 weeks of instruction in industrial inspection, rope access and other valuable courses that will help the candidate to obtain his or her new career immediately after graduating. Prospective employers are invited to interview students during the course so that these candidates can make suitable contacts within industry and possibly become employed prior to finishing the course.

Upon completion of the ***Heights of Inspection*** program, the student is well prepared to impact our industry on day one.

Course segments included in the program are:

- Industrial Radiation Safety
- Industrial Rope Access
- Basic Rigging
- Access Equipment Inspection
- Ultrasonic Thickness Testing
- Liquid Dye Penetrant Inspection
- Magnetic Particle Inspection
- Visual Inspection
- Inspection Report Writing
- Basic First Aid and CPR
- HUET and Water Survival
- Basic Onshore Orientation
- Basic Offshore Orientation

Please see a further description of the program further in this Course Catalog.

Training and Certification

The NDT and Rope Access industries make a big distinction between training and certification.

Training is defined as "*an organized program developed to impart the knowledge and skills necessary for qualification*" while certification is defined as "*validating the authenticity of something or someone*". There is a fundamental difference between these two words.

The difference is that training imparts theoretical or practical knowledge without the basis of experience. Certification is attestation that the person being authenticated can perform as required. Experience is the difference.

Many of the inspection courses that are offered by ND^3 are considered training courses. These courses provide necessary training that the graduate can use to gain experience to become certified.

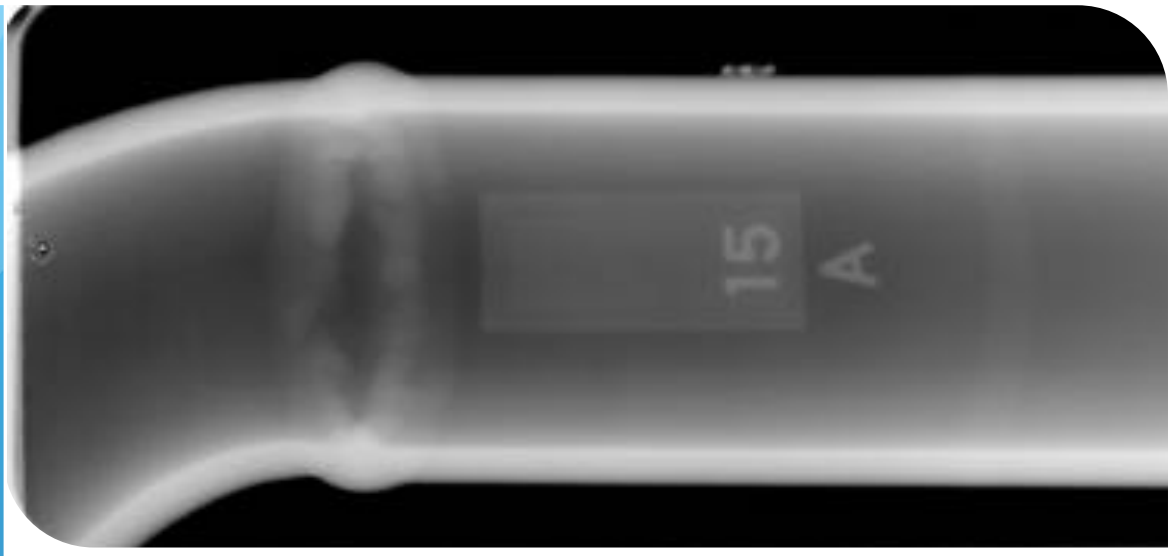
The inspection industry is primarily based upon certification requirements contained in documents named ASNT-SNT-TC-1A or ASNT-CP-189. These industry standards mandate that training be but a part of certification. In one case, ASNT-SNT-TC-1A, certification is the sole responsibility of the employer. Therefore, upon completing many courses offered by ND^3, your employer will mandate that you gain experience prior to the Company certification.

Regardless, you will be issued training certificates for all courses completed by attendance and passing the final examination, if one is given. You may use these documents to gain employment or as a part of certification qualification.

Radiation Safety is somewhat different in that Radiation Safety is a jurisdictional requirement prior to working with radioactive material. It is the first step to working safely with radioactive material and radiation producing machines.

Industrial Rope Access training with ND^3/AccessRULES is an exception in that you will receive training as a Level 1 Technician. Level 1 Rope Access Technicians do not have an experience requirement.

After your Industrial Rope Access Training Course is finished, you will have a daylong assessment in which you prove to an independent assessor that the training was effective and that you can perform the skills assessment required. When you pass the assessment, you will be certified to that level of competency in Industrial Rope Access.



Industrial Radiation Safety, Industrial Radiography and Radiographic Film Interpretation

Industrial radiography is a nondestructive testing technique using high-energy radiation to penetrate an object resulting in an image on a piece of radiographic film. Before any worker can perform industrial radiography, every jurisdiction requires completion of a minimum of 40 hours of industrial radiation safety. Radiation Safety prepares the worker for a career in industrial radiography so that he or she can protect all radiation workers and the general public from the effects of ionizing radiation.

Industrial radiography technicians use the precepts learned in their Radiation Safety course to work safely while using these invisible dangerous rays of energy.

Industrial Radiography courses, either Level I or Level II, instruct the radiographer on how to produce radiographs of high quality using geometric principles of enlargement, image production, processing chemistry, and others.

Industrial radiography is, perhaps, one of the most versatile and widely used inspection techniques because it produces a fixed image that is easily understood and widely interpretable.

The following pages outline, in a general fashion, each course offering for industrial radiography, industrial radiation safety and radiographic film interpretation. Please contact *support@nd3llc.com* for more detailed syllabus for each course offering

Industrial Radiation Safety Course Outline

I. *Fundamentals of Radiation Safety*
   A. Characteristics of radiation
   B. Units of radiation dose and quantity of radioactivity
   C. Significance of radiation dose
      1. Radiation protection standards
      2. Biological effects of radiation dose
      3. Case histories of radiography accidents
   D. Levels of radiation from sources of radiation
   E. Methods of controlling radiation dose
      1. Working time
      2. Working distances
      3. Shielding

II. *Radiation Detection Instrumentation to be Used*
   A. Use of radiation survey instruments
      1. Operation and daily inspection
      2. Calibration
      3. Limitations
   B. Survey techniques
   C. Use of personnel monitoring equipment
      1. Film badges
      2. Thermoluminescent dosimeters (TLD)
      3. Pocket dosimeters
      4. Alarm ratemeters

