DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

FED 101 – Fundamentals of Engineering Design (CE)

Spring 2017

Corequisite: HUM 101 and MATH 108 or MATH 110 or MATH 111

OUTLINE OF COURSE

1. COURSE DESCRIPTON

Main Topic: *"Innovation in the Built Environment"*

Fundamentals of Engineering Design (FED) is a two-credit course that will introduce students to the basics of Civil Engineering design and provide an overview of the different disciplines within Civil Engineering, including structures, geotechnical, water resources, 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 will 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 assignment will be due the following week unless otherwise specified by the instructor.

Moodle

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

Course Instructor: Thomas J. Jaworski, P.E., M.ASCE

Office: Colton Hall, Room 241
Office Hours: Posted outside office and by appointment.

Online Appointment Scheduling
https://njitcee.acuityscheduling.com

E-mail: tjj5@njit.edu

2. REQUIRED TEXTS

Reference Text (NOT REQUIRED):
Studying Engineering: Road Map to a Rewarding Career by Raymond B. Landis
3rd edition (or later), ISBN 978-0-9646969-2-1

3. LECTURE CLASSROOM

Kupfrian Hall Room 210

Monday: 10am to 11:25am
Wednesday: 10am to 11:25am

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 provide some other similar explanation.

5. GRADING POLICY

Homework Assignments – 5 total **20%**

Technology Special Topic **15%**

- *Design/build/reverse engineer a widget.*

Quiz 1 – *Engineering (topics may vary depending on lectures)*
(transportation, engineering mechanics, structural, material science, geotechnical, reverse engineering, Excel, water resources) **20%**

Quiz 2 – *Engineering (topics may vary depending on lectures)*
(coastal resilience, 3D laser scanning, construction, site engineering, environmental, "soft skills")
20%

Project Report – Oral Presentation **25%**
(presentation will be evaluated based on the following traits)

- Nonverbal Skills
- Verbal Skills
- Content

100%

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.

The NJIT honor code will be upheld and any violations will be brought to the immediate attention of the Dean of Students. (http://www.njit.edu/academics/pdf/academic-integrity-code.pdf).

All students are responsible for upholding the integrity of NJIT by reporting any violation of academic integrity to the Office of the Dean of Students. (http://www.njit.edu/doss/). The identity of the student filing the report remains anonymous.

7. CLASS REQUIREMENTS

- Homework must be handed to the instructor in the class. Homework will not be accepted thru e-mail or Moodle 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
  - 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/ipods, 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.

- 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

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

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

Introduction to Technology

a. Design/Build/Reverse Engineer a Widget
b. Drone/Bluetooth Technology
c. 3D Laser Scanning
d. Materials Science/Protective Technologies

Civil Engineering – Discipline Specific

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

Engineering Topics

a. "The Soft Skills" – Engineers and Writing (Technical Writing/Public Speaking)
b. Reverse Engineering
c. Coastal Resilience
d. Spreadsheets (EXCEL)
e. Engineering in the Built Environment – Case Study
d. Entrepreneurship in Engineering
e. Basics of Engineering Mechanics
f. Data Presentation
g. Forensic Engineering

Video Discussion Topics

a. Virtual Professor Talks with Students
b. Grand Canyon Walkway
c. Tacoma Narrow Bridge and the Whitestone Bridge
d. New Bayonne Bridge

Project Report (suggested topics)

a. Green Infrastructure
    - *Case Studies: USEPA, EPA-841-F-10-004 (August 2010)*
b. Shape Memory Alloys (SMA) in Civil Structures
c. Vibration of Pedestrian Bridges
    - *Case Study: Millennium Bridge – London, England*
    - *Case Study: Squibb Park Bridge – Brooklyn, NY*

