Fall 2020

CE 485-001: Special Topic: OSHA in Civil Engineering

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CE 485-001: OSHA in Construction Industry and CE

Class Hours & partially synchronous online

Thursday 11:00 am - 1:50 pm Colton Hall 416 (First Day of Classes Tuesday, September 01, 2020)

Office (300 Wilson Ave Newark) at (973) 817-9090 or fg4@njit.edu

REQUIRED TEXT

OTHER REFERENCE
International Building Code (IBC 2018) and International Residential Code (IRC 2018) NJ & NY sections on Safety and some of it supplements
Other files are assigned electronically as supplemental readings and will be e-mailed or place on Canvas to class participants. These are denoted in course outline as Efiles.

Prerequisites: CE-FED 101, CE-2101

COURSE DESCRIPTION AND OBJECTIVES:

This course is a general comprehensive course on Occupational Safety and Health Act offered by the Civil and Environmental Engineering Department at NJIT. It provides a broad understanding of the construction safety requirements that are used in the overall construction industry. The course will follow many of the guide line requirements for conducting construction outreach training classes 10-Hour & 30-Hour Construction Industry – designated training topics. Also, the various PPE, safety equipment, tools and techniques and their interactions in the construction industry, will be covered with practical illustrations and complemented by hands-on exercises and case studies, and field visits.

LEARNING OUTCOMES

This course covers the environment, planning and management issues related to the modern approach of construction management. Using the cases and background materials, and methodologies covered, you should be able to:

- Analyze the feasibility of a construction project within resource constraints.
- Understand the basic structure of the construction industry, its environment, its various sectors and its overall relationship to the US and global economy.
- Devise the best organizational structure capable of carrying out the project.
- Understand engineering economic principles and apply the concepts of life-cycle management of a constructed project from the owner’s perspective (feasibility, financing, rate of return, contract management, quality control).
- Define the role of the general contractor, and understand the perspective of the GC as a business (estimating, bidding, project financing, cash flow management, materials and operations management).
- Understand the components of modern Professional Construction Management, and its relationships to other project participants as a form of project delivery.
### COURSE OUTLINE* (Subject to updating throughout semester)

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Textbook/Reading</th>
<th>Assignment (*)</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>03 Sept</td>
<td>Intro to OSHA 29CFR 1926 OSHA Construction Industry</td>
<td>Reading #1 1903 &amp; 1904 Subparts A - G</td>
<td>Workers’ rights, employers responsibility OSHA Log – Form 300</td>
</tr>
<tr>
<td>2</td>
<td>10 Sept</td>
<td>PPE 1926 Subpart E pg265-269</td>
<td>Assignment #1 Fall protection calculations hand out - Canvas</td>
<td>Head, hearing, eye-face respiratory, body harness, etc.</td>
</tr>
<tr>
<td>3</td>
<td>17 Sept</td>
<td>Fall Protection 1926 Subpart M</td>
<td>Reading #2 337-349 Pg. and handout</td>
<td>Legal Aspects of Organizations; Impact of Taxes-Field Trip (1)</td>
</tr>
<tr>
<td>4</td>
<td>24 Sept</td>
<td>Case studies</td>
<td>Case: Main Street, PennAve, South street</td>
<td>South Street injury case</td>
</tr>
<tr>
<td>5</td>
<td>1 Oct</td>
<td>PPE Commercial diving</td>
<td>Subpart Y-Diving &amp; 1910</td>
<td>Saturday site demonstration pg 51-56</td>
</tr>
<tr>
<td>6</td>
<td>8 Oct</td>
<td>Commercial diving surface supply</td>
<td>Subpart Y-Diving &amp; 1910 Assignment #2</td>
<td>Equipment pg 55 Quiz 1</td>
</tr>
<tr>
<td>7</td>
<td>15 Oct</td>
<td>Cranes, Derricks, hoists</td>
<td>Subpart CC-Cranes &amp; derricks</td>
<td>Reading pg 545 - 563</td>
</tr>
<tr>
<td>8</td>
<td>22 Oct</td>
<td>Rigging for lifts, hand signals</td>
<td>Subpart CC-Cranes &amp; derricks Handouts</td>
<td>Hand on checking equipment</td>
</tr>
<tr>
<td>9</td>
<td>29 Oct</td>
<td>Concrete &amp; Masonry Construction</td>
<td>Subpart Q Pgs 381-384</td>
<td>Mid-Term through first 8 weeks</td>
</tr>
<tr>
<td>10</td>
<td>5 Nov</td>
<td>Excavations</td>
<td>Subpart P-Pipe installation, Building excavation</td>
<td>Underpinning problem Pg 365-378</td>
</tr>
<tr>
<td>11</td>
<td>12 Nov</td>
<td>Scaffolds</td>
<td>Subpart L</td>
<td>Design problem &amp; Pgs 319-335</td>
</tr>
<tr>
<td>12</td>
<td>19 Nov</td>
<td>Steel Erection &amp; Welding - Cutting</td>
<td>Subparts R &amp; J</td>
<td>Read Pgs 299-302 &amp; pgs 385-391</td>
</tr>
<tr>
<td>13</td>
<td>26 Nov</td>
<td>Thanksgiving Break</td>
<td>No class</td>
<td>No class</td>
</tr>
<tr>
<td>14</td>
<td>3 Dec</td>
<td>Welding &amp; Hand tools</td>
<td>Structural building materials</td>
<td>Construction Materials</td>
</tr>
<tr>
<td>15</td>
<td>10 Dec</td>
<td>Electrical</td>
<td>Subpart K</td>
<td>Pgs 303 -314</td>
</tr>
<tr>
<td>16</td>
<td>11 &amp; 12 Dec</td>
<td>Reading day review for final</td>
<td>Reading day review for final</td>
<td>Final cover entire semester</td>
</tr>
</tbody>
</table>