III. *Requirements of Pertinent Federal and State Regulations*

IV. *Licensee's or Registrant's Written Operating and Emergency Procedures*

V. *Radiographic Equipment Use*
   A. Associated equipment
   B. Radiographic exposure devices and sealed sources
   C. Storage containers
   D. Operation and control of X-ray equipment
   E. Collimators

VI. *Transportation of Radioactive Sources*
   A. Exclusive Use Vehicle
   B. Placarding
   C. Labeling and Reports

"Very informative and personal. Great attitude and delivery. I enjoyed the class"

WB

Course Length

The Industrial Radiation Safety Course is 40 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND^3 course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $800.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level I Radiographic Inspection Course Outline

I. Introduction

A. History, Definitions and Basic Safety
B. Math Review

II. Fundamental Properties of Matter

A. Electrons, Protons, Neutrons
B. Atomic Number and Weight
C. Isotope vs. Radioisotope

III. Radioactive Materials

A. Production
B. Units
C. Plotting Activity and Decay

IV. Types of Radiation

A. Alpha, Beta, Gamma, X-Ray
B. Energy Characteristics

V. Interaction of Radiation with Matter

A. Ionization
B. Absorption
C. Emissivity
D. Attenuation
E. Inverse Square Law

VI. Exposure Devices and Radiation Sources

A. Sources
B. Gamma Ray Units
C. X-Ray Units

VII. Radiological Safety Review

A. Time, Distance and Shielding
B. Occupational Dose Limits
C. Protecting People
D. ALARA Programs

VIII. Radiographs

A. Radiographic Film
B. Exposure Geometry
C. Shadow Formation
D. Screens and Intensification

IX. Image Quality

A. IQI's
B. Sensitivity, Latitude, and Contrast

X. Film Handling, Loading and Processing

A. In the Darkroom
B. While Making Exposures
C. Processing Radiographs

XI. Exposure Techniques

XII. Codes, Specifications and Standards

"I thought you were very helpful and made a boring class a fun and learning environment"

AW

Course Length

The Industrial Radiography Level I Course is 40 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $800.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level II Radiographic Inspection Course Outline

I. Introduction

A. Review of Basic Radiographic Principles
B. Math Review
C. Exposure Calculations

II. Darkroom Facilities, Techniques and Processing

A. Facilities and Equipment
B. Film Loading
C. Processing
D. Film storage

III. Unsatisfactory Radiographs

A. Causes
B. Cures

IV. Indications, Discontinuities and Defects

A. Classification
B. Energy Characteristics

V. Manufacturing Process and Associated Discontinuities

A. Castings
B. Rolled Products
C. Forged Products
D. Extruded Products
E. Welded Products

VI. Exposure Devices and Radiation Sources

A. Sources
B. Gamma Ray Units
C. X-Ray Units

VII. Radiological Safety Review

A. Time, Distance and Shielding
B. Occupational Dose Limits
C. Protecting People
D. ALARA Programs

VIII. Radiographs

A. Radiographic Film
B. Exposure Geometry
C. Shadow Formation
D. Screens and Intensification

IX. Image Quality

A. IQI's
B. Sensitivity, Latitude, and Contrast

X. Exposure Techniques

XI. Codes, Specifications and Standards

"This course was extremely beneficial in moving forward in my industry"

Course Length

The Industrial Radiography Level II Course is 40 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Refer to the current ND^3 course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $800.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level II Radiographic Film Interpretation Course Outline

I. **Introduction**
   - A. Review of Basic Radiographic Principles
   - B. Math Review

II. **Radiographic Viewing**
   - A. Film Illumination Requirements
   - B. Background Lighting
   - C. Visual Acuity and Adaptation
   - D. Film Density Requirements
   - E. Film Artifacts
   - F. Identification
   - G. Image Quality Indicators
   - H. Location Markers
   - I. Types of Views

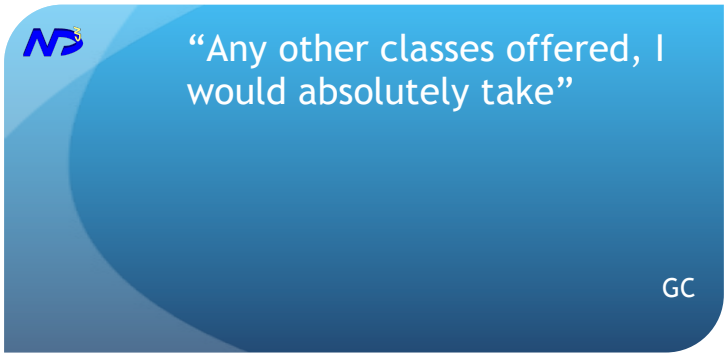
III. **Unsatisfactory Radiographs**
   - A. Causes
   - B. Cures

IV. **Application Techniques**
   - A. Multiple Film Techniques
   - B. Enlargement and Projection
   - C. Geometrical Relationship
   - D. Triangulation Methods for Defect Location
   - E. Localized Magnification
   - F. Film Handling Techniques

V. **Manufacturing Process and Associated Discontinuities**
   - A. Castings
   - B. Rolled Products
   - C. Forged Products
   - D. Extruded Products
   - E. Welded Products

VI. **Reporting**

VII. **Codes, Specifications and Standards**



Course Length

The Level II Radiographic Film Interpretation is either 24 or 40 hours in length, depending upon the certification level of the student, and varies in number of days of instruction.

Classes given on the weekends are 8 or 10 hours each day while classes given during the week are 8 hours per day.

