NJIT New Jersey Institute of Technology
Newark College of Engineering

# Fundamentals of Engineering Design (FED101) – General Engineering (Spring 2019, Sections 032, 034, 036, 038)

## Course Description:

Fundamental of Engineering Design is a two-credit course that reviews the basic concepts of engineering and introduces some tools used for the design and implementation of devices and systems. This version of the course is specially designed for the students in the General Engineering Program. In the lecture portion, students will be introduced to the engineering design process using the widget activity and other exercises, as well as engineering research. Students will also learn about key issues in the practice of engineering, including engineering ethics. In addition, students will be taught to design their process of becoming a world-class engineer and will be introduced to all the traditional engineering and engineering technology majors offered at NJIT. Design your process exercises are aimed at helping students with the process of changing, growing, and developing into individuals that focus on and adopt the attitudes and behaviors that are appropriate to success in math/science/engineering coursework.

In the laboratory, students will be introduced to approaches to synthesis and design, and to representative software libraries used by present-day engineers. Students will study Creo Parametric 4.0 (previously known as Pro/Engineer/Wildfire). Creo exercises will help students conceptualize and implement simulations, designs, systems, and projects. All students will use the software packages as tools in developing and implementing a term project during the second half of the semester. For the term project, students will use what they were taught in class, as well as the relevant technical literature (and in some cases additional material from the non-engineering literature that provides context to engineering work).

All activities offered through this course are designed to help students pick up transferable skills that they can take to any engineering major they choose to pursue with special emphasis on oral and written communication skills. The overall objective is to provide background and context to engineering studies and help students to succeed and move forward on engineering education path.

## Text:

Raymond B. Landis, *Studying Engineering: A Road Map to a Rewarding Career* (4th ed.). Discovery Press (ISBN-10: 0979348749, ISBN-13: 978-0979348747)

In addition to the above text, material will be made available in the form of hand-outs or will be uploaded on Canvas course page. Students might also be asked to download a few articles and other reading material from the website of NJIT's Robert W. Van Houten Library.

**Articles** (will be assigned during the term)**:**

(1) Margaret N. Strand and Kevin C. Golden: "Consulting Scientist and Engineer Liability: A Survey of Relevant Law," *Science and Engineering Ethics* (1997) Vol. 3, Issue 4, pp. 357-394 (download from the website of the NJIT Robert W. Van Houten Library)

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**Course Coordinator and Primary Instructor:**


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| | Dr. Ashish Borgaonkar | Office: GITC 5700 |
| | Phone: 973-596-3467 | E-mail: ashish.borgaonkar@njit.edu |
| **CREO Expert:** | Dr. Jaskirat Sodhi | Office: GITC 5700 |
| | Phone: 973-596-5220 | E-mail: jaskirat.sodhi@njit.edu |
| **Ethics Expert:** | NCE Dean Dr. Moshe Kam | Office: Fenster Hall 280 |
| | Phone: 973-596-6506 | E-mail: kam@njit.edu |


**Office Hours:**

TBD

**Library Liaison:** Davida Scharf, PhD

Contact Information:
http://library.njit.edu/staff/librarian/
http://library.njit.edu/staff/admin/

Useful Information:
Research Tutorials: http://researchguides.njit.edu/tutorials
Communication: Thinking, Reading, Writing, Speaking: Tools for All Writers:
http://researchguides.njit.edu/communication

**Teaching Assistants:**

**Lecture TA:**

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| Weiqiang Dong | wd35@njit.edu |
| Chizhong Wang | cw278@njit.edu |

**Laboratory TAs:**

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| Ludvik Alkhoury | la256@njit.edu |
| Maria Mostacero | mcm36@njit.edu |
| Gerges Hakim | gh82@njit.edu |
| Shanee Halevi | sjh27@njit.edu |

**Times and Venues (https://uisnetpr01.njit.edu/courseschedule/):**

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| Common Lecture: | M 1:00 PM – 2:20 PM, CKB303 |
| Section 032 Lab.: | R 1:00PM – 2:20PM, MALL PC40 |
| Section 034 Lab.: | R 10:00AM – 11:20AM, MALL PC37 |
| Section 036 Lab.: | F 10:00AM – 11:20AM, MALL PC40 |
| Section 038 Lab.: | F 1:00PM – 2:20PM, MALL PC39 |

**Course Schedule:**

| Week | Topic | Reading Assignment | Homework |
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| Week 1 | *Lecture*: General introduction to the weekly Tuesday session (FED101-ESC Instructional Staff).<br><br>*Lab:* Introduction, syllabus and overview of the semester. | Chapter 1 | Homework 1 |
| Week 2 | *Lecture*: Becoming a 'World-Class' Engineering Student (1)<br><br>Introduction: The Widget Activity<br><br>*Lab:* Introduction to CREO. Instructor Handout -1 | Chapter 1 | Widget Activity Homework<br><br>Homework 2 |
| Week 3 | *Lecture:* Introducing one of the engineering disciplines, related professional societies and careers (1)<br><br>The Widget Activity – Hands-on Design Exercise<br><br>*Lab*: Basic tools used in CREO. Instructor Handout -2 | Chapter 2 | |
| Week 4 | *Lecture:* Becoming a 'World-Class' Engineering Student (2)<br><br>Introduction to Engineering Research Part I<br><br>*Lab:* Basic tools used in CREO. Instructor Handout -3 | Chapter 3 | Homework 3 |
| Week 5 | *Lecture*: Becoming a 'World-Class' Engineering Student (3)<br><br>Introducing one of the engineering disciplines, related professional societies and careers (2)<br><br>*Lab:* Some more tools used in CREO. Instructor Handout -4. | Assigned Research Articles | Homework 4<br><br>Engineering Research Homework Part I |
| Week 6 | *Lecture:* Guest Lecture<br><br>Engineering Research Activity Discussion<br><br>Engineering Research Activity Part II<br><br>*Lab:* Introducing related advanced software tools to be utilized in final project. Assembling parts in Creo. Instructor Handout -5. Class will be divided into groups according to the software used for their term project.<br>Students will be asked to choose a project of their interest, Explanation of Project | Chapter 4 | |
| Week 7 | *Lecture:* Engineering Ethics (1) (Dr. Kam)<br><br>Introducing one of the engineering disciplines, related | Assigned Research Articles | Engineering Research Homework |

