Spring 2019

FED 101-008: Fundamentals of Engineering Design (CE)

Thomas Jaworski

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FED 101 – Fundamentals of Engineering Design (CE), Section 008

Spring 2019

Corequisites: HUM 101 and (ENGR 101 and MATH 110) or MATH 111.

OUTLINE OF COURSE
1. Course Description
2. Required Texts
3. Lecture Classroom
4. Attendance Policy
5. Grading Policy
6. Withdrawals and NJIT Honor Code
7. Class Requirements
8. CEE Mission, Program Objective and Student Outcomes
9. Lecture Topics – Engineering and Technology
10. Lecture Dates

1. COURSE DESCRIPTION
Main Topics: “Innovation in the Built Environment – Environmental Engineering”
“The Soft Skills – Critical Thinking/Writing”

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 assignments 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 Instructors: Thomas J. Jaworski, P.E., M.ASCE (Course Coordinator).

CEE Department Professors and Special Lecturers (Industry Representatives).

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: NONE REQUIRED

3. LECTURE CLASSROOM

Kupfrian Hall, Room 210
Tuesday and Friday: 10am – 11:20am

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

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Assignments (8 -10)</td>
<td>20%</td>
</tr>
<tr>
<td>Technology Special Topic</td>
<td>15%</td>
</tr>
<tr>
<td>Design/build/reverse engineer a widget</td>
<td></td>
</tr>
<tr>
<td>Project Assignments</td>
<td>30%</td>
</tr>
<tr>
<td>1. Site Civil</td>
<td>10%</td>
</tr>
<tr>
<td>2. Traffic Flow</td>
<td>10%</td>
</tr>
<tr>
<td>3. Virtual Bridge Design</td>
<td>10%</td>
</tr>
<tr>
<td>Project Report – Oral Presentation</td>
<td>15%</td>
</tr>
<tr>
<td>Topic: Environmental Engineering</td>
<td></td>
</tr>
<tr>
<td>(presentation will be evaluated based on the following traits): Nonverbal Skills, Verbal Skills and Content</td>
<td></td>
</tr>
<tr>
<td>The Plastic Plague – Written Report</td>
<td>20%</td>
</tr>
<tr>
<td>“The Great Pacific Garbage Patch”</td>
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<tr>
<td>Total</td>
<td>100%</td>
</tr>
<tr>
<td>EXTRA CREDIT: Critical Thinking/Writing</td>
<td>5 points</td>
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<tr>
<td>Write a six (6) word short story.</td>
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<tr>
<td>or</td>
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<tr>
<td>Technology – write a one sentence definition.</td>
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</tbody>
</table>

Grading Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100-90</td>
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<tr>
<td>B+</td>
<td>89-85</td>
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<tr>
<td>B</td>
<td>84-80</td>
</tr>
<tr>
<td>C+</td>
<td>79-75</td>
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<tr>
<td>C</td>
<td>74-70</td>
</tr>
<tr>
<td>D</td>
<td>69-60</td>
</tr>
<tr>
<td>F</td>
<td>Below 60</td>
</tr>
</tbody>
</table>
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](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](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 (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.

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

**FED 101 – Fundamentals of Engineering Design**

### 8. LECTURE TOPICS – ENGINEERING AND TECHNOLOGY

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

**Introduction to Technology**
- Design/Build/Reverse Engineer a Widget
- Drone/Bluetooth Technology
- Materials Science/Protective Technologies

**Civil Engineering – Discipline Specific**
- Structural Engineering
- Geotechnical Engineering
- Construction Engineering/Management
- Water Resources Engineering
- Environmental Engineering
- Environmental Law
- Site Engineering

**Engineering Topics**
- “The Soft Skills” – Engineers and Writing (6 word short story).
- Reverse Engineering
- Spreadsheets (EXCEL)
- Engineering in the Built Environment – Case Study
- Basics of Engineering Mechanics
- Data Presentation
- Forensic Engineering
- Life Cycle Assessment

**Video Discussion Topics**
- Virtual Professor Talks with Students
**Project Report** (topics suggested by the Professor or other topics as approved by the Professor)

9. 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:** 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:** Alumni will advance their 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:

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

<table>
<thead>
<tr>
<th>Strategies, Actions and Assignments</th>
<th>ABET Student Outcomes (1-7)</th>
<th>Program Educational Objectives</th>
<th>Assessment Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Learning Outcome 1:</strong> Work on engineering design problems at the start of their education to stimulate their interest in engineering.</td>
<td>1, 2</td>
<td>1</td>
<td>Class assignments.</td>
</tr>
<tr>
<td>Students will learn CEE design practices in bridge engineering and construction cost estimating.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student Learning Outcome 2:</strong> Use the team approach to problem solving.</td>
<td>1, 2, 5</td>
<td>1, 2</td>
<td>Meetings with instructor. Class assignments.</td>
</tr>
<tr>
<td>Students will work in teams on the assigned design problems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student Learning Outcome 3:</strong> Practice oral and written communication skills.</td>
<td>3</td>
<td>1, 2</td>
<td>Class project.</td>
</tr>
<tr>
<td>Student will be required to make written and oral reports on their class projects.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
11. LECTURE TOPICS – ENGINEERING AND TECHNOLOGY