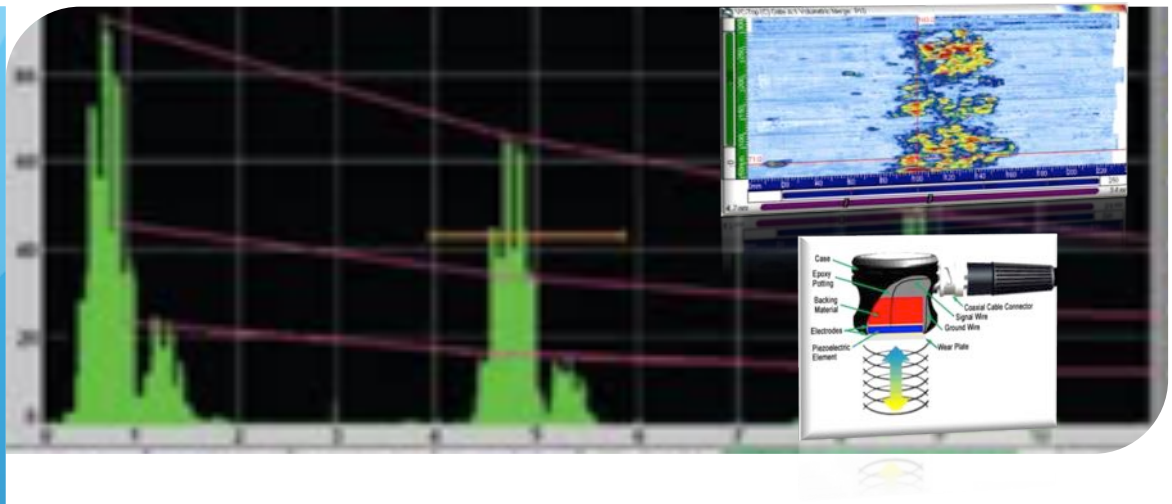
Course Dates

The Level I Radiographic Film Interpretation Course is given as needed, based upon current ND³ enrollment policy.

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Industrial Radiation Safety Course is $480.00 for the 24-hour course (prior certification as Level II Radiographer) and $800.00 for the 40-hour course (no prior radiographer training or experience) per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information



Ultrasonic Testing

Ultrasonic testing involves the use of high frequency sound to determine the condition of a component. These high frequency sound waves, ultrasound, travel along very distinct paths and reflect back to the transmitting transducer allowing the technician to "see" inside of the part being tested.

There are two primary modes of propagation for industrial ultrasonic techniques, longitudinal beam for determining thickness of the component or some material properties and flaws, and shear wave testing which projects a sound beam in at a refracted angle allowing for the detection of welding or material flaws.

Of paramount importance in ultrasonic testing is the operator's ability to know where the sound is and to interpret the returned signal that would often indicate a flaw in the material or reduced thickness. Our courses are designed to ensure that you can perform these two crucial functions.

Other modes exist, but are instructed on an "as-needed" basis such as phased array inspection, time of flight diffraction, or guided wave ultrasonics, for instance.

The following pages outline, in a general fashion, each course offering for Ultrasonic Thickness Testing and Level I and Level II Ultrasonic Inspection methods. Please contact *support@nd3llc.com* for more detailed syllabus for each course offering

Level I and II Ultrasonic Thickness Inspection Course Outline

I. **Introduction**

- A. Terms and Definitions
- B. Applications
- C. Math Review

II. **Basic Principles of Ultrasonic Testing**

- A. Nature of Sound Waves
- B. Modes of Generation
- C. Velocity, Frequency, and Wavelength
- D. Reflection and Refraction
- E. Acoustic Impedence
- F. Attenuation

III. **Parts of the Sound Beam**

- A. Nearfield
- B. Far Field
- C. A-, B-, C-Scan Presentations
- D. Other Presentations and Modes

IV. **Ultrasonic Equipment**

- A. Transducers
- B. Cables
- C. Couplant
- D. Calibration Blocks
- E. Ultrasonic Thickness Units

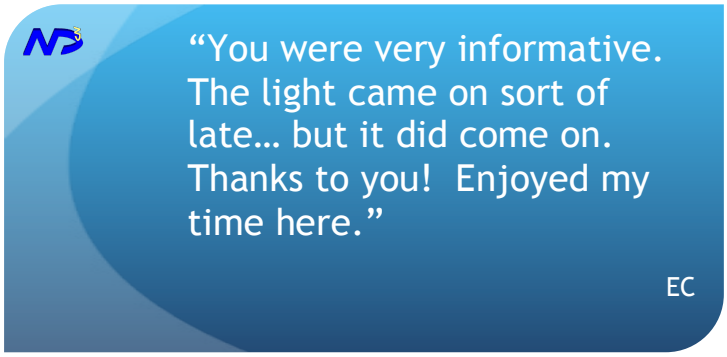
V. **Calibration**

- A. Thickness Envelope
- B. CAL Velocity
- C. CAL Zero
- D. Ultrasonic Doubling

VI. **Operation of Units**

- A. Panametrics Units
- B. GE Units

VII. **Codes, Specifications and Standards**



Course Length

The Ultrasonic Thickness Inspection Course is 24 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $480.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level I Ultrasonic Shear Wave Inspection Course Outline

I. Introduction

A. Terms and Definitions
B. Applications
C. Math Review

II. Basic Principles of Ultrasonic Testing

A. Nature of Sound Waves
B. Modes of Generation
C. Velocity, Frequency, and Wavelength
D. Reflection and Refraction
E. Acoustic Impedence
F. Attenuation
G. Snell's Law

III. Parts of the Sound Beam

A. Nearfield
B. Far Field
C. A-, B-, C-Scan Presentations
D. Other Presentations and Modes

IV. Ultrasonic Equipment

A. Transducers
B. Cables
C. Couplant
D. Calibration Blocks
E. Ultrasonic Thickness Units

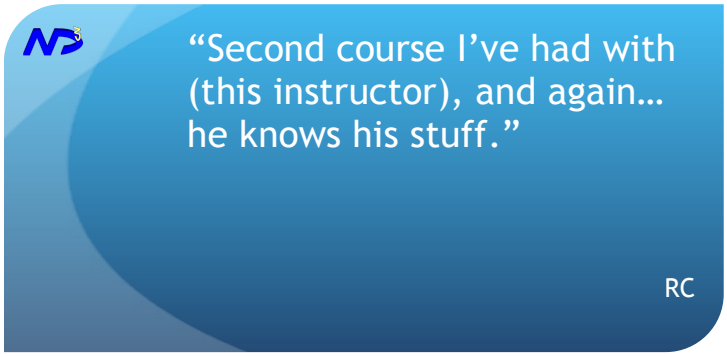
V. Calibration (Electronic and Functional)

A. Side Drilled Holes
B. Notches
C. Types of Calibration Blocks
D. Surface Distance, Depth, SPD Calculations
E. Reference dB
F. DAC Curves

VI. Operation of Units

C. Finding Defects
D. Gates
E. Sizing Discontinuities

VII. Codes, Specifications and Standards



Course Length

The Ultrasonic Shear Wave Level I Course is 40 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $800.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level II Ultrasonic Shear Wave Inspection Course Outline

