

Drexel University, College of Engineering
ENGR 113, *First-Year Engineering Design*, Spring 2019-20
Fundamentals of Digital Design & Advanced Manufacturing
(Version 2.0)

Credits: 3.00 Contact Hours: Lecture: 1 Hr; Recitation 1 Hr; Lab 2Hr.

Instructor Information:

Instructor Name: *Dr. Antonios Kontsos, Associate Professor, Mechanical Eng. & Mech.*

Office: AEL 172A

Phone: 215-895-2297

Office Hours: T-TH 12-1pm

E-mail: ak866@drexel.edu

Student Learning Information:

Brief description of the content of the course (Course Catalog Description): In this course, students will focus on applying the engineering design process (by leveraging digital design and advanced manufacturing methods) to problems of particular interest in the various engineering fields. A key component of the course is a term-long interdisciplinary project where students will work in teams to solve an engineering problem (by designing a part).

Pre-requisites or Co-requisites:

1. ENGR 111, Minimum Grade: D
2. (ENGR 131 OR 132), Minimum Grade: D

Course Purpose within a Program of Study: This course engages students in project-based learning related to the engineering design process, as related to various engineering disciplines. This course serves as an introduction to upper level courses (in design, manufacturing, simulation and testing) that are required in each major.

Statement of Expected Learning: This class consists of one 2-hour lecture, a 2-hour lab and other online activities students are expected to complete.

Course Outcomes: Upon completion of this course, students will be able to

1. Describe and apply the engineering design process.
2. Use appropriate combinations of mathematics, science, data analysis, modeling, and programming to propose, implement, and evaluate a solution to an engineering design challenge.
3. Understand the use of digital design, analysis and modeling tools.
4. Understand traditional and advanced manufacturing methods.
5. Work effectively as a member of a team.
6. Plan and manage an engineering project and demonstrate good time management skills.
7. Demonstrate effective technical communication skills in oral, visual, and written forms.

Project Outcomes:

1. Create a 3D digital model using Computer Aided Design (CAD).
2. Analyze the properties and performance of the 3D model using Computer Aided Engineering (CAE) methods.

Drexel University, College of Engineering
ENGR 113, *First-Year Engineering Design*, Spring 2019-20
Fundamentals of Digital Design & Advanced Manufacturing
(Version 2.0)

3. Implement Computer Aided Manufacturing Methods (CAM) and Advanced Manufacturing methods to virtually produce valid prototypes of 3D assemblies.

ABET engineering program outcomes:

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.

Drexel Student Learning Priorities:

Creative and Critical Thinking: Uses divergent (e.g., generation of novel ideas, thinking out of the box, brainstorming) and convergent thinking (e.g., critical thinking, evaluation of ideas, quantitative and qualitative analysis, scientific reasoning) to generate novel and relevant ideas, strategies, approaches or products.

Technology Use: Make appropriate use of technologies to communicate, collaborate, solve problems, make decisions, and conduct research, as well as foster creativity and life-long learning.

Communication: Employ an understanding of audience, purpose and context to communicate effectively in a range of situations using appropriate media.

Professional Practice: Apply knowledge and skills gained from a program of study to the achievement of goals in a work, clinical, or other professional setting.

Course Materials:

Required Textbook: None. All course materials, including weekly lecture and lab downloads, video tutorials and weekly announcements, will be available electronically through the course *Blackboard Learn (BbLearn)* site.

Supplemental Materials: Students should have access to Microsoft Office (or equivalent) for lab report preparation, data analysis/plotting, and presentation generation. **All assignments must be submitted in PDF format, so students will also need a means of**

Drexel University, College of Engineering
ENGR 113, *First-Year Engineering Design*, Spring 2019-20
Fundamentals of Digital Design & Advanced Manufacturing
(Version 2.0)

converting reports into this format. Newer versions of MS Office can generate PDFs directly.

Assignments, Assessments and Graded Activities: In this class, students' knowledge and comprehension of the material will be assessed in a number of different ways, as detailed in the grading matrix below.

Course graded components:

Component	Weighting	Description
Participation	10%	Individual students must participate online. Grade determination is at the discretion of the section instructor.
Teamwork Assessments	10%	Individual assessments as a measure of how strongly you contributed to your team's project. Any teamwork issues should be communicated to your advisors immediately, not at the end of the quarter. Half of your grade is for completing the assessment, and the other half is based on your teammates' assessment of your performance.
Project Proposal	15%	Group assignment <u>due by the end of week 4</u> . You are required to submit proposal outlining your project's goals, technical activities, and deliverables. Your instructor will require edits and final submission as needed. For more information, see the Design Proposal Template on the ENGR 113 website.
Midterm Online Oral presentation	10%	Group presentation <u>due at the end of week 4</u> . This serves as an update on their progress and an opportunity to share their project with others in the class.
Project Website Checks	10%	Groups will maintain a project website. There will be 3 website checks throughout the term.
Draft Final Report	10%	Group report <u>due at the end of week 9</u> . This must contain all data and progress made through week 8, as well as a complete outline of any remaining sections that will be completed through the remainder of the project.
Final Report	25%	Group report <u>due at the end of week 10</u> . The report must thoroughly document the progress and the end result of your project. For more information, see the Final Report and Presentation Instructions on the ENGR 113 website.
Final Online Oral Presentation	10%	Group presentations summarizing the work completed during the term. These presentations will take place on <u>Friday, June 12th</u> during normal lab hours.

Drexel University, College of Engineering
ENGR 113, *First-Year Engineering Design*, Spring 2019-20
Fundamentals of Digital Design & Advanced Manufacturing
(Version 2.0)

Grading Scale: The mapping between percent grade and final letter grade will be:

Grade	Range	Grade	Range	Grade	Range	Grade	Range
A+	98 - 100	B+	87 – 89.9	C+	77 – 79.9	D+	67 – 69.9
A	93 – 97.9	B	83 - 86.9	C	73 – 76.9	D	60 – 66.9
A-	90 – 92.9	B-	80 – 82.9	C-	70 – 72.9	F	< 60

Submission Information: Each assignment will have specific instructions regarding how it should be submitted.

Instructor Feedback: Instructors will provide feedback in the appropriate format in a reasonable time frame.

Course Schedule:

Week	Lecture Topics	Lab Activities/Deliverables
1	i) Course Overview and resources ii) The Engineering Design Process iii) Introduction to digital design & advanced manufacturing iv) Project definition and requirements	i) Online Lab Safety modules ii) Introduction to CAD iii) Group formation iv) Setup Project Website v) Initial Proposal
2	i) Project Management ii) Project Management Activity iii) Writing a design proposal iv) Fundamentals of 2D sketching	i) Project Website check #1 ii) Project idea 2D sketching iii) Project idea quad-chart #1
3	i) Researching an engineering topic ii) Introduction to 3D modeling	i) Project Website check #2 ii) Project idea 3D sketching iii) Project idea quad-chart #2
d	Project Proposals (Teamwork Assessment #1)	
5	i) Traditional & Advanced Manuf.	i) Virtual Machine shop visit ii) Design for manufacturing iii) Final report formatting iv) Project idea quad-chart #3
6	i) Simulation & Optimization methods	i) Simulation examples ii) Project simulation proposal iii) Project idea quad-chart #4
7	i) Testing & Characterization	i) Testing of a part of component ii) Project Website check #3
8	Project Prototype Review (Teamwork Assessment #2)	
9	Draft Final Report	
10	Final Online Oral presentations	Final Reports Final Oral Presentations

Grading Scale: This syllabus is subject to change at any time.

Academic Policies:

Course-Specific Policies:

Assignment Submission:

- Written reports must be submitted in PDF format via *DrexelLearn*.

University Academic Policies:

Missed Classes: Absence from class will be based on the University's absence policy. Please review the link below.

<http://drexel.edu/provost/policies/absence/>

Academic Integrity, Plagiarism and Cheating Policy: Please review the University policy regarding academic integrity:

<http://drexel.edu/provost/policies/academic-integrity/>

http://drexel.edu/studentlife/community_standards/studentHandbook/

Office of Equality and Diversity - Disability Resources: Students [requesting accommodations](#) due to a disability at Drexel University need to request a current Accommodations Verification Letter (AVL) in the [ClockWork database](#) before accommodations can be made. These requests are received by Disability Resources (DR), who then issues the AVL to the appropriate contacts. For additional information, visit the DR website at drexel.edu/oed/disabilityResources/overview/, or contact DR for more information by phone at 215.895.1401, or by email at disability@drexel.edu.

Course Drop Policy:

<http://drexel.edu/provost/policies/course-add-drop/>

Course Withdrawal Policy:

<http://drexel.edu/provost/policies/course-withdrawal/>

Course Change Policy: The instructor reserves the right to modify the course, as necessary, during the term: including policies, evaluations, due dates, course content, schedule, assignments or requirements. All changes will be communicated in lecture and/or *via* the course *DrexelLearn* page.

Weather, Emergencies and University Closing: University closing or delayed opening information will be posted on www.drexel.edu. In the event of the need to close or delay the daily opening of a campus, the University will provide notice *via* Web, telephone, and the DrexelALERT system. Closing or delayed opening information will be announced at 215-895-MELT (6358).

The University determines whether to close or delay opening due to inclement weather, not the instructor. Therefore, please do not contact the instructor for this information.