

ATLB-1070: GRADE LASER

Cuyahoga Community College

Viewing: ATLB-1070 : Grade Laser

Board of Trustees:

2017-06-29

Academic Term:

Spring 2019

Subject Code

ATLB - AIT-Construct/Hazard Material

Course Number:

1070

Title:

Grade Laser

Catalog Description:

Advanced course covering the construction grade laser, its components and application. Also included are the safety requirements as prescribed by the Occupational Safety and Health Administration (OSHA), interpretation of engineering drawings and applied math.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Laborer's apprenticeship program.

Outcomes

Course Outcome(s):

Discuss the safety standards that apply to laser operation and are prescribed by OSHA in Subpart D.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Identify the qualifications required by OSHA for laser operation.
2. Discuss the OSHA standard for unattended equipment.
3. Discuss the requirement for worker safety and required signage while operating lasers on a jobsite.
4. Discuss the hazards of the laser beam and explain how they can be affected by changing weather conditions.

Course Outcome(s):

Discuss the operation of the laser, its components and applications with respect to construction.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Differentiate between diffused light and a concentrated laser beam.
2. List the different types of lasers and discuss the respective applications.
3. List the various applications of laser equipment used for construction.
4. Differentiate between flat grade and single slope site conditions.

Course Outcome(s):

Discuss the use of engineering drawings, explain the related scales and apply respective math concepts used for slope and percent grading.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Differentiate between the various scales found on engineering drawings and discuss relative applications for site work.
2. Identify invert elevations and discuss how they are used to establish respective grades.
3. Apply math concepts to establish and verify slopes and grades.
4. Compute required percent of grade for surface drainage between different spot elevations.
5. Interpret engineer site drawings to determine elevations for various site considerations.

Methods of Evaluation:

1. Tests
2. Quizzes
3. Classroom participation

Course Content Outline:

1. Laser safety
 - a. Laser operator qualifications
 - i. Training
 - ii. Proof of training
 - iii. Qualified person
 1. Manufacturer representative
 2. Extensive training in laser operation
 3. Laser equipment experience
 4. Recognized degree
 - b. Unattended equipment
 - i. Beam shutters
 - ii. Time duration
 - iii. Safety concerns
 - c. Worker safety
 - i. Signage
 - ii. Sign location
 - iii. Worker languages
 - iv. Beam rotation height
 - v. Reflective materials
 - d. Laser hazards
 - i. Eye
 - ii. Light refraction
 - iii. Light intensity
2. Laser: operation, components applications
 - a. Operation
 - i. Power source
 1. Line voltage
 2. D-cell battery
 3. 12 volt battery
 - ii. Revolutions per minute (RPM)
 1. Speed
 2. Stationary
 - iii. Infrared
 - iv. Visible light
 - b. Diffused light versus concentrated beam

- i. Diffused light
 - 1. Sunlight
 - 2. Incandescent
 - 3. Flashlight
- ii. Concentrated beam
 - 1. Directed beam
 - 2. Non-diffusing
 - 3. Band width
 - 4. Accuracy
 - 5. Light color
 - 6. Intensity
- c. Laser types
 - i. Solid crystal
 - ii. Gas
 - 1. Helium
 - 2. Neon
 - iii. Rotating grade
 - iv. Dual slope
 - v. Fixed beam
 - vi. Dual beam
- d. Flat
 - i. Slabs
 - 1. Floors
 - 2. Ceilings
 - 3. Parking lots
 - ii. Single slope
 - 1. Drain ditches
 - 2. Swales
 - 3. Trenches
 - 4. Lots
- 3. Lasers and engineer drawings
 - a. Drawing applications
 - i. Highway construction
 - ii. Building construction
 - iii. Storm water drainage
 - b. Scales
 - i. Engineer
 - 1. Range
 - 2. Feet, tenths hundredths
 - ii. Architectural
 - iii. Metric
 - c. Engineer applications
 - i. Site work
 - ii. Highway
 - iii. Underground utilities
 - d. Invert elevations
 - i. Identification
 - 1. Inlet
 - 2. Outlet
 - ii. Grades
 - 1. Invert depth
 - 2. Distance between inverts
 - e. Math concepts
 - i. Decimal applications
 - ii. Basic triangulation
 - iii. Slope
 - 1. Elevation differences
 - 2. Distances
 - iv. Grade

1. Pipe
 2. Subgrade
 3. Storm water drainage
 4. Floors and ramps
 5. Drawing verification
- f. Percentages
- i. Grade
 - ii. Spot elevations
 - iii. Flow line of pipe
 - iv. Drainage considerations

Resources

Drexel J. Thrash Training Center. *Rotating Grade Laser*. current. Drexel J. Thrash Training Center; Howard, Ohio 43028, 2001.

Wesley G. Crawford. *"Lasers on the Jobsite"*. current. Purdue University; West Lafayette, Indiana 47906, 1998.

Wesley G. Crawford. *"Construction Surveying and Layout"*. second Edition. Creative Construction Publishing Co.; West Lafayette, In. 47906, 1995.

Resources Other

Construction Laser Levels Explained"

<http://www.engineersupply.com>

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