I. Introduction

A. Terms and Definitions
B. Applications
C. Review of Principles
D. Math Review

II. Evaluation of Base Material Products

A. Ingots
B. Plate and Sheet
C. Bar and Rod
D. Pipe and Tubulars
E. Forgings
F. Castings
G. Composite Structures

III. Evaluation of Welds

A. Welding Processes
B. Normal Reflector Orientation
C. Size, Type, Location of Discontinuities
D. Categorizing Defects Based on Presentation

IV. Discontinuity Detection

A. Sensitivity to Reflections
B. Resolution
C. Determination of Size
D. Location of Discontinuity

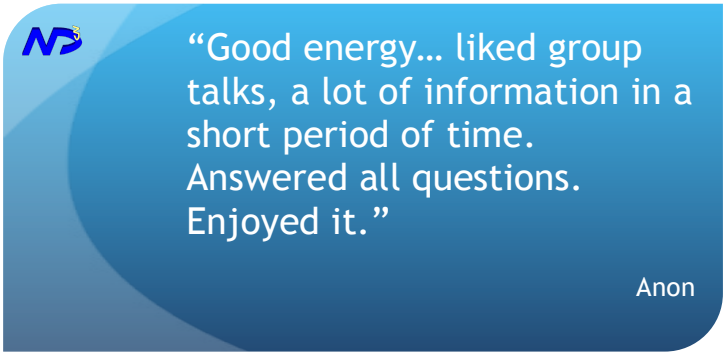
V. Calibration (Electronic and Functional)

A. Side Drilled Holes
B. Notches
C. Types of Calibration Blocks
D. Surface Distance, Depth, SPD Calculations
E. Reference dB
F. DAC Curves

VI. Operation of Units

A. Finding Defects
B. Gates
C. Sizing Discontinuities

VII. Codes, Specifications and Standards



Course Length

The Ultrasonic Shear Wave Level II Course is 40 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $800.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Liquid Dye Penetrant
and
Magnetic Particle Inspection

Among the most widely utilized non-destructive testing techniques are Magnetic Particle (MPI) and Liquid Dye Penetrant (PT) Inspection. These techniques are primarily used to find surface breaking discontinuities and, in the case of MPI, some subsurface discontinuities.

Magnetic Particle Inspection of ferromagnetic materials relies heavily on the laws of magnetism possibly first introduced by Aristotle in the mid 300's BC. Using magnetic fields, small ferromagnetic particles are attracted to leakage fields (defects) and are visible at the accumulation site.

When testing a non-ferromagnetic material, the use of visible or fluorescent dyed oils, which (through capillary action) work their way into surface breaking discontinuities, only to be blotted out of the indication by a powder is the basic premise of Liquid Dye Penetrant Inspection.

The following pages outline, in a general fashion, each course offering for Liquid Dye Penetrant and Magnetic Particle Inspections. Please contact support@nd3llc.com for more detailed syllabus for each course offering

Level I and Level II
Liquid Dye Penetrant Inspection
Course Outline

I. **Introduction**
   A. Terms and Definitions
   B. Applications
   C. Basic Principles
   D. Types of Penetrants Available

II. **Liquid Penetrant Process**
   A. Pre-Cleaning
   B. Lighting
   C. Application of Penetrant
   D. Removal of Excess Penetrant
   E. Application of Developer
   F. Inspection and Evaluation
   G. Post Cleaning

III. **Liquid Penetrant Testing Methods**

IV. **Testing Equipment**

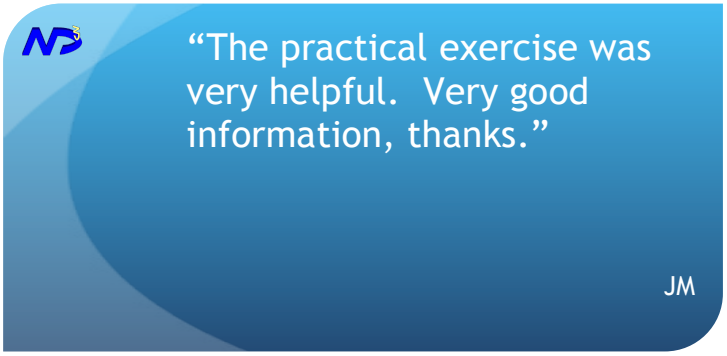
V. **Selection of Test Method**
   A. Advantages/Disadvantages of Methods

VI. **Inspection and Evaluation of Indications**
   A. General
   B. Factors Affecting Indications
   C. Indications from Porosity
   D. Indications from Cracks
   E. Indications from Specific Material Forms

VII. **Codes, Specifications and Standards**

Additional Information

The Level I and II Liquid Dye Penetrant Inspection Course is generally offered at the same time due to individual Level course length. This single course meets the training requirements for both Levels prior to certification



Course Length

The Level I and II Liquid Dye Penetrant Inspection Course is 12 hours in length and may vary in number of days of instruction.

Classes given during the week are generally 8 hours per day.

Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $240.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level I and Level II
Magnetic Particle Inspection
Course Outline

I. **Introduction**
   - A. Terms and Definitions
   - B. Applications
   - C. Basic Principles
   - D. Characteristics of Magnetic Fields

II. **Effects of Discontinuities on Magnetic Fields**
   - A. Surface Cracks
   - B. Scratches
   - C. Subsurface Defects

III. **Magnetizing by Means of an Electric Current**
   - A. Field around a Straight Conductor
   - B. The Right Hand Rule
   - C. Direct Magnetization
   - D. Indirect Magnetization

IV. **Longitudinal Magnetization**

V. **Circular Magnetization**

VI. **Selecting the Proper Magnetization Method**

VII. **Magnetic Particles**

VIII. **Principle of Demagnetization**

IX. **Testing Equipment**

X. **Selection of Test Method**
   - A. Advantages/Disadvantages of Methods

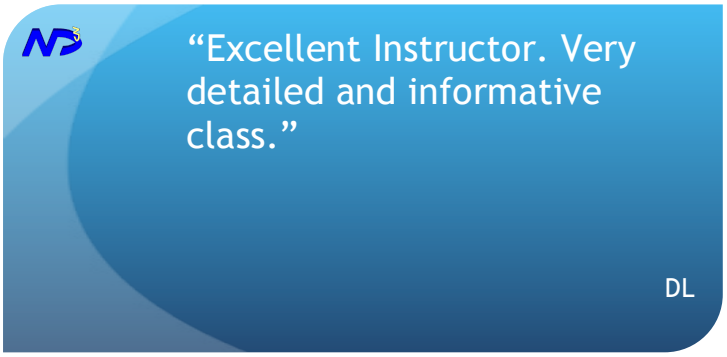
XI. **Inspection and Evaluation of Indications**
   - A. General
   - B. Factors Affecting Indications
   - C. Indications from Porosity
   - D. Indications from Cracks
   - E. Indications from Specific Material Forms

XII. **Codes, Specifications and Standards**

XIII. **Quality Control and Calibration**

Additional Information

The Level I and II Magnetic Particle Inspection Course is generally offered at the same time due to individual Level course length. This single course meets the training requirements for both Levels prior to certification.