**Reading day 1 & 2 Dec 11 & 14 - Final Exam Period begins: Dec 15. Ends Dec 21**

Assignment sheet will be handed out in class and/or found in Canvas with due dates

*Actual Assignments may differ from list and can be changed by Instructor during Semester.*
GRADING:

The overall term grade will be based on the following elements:

Paper & Presentation: 17.5%
Quiz 1: 10%
Homework: 20%
Class Participation/attendance: 10%
Mid-Term: 17.5%
Final: 25%

Field Trip Reports

Each student will submit one (1) report and will present a group presentation, which will be a self-conducted field trip according to the following schedule:

1. Project Administration: You will establish a construction project of your choice, or a section of the class field trip project:
   a- The construction project background, key OSHA section applicable to your specific project.
   b- Understanding the Owner, GC/CM, and subcontractor responsibilities regarding site safety, responsible person in charge vs. qualified person.
   c- Description of the Construction site signage and overall site safety compliance
   d- Include a one page inspection report of site conformity to OSHA standards.

   Report is due November 5 hand in at the beginning of class.

2. Group presentation:
   a- A detailed PowerPoint Presentation of you Construction site Safety
   b- Three (3) or Four (4) person groups each are presenting their 3-5 minute portion

   Presentation will be conducted last few classes

Outline and Content Elements for Each (Part of) the Field Trip Reports:

1. Introduction: Identify the project, its location and the type of construction. Give the dates of your visitation. Identify the Owner, Contractor, and sub-contractors and all the responsible people for each.


3. Engineering Evaluation: Present your own evaluation of the equipment, materials, and procedures being used on the project based on your knowledge from OSHA CE 485. Suggest alternatives that might improve job progress and efficiency. Discuss any environmental and safety aspects of the project.
4. **Appendix**: (If any) Present applicable OSHA sections, manufacturer’s literature MSDS sheets, news articles, web links, etc.

5. **Figures and Photographs**: These or sketches are strongly recommended. Refer to all figures and photos in the body of the report.

Note: Make certain that you do not disrupt the ongoing construction activities during your visit. Always check first with the person-in-charge, usually the project superintendent, upon your arrival. Be courteous and remember, construction managers are busy people.

**Report Format and Grading**: The report should be word processed on 8.5 x 11 in. bond paper and handed in on dates specified. Correct grammar and spelling are required. Grading will be based on (1) Technical content, (2) Communication effectiveness including organization, grammar, spelling, clarity, and neatness. Suggested length of the text portion of the report is at least 3 pages inspection sheet bullet point and quote OSHA sections.

NJIT Honor Code: the NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students.

- "**Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university.** Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: [http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf](http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf). Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu”
### Outcomes Course Matrix

**CE-485-001 – OSHA in Construction Industry and CE**

<table>
<thead>
<tr>
<th>Strategies and Actions</th>
<th>Student Learning Outcomes</th>
<th>Outcomes (a-k)</th>
<th>Prog. Object.</th>
<th>Assessment Methods/Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Objective 1:</strong> Enable students to understand and interpret OSHA guidelines site problems stimulate their interest in safety engineering.</td>
<td>Students will learn CEE design practices in Safety engineering and construction site standards</td>
<td>Students will be able to perform safety engineering design problems.</td>
<td>a, b, c, e, f,</td>
<td>1</td>
</tr>
</tbody>
</table>

**Course Objective 2:** Enable students to learn the team approach to safety problem solving.

<table>
<thead>
<tr>
<th>Strategies and Actions</th>
<th>Student Learning Outcomes</th>
<th>Outcomes (a-k)</th>
<th>Prog. Object.</th>
<th>Assessment Methods/Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will work in teams on the assigned design problems.</td>
<td>Students will learn about team dynamics, leadership, responsible &amp; qualified person in charge</td>
<td>c, d, f, g, j,</td>
<td>1, 2</td>
<td>Meetings with instructor. Class assignments.</td>
</tr>
</tbody>
</table>

**Course Objective 3:** Develop oral and written communication skills.

<table>
<thead>
<tr>
<th>Strategies and Actions</th>
<th>Student Learning Outcomes</th>
<th>Outcomes (a-k)</th>
<th>Prog. Object.</th>
<th>Assessment Methods/Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student will be required to make written inspection oral reports on their class projects.</td>
<td>Students will develop their written and oral presentation skills.</td>
<td>d, g,</td>
<td>1, 2</td>
<td>Class project.</td>
</tr>
</tbody>
</table>

### CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our Program Educational Objectives are reflected in the achievements of our recent alumni:

1. Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward safe, practical, sustainable solutions in a
wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2. Professional Growth: Alumni will advance their technical and interpersonal skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3. Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

a. OSHA’s Mission
b. OSHA Standards
c. Employer Responsibilities
d. Workers’ Rights/Responsibilities
e. Enforcing Standards
f. Reporting Safety Hazards
g. Whistleblower Protections
h. Worker Resources
i. Advanced OSHA engineering examples and problems