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Fall 2020

FED 101-001: Civil Engineering Fundamentals of Engineering

Frank Golon

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Golon, Frank, "FED 101-001: Civil Engineering Fundamentals of Engineering" (2020). *Civil and Environmental Engineering Syllabi*. 466.
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JOHN A. REIF, JR. DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING

NJIT New Jersey Institute of Technology

FED 101 – Fundamentals of Engineering Design (CE), Section 001

Fall 2020

Corequisite: HUM 101 and ENGR 101 and MATH 110 or MATH 131 or MATH 111

OUTLINE OF COURSE

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1. COURSE DESCRIPTON

Main Topics: ***"Civil infrastructure – bridges, dams, roads & highways, tunnels, canals, sewer & water systems, and buildings of all types, along with engineering economics***

Fundamentals of Engineering Design (FED) is a two-credit course that will introduce students to the basics of Civil Engineering construction, design, and inspection. This course will provide an overview of the different disciplines within Civil Engineering, including structures, geotechnical, infrastructure, water resources, engineer economics environmental, transportation, construction engineering and construction management. FED will facilitate, through class lecture, demonstrations and student participation, a blending of engineering science and technology.

- Guest lecturers may come to class and share their experience working in the field.
- Student organizations and department personnel will be introduced.
- Students will be required to complete a team technical project and make an oral presentation on their project to the class.
- All homework assignments will be due the following week unless otherwise specified by the instructor.

Canvas
Assignments and materials for this course will be posted on Moodle. Students must use their UCID to sign in at **http://www.canvas.njit.edu**

Course Instructors: **Frank L. Golon, Ph.D., P.E.**
Professor

***Office**:* 300 Wilson Avenue
Office Hours: By appointment

E-mail: **Frank.L.Golon@njit.edu**

2. REQUIRED TEXTS: NONE REQUIRED
One Architectural Scale & One Engineering Scale (book store carries)

3. LECTURE CLASSROOM

Kupfrian Hall 211
Monday and Wednesday: 9am – 10:20am

4. ATTENDANCE POLICY
Students must sign in for every class. You are required to attend every lecture class. If a class is missed, it is the student's responsibility to submit the homework on the assigned submission date. If you miss more than one (1) class lecture without excuse/prior permission, each subsequent class missed will result in loss of up to 5% of the overall grade. Five (5) or more total missed classes will result in an F grade.

NJIT FRESHMAN ATTENDANCE POLICY
All freshmen are required to attend every class.

Late arrival to class is not permitted. It is the decision of the instructor to admit you to the class late. Approval for late arrival will be considered by the instructor prior to the class. Request for late arrival must be sent via e-mail to the instructor. Students will not be admitted to class if they overslept or forgot they had a class or if they provide some other similar explanation.

5. GRADING POLICY

Homework Assignments (5)	**25%**
Technology Special Topic Possible site visit Lake Cushetunk Dam Readington Twp. And/or Newark Construction Site	**10%**
Quizzes and/or Special Project Assignments 1. Site Civil/Transit 10% 2. Critical Infrastructure 10% 3. Building Inspection & Design 10%	**30%**
Project Report – Oral Presentation Topic: Civil Engineering *(presentation will be evaluated based on the following traits):* Nonverbal Skills, Verbal Skills and Content	**15%**
Class attendance & Participation Plan reading, scales, code evaluation, Etc.	**20%**
Total	**100%**
EXTRA CREDIT: problems to be assigned 10 points **Structural, Engg Eco, geotechnical, site civil,**	

Grading Scale

A	**100-90**
B+	**89-85**
B	**84-80**
C+	**79-75**
C	**74-70**
D	**69-60**
F	**Below 60**

6. WITHDRAWALS AND NJIT HONOR CODE

In order to insure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline will not be permitted unless extenuating circumstances (e.g., major family emergency or substantial medical difficulty) are documented. The course Professors and the Dean of Students are the principal points of contact for students considering withdrawals.

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*

7. CLASS REQUIREMENTS

- Homework must be handed to the instructor in the class. Homework will not be accepted thru e-mail or Canvas posting. Homework will not be accepted after the due date. Hand written assignments will not be accepted.

- Each assignment must include the following information on the upper right corner of each page.
    - Your name
    - Date
    - Learning Communities ID (if applicable)
    - Number of pages
    - Assignment Number and/or Assignment Name

- Homework must be stapled if more than two (2) pages. Loose page assignments will not be accepted.

- Cite your references when writing your individual and group reports. Use the format identified in your HUM 101 course.

- Each person will contribute to and be responsible for the team technical report, the presentation slides, and participation in making the presentation.

- At the end of the course, each student will be required to submit an evaluation of the performance of their project team members.

- The schedule is not absolutely fixed. It is prepared only to give students the topics to be covered in the course. Schedule is subject to change as per the availability and convenience of guest lecturers and that of the field visit site personnel.

- Students will be informed of all changes in advance and any changes to the syllabus will be discussed in class.

- Students are encouraged to back up their work on a personal flash drive or compatible media. You are required to save your homework assignments.

- Cell phones/tablets/laptops, etc. must be turned off in class. Electronic devices can be used when it is necessary for the class when directed by the instructor.

- Remove hats, sunglasses, ear buds, but keep on masks.

- Leaving the room for any reason is permissible at any time. Please do so quietly.

8. CEE MISSION, PROGRAM 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 objectives are reflected in the achievements of our recent alumni.

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

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

3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, and humanitarian endeavors.