Course Length

The Level I and II Magnetic Particle Inspection Course is 20 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

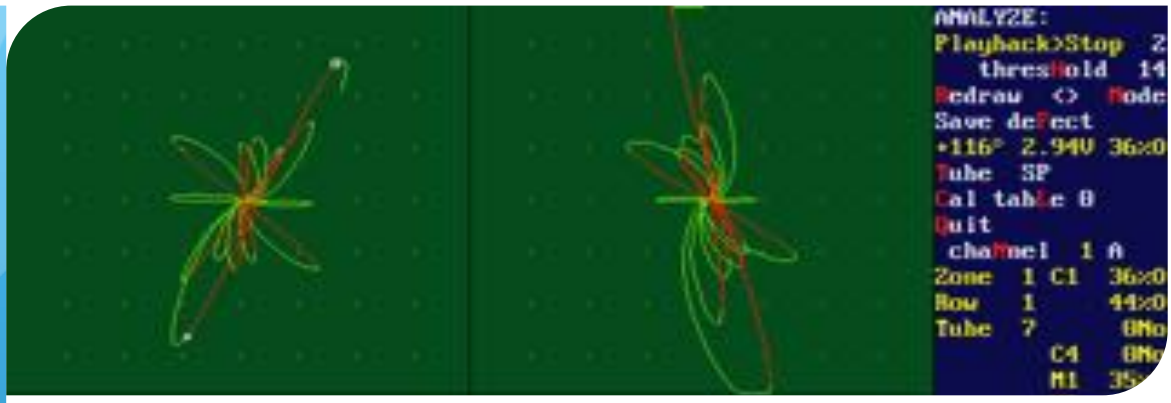
Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND^3 course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $400.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information



Eddy Current Inspection

Quickly becoming a cost effective alternative to Magnetic Particle Inspection, Surface Eddy Current Inspection allows for the operator to locate cracks and other surface and near-surface discontinuities without the need for costly removal of non-metallic coatings. Often times, surface eddy current inspection is used to perform a survey and, if a discontinuity is found, the coating is removed and Magnetic Particle Inspection is used to verify the presence of the break.

Other eddy current inspection techniques are used for determining the condition of heat exchanger tubes used primarily in refineries and chemical plants. In this arrangement the Eddy Current Probe coil is most often positioned within the tube after cleaning. Using Eddy Currents, the operator can reliably determine the position of the indication, internal or external, and extent of damage.

Eddy currents are generated when a current conducts into a coil that, in turn, produces a small magnetic field around the coil. This magnetic field produces eddy currents in the metallic material, which can be measured and analyzed.

When the eddy current probe is brought into proximity to a defect, the eddy currents are disrupted causing a deflection of the currents noticed by the pick-up coil and display on the screen.

The following pages outline, in a general fashion, each course offering for Eddy Current Inspections. Please contact support@nd3llc.com for more detailed syllabus for each course offering.

Level I Eddy Current Inspection Course Outline

I. **Introduction**

- A. Terms and Definitions
- B. Applications
- C. Basic Principles

II. **Electromagnetic Theory**

- A. Eddy Currents via A/C Field
- B. Impedance Changes
- C. Properties of Eddy Currents
  1. Circular
  2. Strongest at Surface
  3. Small Magnitude of Current Flow
  4. Frequency and Phase Relationship
  5. Conductivity of Materials
  6. Permeability of Materials
  7. Geometry

III. **Types of Probes**

- A. Arrangements
- B. Modes of Operation
- C. Theory of Operation
- D. Hall Effect Sensors
- E. Applications
- F. Advantages/Disadvantages

IV. **Selection of Inspection Parameters**

V. **Readout Mechanisms**

- A. Impedance Plane Displays
- B. Data Recording Systems
- C. Alarms, etc.
- D. Numerical Readouts
- E. Gates, Tables, Others

VI. **Testing Equipment**

VII. **Inspection and Evaluation of Indications**

- A. General
- B. Factors Affecting Indications
- C. Indications from Porosity
- D. Indications from Cracks
- E. Indications from Specific Material Forms

VIII. **Codes, Specifications and Standards**

IX. **Quality Control and Calibrations**

> "The instructor made the class fun and enjoyable. I would recommend this class to anyone who needs to take it."
>
> Anon

Course Length

The Eddy Current Level II Course is 40 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $800.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level II Eddy Current Inspection Course Outline

I. **Introduction**

- A. Terms and Definitions
- B. Applications
- C. Review of Electromagnetic Theory
- D. Types of Probes

II. **Factors That Effect Impedance**

- A. Test Part
- B. Test System

III. **Signal to Noise Ratio**

- A. Relationship to Eddy Current Testing
- B. Methods to Improve

IV. **Selection of Inspection Parameters**

V. **Coupling**

- A. Fill Factor
- B. Lift Off

VI. **Field Strength and its' Effects**

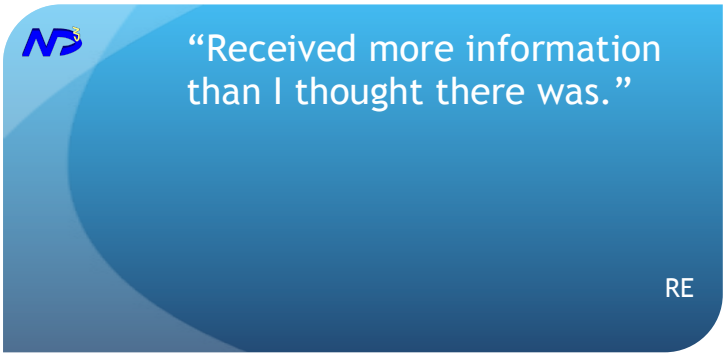
VII. **Instrumentation**

VIII. **Inspection and Evaluation of Indications**

- A. General
- B. Factors Affecting Indications
- C. Indications from Porosity
- D. Indications from Cracks
- E. Indications from Specific Material Forms

IX. **Codes, Specifications and Standards**

X. **Calibrations**



Course Length

The Eddy Current Level II Course is 40 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Refer to the current ND^3 course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $800.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Visual Inspection

Visual Inspection is the use of the eye to conduct an inspection. Some say that all inspection is, at the heart, a visual inspection. Methods such as Magnetic Particle or Liquid Dye Penetrant are methods that directly use the eye to determine the presence of a discontinuity by increasing the contrast between the inspection surface and the defect.

