Heavy Equipment Operation II
Course Design
2008-2009

Course Information
Organization东方亚利桑那学院
Division工业技术教育
Course NumberTEC 151
Title重型设备操作II
Credits6
Developed byB. Stephen Cullen, Ph.D.
Lecture/Lab Ratio3 Lecture/6 Lab
Transfer StatusNon-transferable
Activity CourseNo
CIP Code49.0202
Assessment ModePre/Post Test (100 Questions/100 Points)
Semester TaughtUpon Request
GE CategoryNone
Separate LabNo
Awareness CourseNo
Intensive Writing CourseNo

Prerequisites
Must be at least 18 years of age at the start of the class; Present proof of valid motor vehicle operator's license; Present proof of complete drug screen indicating negative results for drugs; Must have successfully completed OSHA 10 or MSHA Training. Submit documentation of the prerequisites with the completed Proof of Prerequisites Form to the Records and Registration Office.

Educational Value
This course is designed for those wishing to develop basic skills related to heavy equipment to perform earthwork.

Description
This course is designed to introduce the trainee to the basic concepts and procedures related to using heavy equipment to perform earthwork. The course identifies the most appropriate types of equipment for specific jobs and describes the basic operations of the equipment.
**Supplies**

Hard hat  
Steel toe boots  
Safety glasses  
Notebook  
Access to computer and internet

**Competencies and Performance Standards**

1. **Summarize the earthmoving process including the heavy equipment operator's role in ensuring an efficient and profitable operation.**

   **Performance Standards**

   *Student will demonstrate competence by:*
   - outlining the preliminary activities required before any excavation and embankment work.
   - understanding what is included in the typical project plan and identifying specifications and how that information is transformed into directions for doing the project.
   - understanding the layout process and various techniques for layout.
   - outlining the process for setting up and coordinating operations of a project.
   - identifying the elements of production management.
   - outlining the different types of site excavation.
   - outlining the different methods of loading, hauling, and dumping.
   - defining soil stabilization.

   *Student performance will be successful when he/she:*
   - lists variables including projects to public highways, traffic and types of soils.
   - lists the basic types of soil including gravel, sand, inorganic silt, clay, and organic matter and colloids.
   - lists components of the typical project plan including drawings, dimensions, materials, and construction sequence.
   - lists components of specifications including laying out slopes and grades, quality and quantity of materials, test procedures, safety regulations, and traffic control devices.
   - in writing defines and lists main topics including structures designated for removal, traffic control, utility locations, debris location, signs requirements, EEOC regulations, OSHA/MSHA regulations, and any additional state or federal regulations.
   - draws a haul diagram and in writing defines cycle time.
   - identifies the following types of equipment: scrapers, excavator, motor graders, bulldozers, wheeled and tracked loaders, and backhoe loaders.
   - in writing compares and contrasts the following types of excavations including roadway, bulk-pit, bulk wid-area, channel, limited-area vertical, and trench.
   - defines all American Public Works Association underground color codes.
   - defines the types of equipment and proper equipment for specific operation for loading.
2. **Explain the safe use of dozers, scrapers, loaders, excavators, and trucks in the earthmoving process.**

   **Performance Standards**
   
   *Student will demonstrate competence by:*
   
   o identifying different types of dump trucks and their uses.
   o describing the uses of a roller.
   o identifying the components and controls on a typical roller.
   o describing the uses of a scraper.
   o identifying the components and controls on a typical scraper.
   o describing the uses of a loader.
   o identifying the components and controls on a typical loader.
   o describing the uses of a forklift.
   o identifying the components and controls on a typical forklift.

   *Student performance will be successful when he/she:*
   
   o in writing lists different types of dump trucks and their uses.
   o in writing describes when and why rollers are used.
   o while seated on a roller demonstrates knowledge of the various components and controls of a typical roller.
   o in writing identifies when and why a scraper is used.
   o while seated in a scraper, demonstrates knowledge of the various components and controls on a typical scraper.
   o in writing describes when and why loaders are used.
   o while seated on a loader demonstrates knowledge of the various components and controls on a typical loader.
   o in writing describes when and why forklifts are used.
   o while seated on a forklift, demonstrates knowledge of the various components and controls of a typical forklift.

