

Department of Electrical and Computer Engineering
FED 101: Fundamentals of Engineering Design for ECE Major

FED 101 - Fundamentals of Engineering Design (2-1-2)

Instructor: M. Feknous

Textbook: *Laboratory Manual and Supplementary Notes: FED 101 – Freshman Engineering Design, Electrical and Computer Engineering Module*, by John D. Carpinelli, Mohammed Feknous, and Marek Sosnowski (available via the ECE Department Laboratory web page at <http://coefs2.njit.edu>)

Course Description:

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.

Corequisite: HSS 099 or HSS 101 and Math 103 or Math 104 or Math 111.

Specific Course Learning Outcomes (CLO): The student will be able to

1. understand engineering in general and electrical and computer engineering in particular
2. acquire basic handling capabilities of simple circuits containing resistors, diodes, and transistors
3. analyze and design basic digital circuits, culminating in a more complex project
4. research and present a contemporary technological topic in electrical or computer engineering
5. work in teams enhancing skills in leadership and contribution to a team

Relevant Student Outcomes:

- (a) an ability to apply knowledge of mathematics, science, and engineering (CLO 2, 3, 4)
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data (CLO 2, 3)
- (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 (CLO 3)
- (e) an ability to identify, formulate, and solve engineering problems (CLO 2, 3, 4)
- (f) an understanding of professional and ethical responsibility (CLO 1, 3, 5)
- (g) an ability to communicate effectively (CLO 3, 4)

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (CLO 1)

(i) a recognition of the need for, and an ability to engage in life-long learning (CLO 3, 4)

(j) a knowledge of contemporary issues (CLO 4)

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (CLO 2, 3, 4, 5)

Computer assisted design and course specific software:

Pspice, Multisim, Matlab

Course Schedule:

Week	Topic	Chapter	Experiment
1	Introduction	1	N/A
2	Electricity, Charge, Current, Resistance Computer simulation I	2.1-2.3	1
3	Series and Parallel Resistance, Variable Resistors, Kirchoff's Laws	2.4-2.8	2*
4	Transistors and Diodes , Quiz #1	3	4*
5	Computer simulation	4	3*
6	<i>How Things Work</i>	5	
7	<i>How Things Work</i>	5	
8	Digital Logic	6	5*
9	More Complex Combinatorial Digital Logic, Quiz #2	6	6
10	Digital Sequential Logic	6	7
11	<i>Engineering Design Process</i> . Introduction to Project Quiz #3	7	
12-14	Project Presentations by students' teams	7	

* Report written by each team is required for these experiments

Grading Policy:

3 quizzes@10%	30%
Laboratory reports and notebook*	35%
How Things Work**	10%
Project and final report**	25%

**individual effort will be considered in grading of these items. Team work is vital to success.

Attendance is strictly required – three absences may result in failing the course.

Office: ECEC 311

Office hours: MWR 2:30 PM – 3:30 PM

T 1:15 PM – 2:15 PM

Other times can be arranged through appointments

Honor Code: The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students.

Prepared by: M. Feknous