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

(a) an ability to apply knowledge of math, science, and engineering

(b) an ability to design and conduct experiments, as well as interpret data

(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and

safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use techniques, skills and modern engineering tools necessary for engineering practice

University Catalog 2019 - 2020

FED 101. Fundamentals of Engineering Design. 2 credits, 3 contact hours (2;1;0).

Corequisite: HUM 101 and ENGR 101 and MATH 110 or MATH 131 or MATH 111. Teams of students work on open-ended engineering projects. Sections are offered to represent an introduction to real-world engineering design problems in a specific engineering discipline. Topics covered include introduction to basic engineering design elements, processes, measurements, product and project design and development, with hands-on experiments in a specific major area. Students also learn to use engineering tools for computer-aided design and simulation. Technical writing and oral presentation along with project management skills are emphasized. Students are required to take an FED section corresponding to their declared major. Undecided students will be placed in FED sections which best correspond to their interests according to space availability.

Course Objectives

FED 101 – Fundamentals of Engineering Design

Strategies and Actions	Student Learning Outcomes	Outcomes (a-k)	Prog. Object.	Assessment Methods/Metrics
Course Objective 1: Enable freshman to work on engineering design problems at the start of their education to stimulate their interest in engineering.				
Students will learn CEE design practices in bridge engineering and construction cost estimating.	Students will be able to perform simple engineering design.	a, b, c, e, f, k	1	Class assignments.
Course Objective 2: Enable students to learn the team approach to problem solving.				
Students will work in teams on the assigned design problems.	Students will learn about team dynamics, leadership, scheduling, and cooperation.	c, d, f, g, j, k	1, 2	Meetings with instructor. Class assignments.
Course Objective 3: Develop oral and written communication skills.				
Student will be required to make written and oral reports on their class projects.	Students will develop their written and oral presentation skills.	d, g, k	1, 2	Class project.

9. LECTURE TOPICS – ENGINEERING AND TECHNOLOGY

Lectures may include, but not limited, to the following topics.

Introduction to Technology

a. Design/Build/Inspections/Budget/Analyze
b. Drone/Bluetooth Technology
c. Materials Science/Protective Technologies

Civil Engineering – Discipline Specific

a. Structural Engineering
b. Geotechnical Engineering
c. Construction Engineering/Management
d. Engineering Economics
e. Environmental Engineering
f. Contract Law
g. Site Engineering

Engineering Topics

a. "The Soft Skills" – Engineers and Writing
b. Engineering cost estimating & scheduling
c. Spreadsheets (EXCEL)
d. PennAve vs. Newark Water Authority–Contract Case Study
e. Basics of Engineering Mechanics
f. Data Presentation-Dr. Hsu testing
g. OSHA & Safety Engineering
h. Life Cycle Assessment

Video Discussion Topics

a. Construction & Inspection Engineering

Project Report (topics suggested by the Professor or other topics as approved by the Professor)

10. COURSE OUTLINE (Subject to updating throughout semester)

Week	Dates	Textbook/Reading	Assignment (*)	Topics
1	02 Sept	To be assigned or hand-outs	Syllabus Review & Intro	Overview of Civil Engg Industry;
2	8 & 9 Sept	Financial Analysis & Money Mgmt	Engg Economics Assignment #1 Student presentation for ASCE & AWWA	Loans & time value of money ASCE & AWWA presentation
3	14 & 16 Sept	Plan reading & scales Buildings-Arch & Engg	Assignment #2	Arch & Engg Plans
4	21 & 23 Sept	Plan reading & scales Site/Infrastructure	Handouts	Dams & Bridges
4a	26 Sept	Possible Cushetunk Lake Dam Field Trip	Inspection report	Dam Inspection
5	28 & 30 Sept	Lake Cushetunk Dam Restoration	Original repairs 1994 Inspections Present Assignment #3	Gunite Repairs 2008
5a	3 Oct	Possible Cushetunk Lake Dam Field Trip	Inspection report	Dam Inspection
6	5 & 7 Oct	Wreak Lead bridge MTA Al Mellini?	Bascule bridge Cable Presentation	Repairs after hurricane Bus Communication
7	12 & 14 Oct	Transit Bridge & Geotechnical Engg & site evaluation	Borings and test pits Assignment #4	PennAve Quiz/Project
8	19 & 21 Oct	IAB? -Building design & constr. foundations	IAB? - Codes deep foundations & bldg. foundation	IAB Presentation? Local sites
9	26 & 28 Oct	Building design superstructure	Handout class projects	Quiz/Project
10	2 & 4 Nov	Building design Materials	Assignment #5 handout,	Testing materials
11	9 & 11 Nov	Fast track case study South Street Urban Renewal	MS schedule & presentation with problems	Practical Case Studies-Newark & Elizabeth Projects
12	16 & 18 Nov	Design requirements Possible Presentations	Wind & Earthquakes	Building and structures
13	23 Nov	Class presentations	Student Presentations	Student Presentations
14	30 Nov & 2 Dec	Class presentations	Student Presentations	Student Presentations
15	7 & 9 Dec	Class presentations	Student Presentations	Student Presentations
16	15 Dec	Finals week	TBD	Final Presentation

Reading day 1 & 2 Dec 11 & 14 - Final Exam Period begins: Dec 14. Ends Dec 20

OSHA & Ethics will be covered each week specific to the topics
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.

<u>Fall 2020 Academic Calendar</u> (refer to NJIT Registrar for specific details)

September 1, 2020:	First Day of Classes
September 8, 2020:	Last Day to Add/Drop Classes
November 9, 2020:	Last Day to Withdraw
November 26–29, 2020:	Thanksgiving
December 10, 2020:	Last Day of Classes
December 15, 2020:	Final Exam Begin
December 21, 2020:	Final Exams End