

Spring 2024

## **CE 485 - 002: ST: OSHA IN CIVIL ENGRINERING**

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Professor Frank L. Golon Ph.D., P.E., OSHA Authorized Construction Trainer  
Spring 2024

## **CE 485-002: OSHA in Construction Industry and CE**

Class Hours

**Tues & Thurs 10:00 am - 11:20 am** Colton Hall 416 (First Day of Classes Tuesday, January 16, 2024)

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

### **REQUIRED TEXT**

29 CFR 1926 OSHA Construction Industry Regulations & Standards Millennium d2 July 2023 update ISBN-10: 1663801967 or SKU: 33B-001-46 ISBN-13: 9781663801968. This textbook is referred to as 1926 in the lecture readings and other references below.

### **OTHER REFERENCE**

International Building Code (IBC 2021) and International Residential Code (IRC 2021) NJ & NY sections on Safety and some of its supplements

Other files are assigned electronically as supplemental readings and will be e-mailed or placed 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)

Week	Dates	Textbook/Reading	Assignment (*)	Topics
1	16 & 18 Jan	Intro to OSHA 29CFR 1926 OSHA Construction Industry	Reading #1 1903 & 1904 Subparts A - G	Workers' rights, employers responsibility OSHA Log - Form 300
2	23 & 25 Jan	PPE 1926 Subpart E pg265-269	Assignment #1 Fall protection calculations hand out - Canvas	Head, hearing, eye-face respiratory, body harness, etc.
3	30 Jan & 1 Feb	Fall Protection 1926 Subpart M	Reading #2 337-349 Pg. and handout	Stair Engineering and OSHA
4	6 & 8 Feb	Case studies	Case: Main & Market Streets, PennAve, South street	South Street injury case
5	13 & 15 Feb	Cranes, Derricks, hoists	Subpart CC-Cranes & derricks	Reading pg 545 - 563
6	20 & 22 Feb	Rigging for lifts, hand signals	Subpart CC-Cranes & derricks Handouts	Hands on checking equipment
7	27 & 29 Feb	Concrete & Masonry Construction	Subpart Q Pgs 381-384	Through 3-9 & Report Due
8	5 & 7 Mar	Excavations	Subpart P-Pipe installation, Building excavation	Underpinning problem Pg 365-378
9	12 & 14 Mar	No Class Spring Break	No Class Spring Break	No Class Spring Break
10	19 & 21 Mar	Scaffolds	Subpart L	Design problem & Pgs 319-335
11	26 & 28 Mar	Welding & Hand tools - Presentations	Structural building materials - Presentations	Construction Materials Reports Due
12	2 & 4 April	PPE Commercial diving	Subpart Y-Diving & 1910	Saturday site (Weather) demonstration pg 51-56
13	9 & 11 April	Commercial diving surface supply	Subpart Y-Diving & 1910 Assignment #2	Equipment pg 55 Presentations
14	16 & 18 April	Welding & Hand tools - Presentations	Structural building materials - Presentations	Construction Materials Presentations
15	23 & 25 April	Electrical	Subpart K-Presentation	Pgs 303-314-Presentatio
16	30 April- May 2	Final Class Reading day review for final	Final Class Reading day review for final	Final Class Final cover entire semester

**Reading day 1 & 2 May 1 & 2 - Final Exam: May 3 - 9 - TBD**

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: 20%

Quiz 1: 10%

Homework: 20%

Class Participation/attendance: 10%

Quiz 2: 15%

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 **March 26** 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 5-7 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.
2. *Field Investigation:* Describe the project in detail based on your field visitation. Report on the present stage of construction. Report on the labor, equipment, and materials on the job. Report on safety compliances. Report any discussions with personnel (see note below).
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>.*

*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](mailto:dos@njit.edu)”*

## 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, resilient, 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 a 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.

### Student Outcomes

Our BSCE student outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Region Two (2) Federal Outcomes are what students are expected to know and be able to pass a final exam with a 70% grade and attend all classes to receive your 30-hour Construction Safety and health:

- 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