3. **Demonstrate the efficient use of dump trucks, rollers, scrapers, loaders, and forklifts.**

   **Performance Standards**
   
   *Student will demonstrate competence by:*
   
   o completing daily inspection checklist and performing prestart inspection and maintenance procedures on dump trucks.
   o starting, warming up and shutting down a dump truck.
o efficiently operating and driving a dump truck.
o completing the daily inspection reports and performing prestart inspection and maintenance procedures on roller, scraper, loader, and forklift.
o starting, warming up and shutting down roller, scraper, loader, and forklift.

Student performance will be successful when he/she:
o accurately completes the daily inspection checklist and successfully demonstrates prestart inspection and maintenance procedures on a dump truck.
o successfully demonstrates proper procedures for starting, warming up and shutting down a dump truck.
o successfully demonstrates efficiency in operating and driving a dump truck.
o completes the daily inspection reports and performing prestart inspection and maintenance procedures on roller, scraper, loader, and forklift.
o performs basic maneuvers with roller, scraper, loader, and forklift.
o performs the proper procedure for shutting down roller, scraper, loader, and forklift.

4. Correctly use formulas and methods used to compute the cut and fill requirements and estimate a project.

Performance Standards
Student will demonstrate competence by:
o identifying basic geometric shapes.
o calculating the surface area of squares, rectangles, triangles, trapezoids, and circles using formulas.
o calculating the volume of cubes, rectangular objects, prisms, and cylinders.
o calculating the excavation volume of a project using information outlined in building plans.
o calculating the weight of an excavation from its volume.

Student performance will be successful when he/she:
o with 100% accuracy identifies basic geometric shapes.
o without the use of a calculator and with 100% accuracy calculates the surface area of squares, rectangles, triangles, trapezoids, and circles using formulas.
o without the use of a calculator and with 100% accuracy calculates the volume of cubes, rectangular objects, prisms, and cylinders.
o without the use of a calculator and 100% accuracy calculates the excavation volume of a project using information outlined in a building plan.
o without the use of a calculator and 100% accuracy calculates the weight of an excavation from its volume.

5. Demonstrate how to properly set grades.

Performance Standards
Student will demonstrate competence by:
o understanding how cycle time affects scheduling of earthwork.
o describing the proper practices for setting grades from bench mark.
o describing proper practices for setting grades using a laser level or string.
o describing the proper practices for setting the grade of a trench and drain pipe.
o interpreting construction plans to determine grading requirements.

*Student performance will be successful when he/she:*
o in writing states how each piece of heavy equipment has its own duty cycle, which is the time it takes the equipment to complete one cycle of work and be ready to begin another cycle.
o by using a plan, installs a bench mark at the exact location and precise elevation in relation to sea level.
o demonstrates the proper practices for setting grades using a laser level or string.
o demonstrates the proper practices for setting a grade of a trench and drain pipe when using a laser level or string.
o with 100% accuracy outlines in writing the grading requirement of a specific project.

6. **Explain process for reading site plans to obtain cut and fill information.**

**Performance Standards**

*Student will demonstrate competence by:*
o describing the types drawings usually included in a set of plans.
o identifying the different types of lines used on drawings.
o identifying the common abbreviations and symbols used on plans.
o reading and interpreting drawings to determine the type of excavations needed to prepare the site for a project.

*Student performance will be successful when he/she:*
o with 100% accuracy lists the types of drawings typically included in a set of plans.
o explains to instructor the different types of lines and their function.
o with 100% accuracy completes written exam addressing common abbreviations and symbols used on plans.
o with 100% accuracy in writing interprets a set of plans and determines the type of excavations needed to prepare the site for a project.

**Types of Instruction**

Lecture and Field Training

**Grading Information**

**Grading Scale**

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
</tr>
<tr>
<td>B</td>
<td>80-89%</td>
</tr>
<tr>
<td>C</td>
<td>70-79%</td>
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<tr>
<td>D</td>
<td>60-69%</td>
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<tr>
<td>F</td>
<td>Below 60%</td>
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