Visual Inspection should be performed prior to each application of another inspection method to determine, partially, if the inspection should continue. For instance, if, following a visual inspection, a crack on the surface is found, there isn't much point in applying ultrasonic shear wave.

Many National and International visual inspection certifications exist which rely on the eyes of the inspector to find flaws in many different types of equipment such as:

- API 510 for Pressure Vessels
- API 570 for Pressure Piping
- API 653 for Above Ground Storage Tanks
- AWS CWI for Welding Inspection

Obtaining a good background in Visual Inspection is generally regarded as necessary to make inspection personnel the best that they can be, regardless of the method to be employed.

The following pages outline, in a general fashion, each course offering for Visual Inspection. Please contact support@nd3llc.com for more detailed syllabus for each course offering.

Level I Visual Inspection Course Outline

I. **Introduction**

A. Terms and Definitions
B. Applications
C. Overview of Visual Testing Applications

II. **Fundamentals**

A. Vision
B. Lighting
C. Material Attributes
D. Environmental Factors
E. Visual Perception
F. Direct and Indirect Methods

III. **Equipment**

A. Mirrors and Magnifiers
B. Remote Visual Aids
C. Light Sources
D. Gauges
E. Other Systems

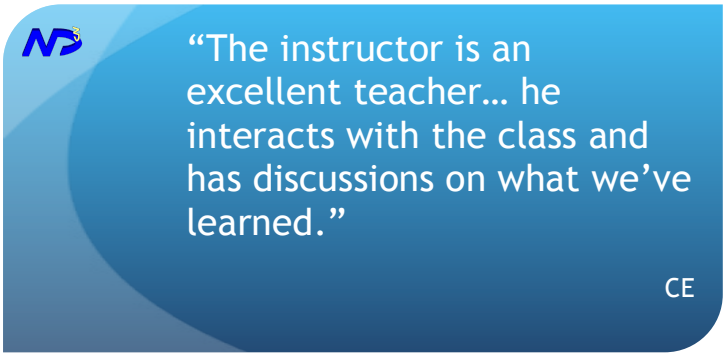
IV. **Visual Testing**

V. **Inspection and Evaluation of Indications**

A. General
B. Factors Affecting Indications
C. Indications from Porosity
D. Indications from Cracks
E. Indications from Specific Material Forms

VI. **Codes, Specifications and Standards**

VII. **Calibrations**



Course Length

The Level I and II Visual Inspection Course is 24 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $480.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level II Visual Inspection
Course Outline

I. **Introduction**
   - A. Terms and Definitions
   - B. Applications
   - C. Overview of Visual Testing Applications

II. **Fundamentals**
   - A. Vision
   - B. Lighting
   - C. Material Attributes
   - D. Environmental Factors
   - E. Visual Perception
   - F. Direct and Indirect Methods

III. **Environmental and Physiological Effects**

IV. **Principles and Theory**
   - A. Optics

V. **Equipment**
   - A. Mirrors and Magnifiers
   - B. Remote Visual Aids
   - C. Light Sources
   - D. Gauges
   - E. Other Systems

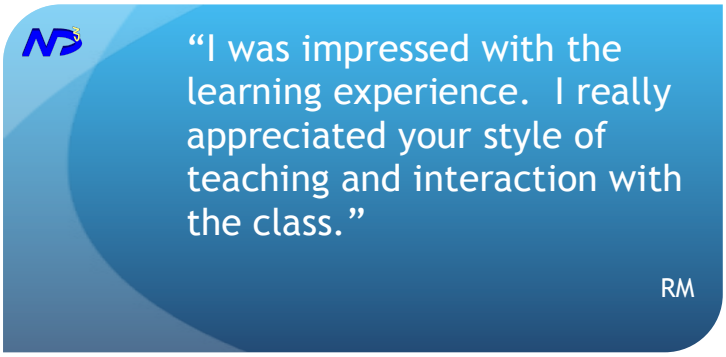
VI. **Visual Testing**

VII. **Inspection and Evaluation of Indications**
   - A. General
   - B. Factors Affecting Indications
   - C. Indications from Porosity
   - D. Indications from Cracks
   - E. Indications from Specific Material Forms

VIII. **Codes, Specifications and Standards**

IX. **Calibrations**

X. **Recording and Documentation**



Course Length

The Level I and II Visual Inspection Course is 24 hours in length and may vary in number of days of instruction.

Classes given on the weekends are 10 hours each day while classes given during the week are generally 8 hours per day.

Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND^3 course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Course is $480.00 per student. Registration and Administrative Fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Industrial Rope Access

Industrial Rope Access are new, innovative ways to access a worksite that offer significant cost savings when compared to the use of conventional access methods such as scaffolding, spiders, cranes, etc. The access technicians are the workers' performing the task to be accomplished and as such, exposure to hazards is minimized. Also, the use of Rope Access techniques removes additional hazards more often associated with the workplace such as congestion and tripping hazards.

There are three levels of certification in regards to Rope Access, Level 1, Level 2, and Level 3. ND3, through AccessRULES, offers certification packages designed for each level of competency. After your rope access course is completed, an independent assessor will gauge your skills and may certify you to the appropriate level to a National or International Standard.

Using techniques and tools to abseil, descend, belay, and deviate ropes, you will understand how to keep yourself and others safe while working on the ropes. Ensuring your safety, not only while in a learning environment but while on the job is our first priority; a job that we take very seriously.

Industrial Rope Access training is the foundation to working safely at height in industry and is uniquely suited to work such as NDE and light trades such as insulation removal/reinstatement, blasting, painting, and even welding. With proper training and certification in rope access, you can take your trade, and your career, to new heights.

The following pages outline, in a general fashion, each course offering for Industrial Rope Access. Please contact support@nd3llc.com for more detailed syllabus for each course offering.