10. LECTURE TOPICS – "Innovation in the Built Environment"

Week		Course Lecture Topic *(1 hour, 25 minutes – each lecture)*	Lecture Instructors & Homework	Notes
1/18/2017	**1**	***Introduction to CEE, the Instructor, the Course*** .	Jaworski, Marhaba, Young	
		Select teams.		4 students per team.
1/23/2017	**2**	***Introduction to Technology. Design/Build/Reverse Engineer a Widget – Part 1***	Jaworski	
		Student Activities.	ASCE, EWB, AWWA,NJSPE, SAC	Tentative date.
1/25/2017	**3**	***Design/Build/Reverse Engineer a Widget – Part 2.*** ***Introduction to Technical Presentation***	Jaworski HW 1: D/B/RE Technical Report (2-3 pages). *Due 2/6/2017*	
1/30/2017	**4**	**CEE Disciplines –** ***Geotechnical*** .	Esmaili HW 2: Foundation Design Terminology. *Due 2/8/2017*	
2/1/2017	**5**	**CEE Disciplines –** ***Transportation***	Daniel HW 3: SYNCHRO Traffic Modelling. *Due 2/13/2017*	
2/6/2017	**6**	***Drone/Bluetooth Technology***	Lee, et al	Field demo.
2/8/2017	**7**	***Basics of Engineering Mechanics***	Jaworski HW 4: *due 2/20/2017*	
2/13/2017	**8**	***Communications***	Mellini Mott MacDonald	
2/15/2017	**9**	***Industry Advisory Board***	Jaworski, et al	
2/20/2017	**10**	***Materials Science/Protective Technologies***	Sanjiv Inamdar (Structural Preservation Systems, LLC)	
2/22/2017	**11**	**CEE Disciplines –** ***Structural***	Jaworski HW 5: Bridge Assessment/Reliability of In-Place Structures. *Due 3/8/2017*	
2/27/2017	**12**	**Field Trip #1**	Jaworski	Historic downtown Newark
3/1/2017	**13**	***Reverse Engineering***	Jaworski	In-place structure - steel truss bridge.
3/6/2017	**14**	***Spreadsheets***	Bandlet HW 6 2D spreadsheet *Due 3/22/2017*	
3/8/2017	**15**	***Quiz #1***	Jaworski	

3/20/2017	**16**	**CEE Disciplines – *Water Resources***	Dresnack	
3/22/2017	**17**	***Coastal Resilience or similar topic***	Hays (Pennoni Assoc.)	
3/27/2017	**18**	***3D Laser Scanning***	Jaworski, Fleming (PSS)	
3/29/2017	**19**	**CEE Disciplines – *Construction Management***	Konon HW 7: Quantity Take-Off, Cost Estimate. *Due 4/10/2017*	
4/3/2017	**20**	**Project Workshop**	Jaworski	Project review.
4/5/2017	**21**	***Site Engineering***	Elgammal (PANYNJ)	
4/10/2017	**22**	***Construction Materials***	Adams	
4/12/2017	**23**	**CEE Disciplines – *Environmental Engineering***	Wen	
4/17/2017	**24**	**Project Workshop**	Jaworski	
4/19/2017	**25**	***Quiz #2***	Jaworski	
4/24/2017	**26**	**Field Trip #2**	Jaworski	NJIT Campus
4/26/2017	**27**	**Technical Presentations – 5 teams**	Jaworski	IAB (1) mentor.
5/1/2017	**28**	**Technical Presentations – 5 teams.**	Jaworski	IAB (1) mentor.
During Final Exams – TBD	**29**	**Technical Presentations – 5 teams.**	Jaworski	IAB (1) mentor.

Spring 2017 Academic Calendar (refer to NJIT Registrar for specific details)

January 17, 2017: First Day of Classes
January 23, 2017: Last Day to Add/Drop Classes

March 13 to March 19, 2017: Spring Break

March 27, 2017: Last Day to Withdraw
May 2, 2017: Last Day of Classes
May 5, 2017: Final Exam Begin
May 11, 2017: Final Exams End