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| | professional societies and careers (3)<br><br>*Lab*: Some more tools used in CREO. Instructor Handout -6 | | Part II |
| Week 8 | *Lecture:* Engineering Ethics (2) (Dr. Kam)<br><br>Introducing one of the engineering disciplines, related professional societies and careers (4)<br><br>*Lab*: Some more tools used in CREO. Instructor Handout -7. | Strand and Golden | Engineering and the Law Homework |
| Week 9 | *Lecture:* Becoming a 'World-Class' Engineering Student (4)<br><br>Introducing one of the engineering disciplines, related professional societies and careers (5)<br><br>*Lab:* Work on Projects | Strand and Golden | Engineering and the Law Homework |
| Week 10 | *Lecture:* Engineering Ethics Debates – 1 (Multiple Locations)<br><br>*Lab:* Makerspace introduction. | Chapter 5 | Homework 5 |
| Week 11 | *Lecture:* Engineering Ethics Debates – 2 (Multiple Locations)<br><br>*Lab:* CREO Project Presentations. | | |
| Week 12 | *Lecture:* Panel Discussion – Choosing your Major<br><br>*Lab:* Makerspace Activity. | | |
| Week 13 | *Lecture:* Becoming a 'World-Class' Engineering Student (5)<br><br>Introduction to Lecture Project/Comprehensive Assignment<br><br>*Lab:* Makerspace Activity. | Chapters 6, 7 | Homework 6 |
| Week 14 | *Lecture:* Becoming a 'World-Class' Engineering Student (6)<br><br>*Lab:* Makerspace Activity | Chapters 6, 7 | Homework 7 |
| Week 15 | Work on Projects/Makerspace Activity | | |
| Week 16 | FINAL REPORTS/PROJECTS DUE<br>NO FINAL EXAM | | Lecture Project Report |

## Attendance Policy:

Each student will be asked to sign his/her name on the attendance sheet as proof of attendance.

Requests to be excused need to be resolved via e-mail before class is held, with the exception of last-minute emergencies that must be reported via e-mail as soon as feasible.

Requests to leave class before the end of the assigned period need to be resolved before class starts.

Each student will be excused to miss a maximum of TWO (2) classes/labs per semester with prior permission/valid reason. Each subsequent class missed will cost the student up to 5% of the overall grade. FIVE (5) or more missed classes/labs will result in an F grade.

## Grading Policy:

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| Class-related work | |
| Assignments and In-Class Activities | 25% |
| Quizzes, Exams, Projects, and Presentations | 25% |
| Total for class-related assignments and exams | 50% |
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| Lab-related work | |
| Lab assignments, reports and homework | 30% |
| Final Project | 20% |
| Total for lab-related work | 50% |

## Notes:

The **NJIT Honor Code** will be upheld. Violations will be brought to the immediate attention of the Dean of Students.

Remember to cite your references when writing individual and group reports. References should allow unambiguous tracing of a source to the original publication. Recommended citation references are those of...
IEEE (available at http://www.ieee.org/documents/ieeecitationref.pdf);
APA (available at https://www.library.cornell.edu/research/citation/apa); and
MLA (available at http://elmo.academyart.edu/reference-help/tours_and_tutorials/MLA-Citations.pdf).

In each paper, essay or report use only one of these styles, consistently for all sources.

Each person will contribute to and be responsible for each group report submitted.

The schedule may change to accommodate the flow of the class and availability of external presenters. Students will be informed of all changes in advance and all changes to the syllabus and time table will be discussed in class.

Even though work is stored on the lab server, students are encouraged to back up their work on a personal flash drive or compatible media. It is also recommended that students use the same machine at every class.

**Honor Code and Behavior:**

Please read the University's Academic Honor Code. Violations of NJIT's Academic Honor Code will lead to disciplinary consequences.

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to http://www.njit.edu/academics/honorcode.php

Cellular phones must be turned off during the class hours, or if you are expecting an emergency call, put it on vibrate. No headphones can be worn in class. Also, class will begin on time. Calendar integrity is critical for attendance and for all assignments.

Don't be shy regarding asking questions during class, and don't be shy about answering questions, even if you are not sure about the answer. The only way you learn is by making mistakes, and realizing how to avoid them.

**Disability Support Services (DSS):**

DSS offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT. If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services at 973-596-5417 or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260.
For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Disability Support Services (DSS) website at http://www5.njit.edu/studentsuccess/disability-support-services/Schedule