Level 1 SPRAT Rope Access Training Course Outline

I. Introduction

A. Terms and Definitions
B. Applications
C. Overview of Rope Access Applications

II. Theoretical Knowledge

A. Legislation
B. Risk Assessments
C. Permit to Work Systems
D. Zones
E. Working Practices
F. Selection, Inspection and Use of Equipment
G. Anchor Types and Systems
H. Angle Loading
I. Fall Factors
J. Haul Systems
K. Suspension Trauma

III. Equipment and Rigging

A. Assembly and Fitting
B. Use of Back-Up Device
C. Tying, Dressing and Using Knots
D. Basic Anchor System
E. Rope and Edge Protection

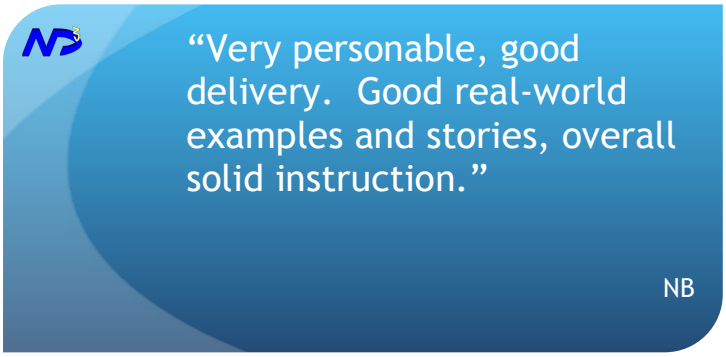
IV. Maneuvers

A. Descent and Ascent
B. Changeovers
C. Descent Using Ascenders
D. Ascent Using Descenders
E. Passing Knots
F. Passing Deviations
G. Passing Re-Belay
H. Rope to Rope Transfer
I. Passing and Edge

V. Rescue

A. Rescue from Descent
B. Awareness of Basic Haul and Lower

Note: The above syllabus pertains, in large part, to SPRAT recommendations. IRATA recommendations may vary. The Rope Access course for which you register will conform to the type of Certification Sought.



Course Length

The Level I Rope Access Course is 40 hours in length and may vary in number of days of instruction.

Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND³ and AccessRULES course calendars published at *www.nd3llc.com* and www.access-rules.com for dates for each course.

Course Cost

The cost for the Course is $1,750.00 per student. Registration, Administrative Fees, and Assessor fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level 2 SPRAT Rope Access Training Course Outline

I. Introduction

A. Terms and Definitions
B. Applications
C. Overview of Rope Access Applications

II. Theoretical Knowledge

A. Review of Level 1 Theory
B. Tensioned Lines
C. Work Restraint
D. Horizontal Lifelines
E. Anchorage Selection
F. Team Work

III. Equipment and Rigging

A. Review of Level 1 Equipment and Rigging
B. Wide "Y" Hang
C. Re-Belay
D. Deviations
E. Rope and Sling Protection
F. Pull-Through
G. Work Restraint and Horizontal Lifelines
H. Tensioned Ropes

IV. Maneuvers

A. Level 1 Maneuvers

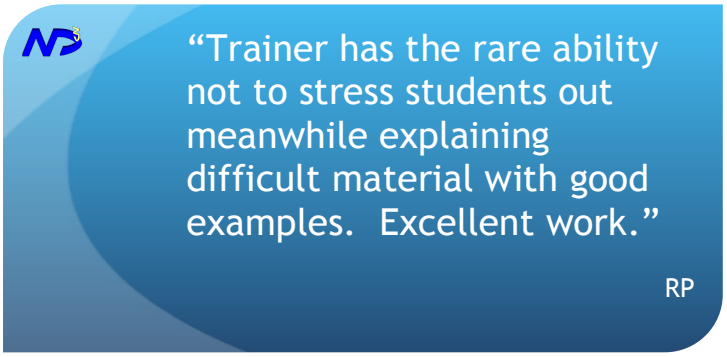
V. Climbing

A. Level 1 Climbing

VI. Rescue / Hauling

A. Level 1 Rescue
B. Rescue From Ascent
C. Haul and Lower From a Platform
D. Hanging Haul
E. Cross Haul

Note: The above syllabus pertains, in large part, to SPRAT recommendations. IRATA recommendations may vary. The Rope Access course for which you register will conform to the type of Certification Sought.



Course Length

The Level 2 Rope Access Course is 40 hours in length and may vary in number of days of instruction.

Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND³ and AccessRULES course calendars published at *www.nd3llc.com* and www.access-rules.com for dates for each course.

Course Cost

The cost for the Course is $1,750.00 per student. Registration, Administrative Fees, and Assessor fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Level 3 SPRAT Rope Access Training Course Outline

I. **Introduction**

A. Terms and Definitions
B. Applications
C. Overview of Rope Access Applications

II. **Theoretical Knowledge**

A. Review of Level 1 and Level 2 Theory
B. Equipment Inspection, Management and Records
C. Lead Climbing
D. Rescue Management

III. **Equipment and Rigging**

A. Review of Level 1 and Level 2 Equipment and Rigging

IV. **Maneuvers**

A. Level 1 and Level 2 Maneuvers

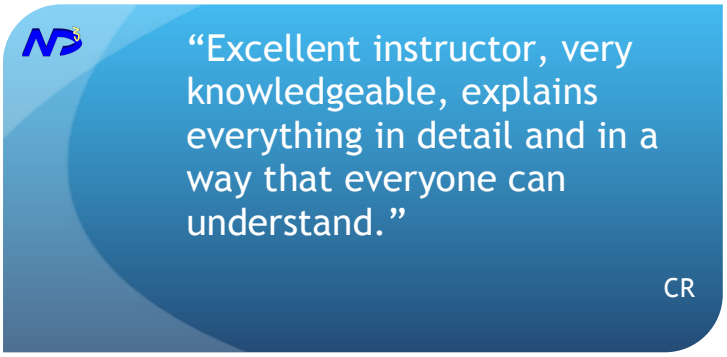
V. **Climbing**

A. Level 1 and Level 2 Climbing

VI. **Rescue**

A. Level 1 and Level 2 Rescues
B. Advanced Rescue
C. Rescue From Tensioned Ropes
D. Rescue From Short Link
E. Rescue From Descent Past Knot
F. Break Into Tight Rope
G. Rescue From Large Re-Belay

Note: The above syllabus pertains, in large part, to SPRAT recommendations. IRATA recommendations may vary. The Rope Access course for which you register will conform to the type of Certification Sought.



Course Length

The Level 3 Rope Access Course is 40 hours in length and may vary in number of days of instruction.