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

**Introduction to Technology**
- d. Design/Build/Reverse Engineer a Widget
- e. Drone/Bluetooth Technology
- f. Materials Science/Protective Technologies

**Civil Engineering – Discipline Specific**
- h. Structural Engineering
- i. Geotechnical Engineering
- j. Construction Engineering/Management
- k. Water Resources Engineering
- l. Environmental Engineering
- m. Environmental Law
- n. Site Engineering

**Engineering Topics**
- b. “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
# LECTURE DATES by Week

<table>
<thead>
<tr>
<th>Week</th>
<th>Course Lecture Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to CEE, the Instructor, the Course</td>
</tr>
<tr>
<td>1a</td>
<td>Select teams.</td>
</tr>
<tr>
<td>2</td>
<td>Introduction to Technology. Design/Build/Reverse Engineer a Widget – Part 1</td>
</tr>
<tr>
<td>3</td>
<td>Design/Build/Reverse Engineer a Widget – Part 2</td>
</tr>
<tr>
<td>4</td>
<td>CEE Discipline – Environmental Engineering</td>
</tr>
<tr>
<td>5</td>
<td>Forensic Engineering</td>
</tr>
<tr>
<td>6</td>
<td>Project Reports</td>
</tr>
<tr>
<td>7</td>
<td>Spreadsheets - Introduction</td>
</tr>
<tr>
<td>8</td>
<td>Site/Civil Engineering</td>
</tr>
<tr>
<td>9</td>
<td>Materials Science/Concrete Protective Technologies</td>
</tr>
<tr>
<td>10</td>
<td>Site/Civil Engineering – Contour Plan</td>
</tr>
<tr>
<td>11</td>
<td>Communications – “The Soft Skills”</td>
</tr>
<tr>
<td>12</td>
<td>Industry Advisory Board</td>
</tr>
<tr>
<td>13</td>
<td>“The Road Less Traveled”</td>
</tr>
<tr>
<td>14</td>
<td>CEE Discipline - Environmental Engineering</td>
</tr>
<tr>
<td>15</td>
<td>Construction Materials</td>
</tr>
<tr>
<td>16</td>
<td>CEE Discipline – Construction Engineering</td>
</tr>
<tr>
<td>17</td>
<td>CEE Discipline – Traffic Engineering</td>
</tr>
<tr>
<td>18</td>
<td>CEE Discipline – Geotechnical Engineering</td>
</tr>
</tbody>
</table>

### Homework
- Exchange contact information. 4 students per team.
- HW: Air and Water Quality.
- HW: Introduction
- HW: Excel Spreadsheet.
- HW: Cut line section, slope triangle.
- HW: Landfill Contamination.
- HW: Traffic Flow
- HW: Introduction

### Notes
- CEE Professor
- Field Trip
- Industry Representative
- Industry Representative
- Industry Representative
- CEE Professor
- CEE Professor
- CEE Professor
- CEE Professor
<table>
<thead>
<tr>
<th>19</th>
<th>CEE Discipline – <strong>Geotechnical Engineering</strong></th>
<th>HW: Tunnel Engineering</th>
<th>CEE Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>CEE Discipline – <strong>Transportation Engineering</strong></td>
<td></td>
<td>CEE Professor</td>
</tr>
<tr>
<td>21</td>
<td>Field Trip</td>
<td></td>
<td>Historic Downtown Newark</td>
</tr>
<tr>
<td>22</td>
<td>Project Workshop – Technical Presentations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>CEE Discipline – <strong>Virtual Bridge Design</strong></td>
<td>HW: Bridge Design</td>
<td>CEE Professor</td>
</tr>
<tr>
<td>24</td>
<td>Architecture - <strong>Life Cycle Assessment</strong></td>
<td></td>
<td>COAD Professor</td>
</tr>
<tr>
<td>25</td>
<td>CEE Discipline – <strong>Water Resource Engineering</strong></td>
<td></td>
<td>CEE Professor</td>
</tr>
<tr>
<td>26</td>
<td>Technical Presentations – 5 teams.</td>
<td></td>
<td></td>
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<tr>
<td>27</td>
<td>Technical Presentations – 5 teams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Technical Presentations – 5 teams.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Technical Presentations – 5 teams</td>
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<tr>
<td>Final Exams – TBD</td>
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</table>

**Spring 2019 Academic Calendar** (refer to NJIT Registrar for specific details)

- **January 22, 2019:** First Day of Classes
- **February 1, 2019:** Last Day to Add/Drop Classes
- **April 8, 2019:** Last Day to Withdraw
- **March 17–March 24, 2019:** Spring Recess
- **May 7, 2019:** Last Day of Classes
- **May 10, 2019:** Final Exam Begin
- **May 16, 2019:** Final Exams End