Course Dates

Courses are taught as part of the 7-week "ND3/AccessRULES – ***Heights of Inspection*** and ***Harness Our Heroes***" comprehensive course for NDE and Rope Access Employment Preparation. These courses are scheduled throughout the year to coincide with the combination course criterion and independently by enrollment.

Refer to the current ND³ and AccessRULES course calendars published at *www.nd3llc.com* and www.access-rules.com for dates for each course.

Course Cost

The cost for the Course is $1,750.00 per student. Registration, Administrative Fees, and Assessor fees apply. These fees are included into the cost but separate of tuition. See the Student Handbook for more information

Heights of Inspection
Combination Course Package

Although we were not privileged to serve our country in active military service, we whole-heartedly support our troops and feel that we owe each and every one of these proud men and women our thanks and gratitude. It is, understandably, a difficult transition from service to civilian life and we at ND^3 and AccessRULES want to help where we can.

We have designed a 7 week course in which enrollment is open to any person who desires to participate, the Heights of Inspection Program, but is built around allowing our returning troops to attend and become employable in a field where high-paying jobs are abundant. Upon successful completion of the Heights of Inspection program, our graduates will have the skills necessary to compete for jobs that pay well except that our graduates will have skills most sought after by employers. We know - we ran companies in the rope access and inspection industries and communicate with these companies every day.

Through completion of the combination program, the returning Armed Forces Member and student will go to work in an exciting, rewarding field in which a career can be made. The pay is high as are the expectations. Employers are actively seeking highly motivated individuals with the discipline and metal steel that is forged in our Armed Services.

Having completed the Heights of Inspection combination program, the graduate will have opportunities within many industries that may not otherwise be available. Start your high profile, high paying new career today.

Heights of Inspection
Combination Course Package

Combining Rope Access Training and Certification with select NDE training, our *combination* course offers unsurpassed technical training over a wide array of skillsets. Completion of this course package makes the student immediately employable in both the offshore and onshore petro-chemical industries, and many more industries, in assignments employers want to fill.

The seven-week course syllabus includes Level 1 SPRAT rope access training *and* certification, Industrial Radiation Safety Training, Level I and II Ultrasonic Thickness Testing training, Level I and II Liquid Dye Penetrant Inspection training, Level I and II Magnetic Particle Inspection training, Level I and II Visual Inspection, Report Writing, Access Equipment Inspection and Maintenance, Basic Rigging, HUET Water Survival training, Basic First Aid training, Offshore Basic Orientation, Onshore Basic Orientation and TWIC Application. Included is the opportunity to interview with your new employer during the course session.

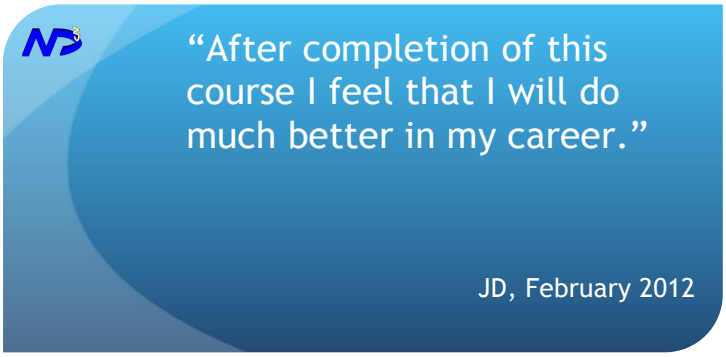
These skills are in high demand in industry, not just in the petro-chemical industry, but in others such as stage management and lighting production, rock stabilization and geo-technical, building façade inspection and repair, and bridge and structure inspection and maintenance to name but a few.

Industry is actively seeking individuals with these skills; the increasing cost of employee training and salary while attending courses make the graduate more attractive when interviewing and hiring. Handing a prospective employer a package of certificates issued by ND^3 and AccessRULES adds additional credence, as your employer will know you received the highest quality training.

The following pages outline, in a general fashion, the syllabus for the *Heights of Inspection* course. Please contact support@nd3llc.com for more detailed

Heights of Inspection
Combination Course Outline

I. Rope Access Level I Course
II. Rigging in Accordance with API RP-2D
III. Access Equipment Inspection and Maintenance
IV. Rope Access Level I Certification
V. Industrial Radiation Safety
VI. Ultrasonic Thickness Inspection Level II
VII. Liquid Penetrant Inspection Level I
VIII. Liquid Penetrant Inspection Level II
IX. Magnetic Particle Inspection Level I
X. Magnetic Particle Inspection Level II
XI. Visual Inspection Level I
XII. Visual Inspection Level II
XIII. Inspection Report Writing
XIV. HUET Offshore Water Survival
XV. Basic First Aid
XVI. Offshore and Onshore Basic Orientation
XVII. Job Placement Techniques



Course Length

The Heights of Inspection Course offering is given over 7 full weeks. Students who have served our country in the military are enrolled and may have special provisions and options.

Several days of administration and testing are included in the course and the Student must complete all phases of training to be eligible for graduation. In most cases, each class day is 8 hours but may run longer as determined by the progress for the applicable section of the course resulting in 264 contact hours for the course.

Course Dates

The Heights of Inspection course is offered every eight weeks dependent upon the number of students enrolled.

Refer to the current ND³ course calendar published at *www.nd3llc.com* for dates for each course.

Course Cost

The cost for the Heights of Inspection Course is $8,730.00 per student.

Getting your NDE or Rope Access training through ND^3, LLC gives you the skills to always approach your work with both confidence and competence.

Rope Access Training

Level 1, 2, or 3 classes available to teach you the theory and skills necessary to become certified and to advance your career to new heights.

Radiography Training

Using ionizing radiation is dangerous. ND^3's Industrial Radiation Safety Course is designed to protect you and others from this damaging energy. After RAS, pursue Industrial Radiography and make beautiful pictures.

Liquid Penetrant & Magnetic Particle Testing Courses

Using techniques taught in these courses, finding cracks and other surface-breaking defects in magnetic and nonmagnetic materials will be reliable every time.

Ultrasonic and Eddy Current Inspection Courses

Bridging the gap between the surface and internal flaws, UT and ET provide reliable inspection data obtained by highly trained and proficient technical staff.

Visual and Optical Testing

Your eye is the best inspection tool available. Learn how to use it correctly by providing the best contrast discrimination tools and techniques available.

Building Confidence Through Competence

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