ECE 294-103: Analog and Digital Circuits Laboratory (0-4-2)
Fall 2025

Instructor: Raj Adhikari
email: ra795@njit.edu

Office hours: Thursdays 5:00-6:00
Meeting times: Thursdays 6:00-10:05 at FMH 304

Text: *Laboratory Manual and Supplementary Notes: ECE 294 – Analog and Digital Circuits Laboratory*, by John Carpinelli and Marek Sosnowski

Description: Laboratory work in the areas covered in ECE 231, ECE 232, and ECE 251. Assembling, testing and analysis of basic analog and digital circuits. Emphasis electronic measurement techniques, instrumentation, and data analysis. Simulations and measurements of dc, ac, and transient response of basic analog circuits. Experiments and design of digital circuits from basic gates to complex logic, including sequential circuits, the arithmetic/logic unit, and computer memories.

Course Outcomes: Students will be able to:

1) Use basic electronic instruments (DC power supply, waveform generator, multimeter, and analog and digital oscilloscopes) to analyze and debug circuits.
2) Verify experimentally basic circuits laws (Ohm's, Kirchhoff's) and explain differences between theoretical and measured values.
3) Measure amplitude and phase of sinusoidal signals on components of RC and RLC circuits.
4) Measure parameters of passive resonance circuits and filters.
5) Design and construct combinatorial circuits using discrete logic gates.
6) Design and construct sequential circuits using flip-flops.

Student Outcomes:

1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (CLO 1-6)
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 (CLO 1-6)
6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (CLO 1-6)

Course Schedule:

Week	Experiment	Topic
1-2	1	Combinatorial Circuits
3	2	Sequential Circuits
4	3	Shift Registers
5	4	Counters
6-7	5	Design Project – A Gate Function Detector
8	6	Introduction to Basic Instruments, the Oscilloscope
9	7	Superposition Principle and Thevenin Equivalent Circuits
10	8	Internal Impedance of Instruments
11	9	AC Measurements
12	10	Input Impedance of an Oscilloscope and the Scope Probe
13	11	The Diode and Diode Circuits
14	12	The Transistor – Comparison of MOS and Bipolar

Grading Policy: For each experiment

Prelab: 30% (individual)
Demo: 20% (group)
Lab Report: 50% (group)

Experiments are equally weighted, except Experiments 1 and 5 are weighted double since they are two weeks each.

Notes:

- All prelabs and lab reports must be submitted on Canvas as a single PDF file. Due dates are listed in the Canvas calendar.
- Individual effort will be considered in grading of all items. Teamwork is vital to success.

Academic Integrity:

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** *If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at* dos@njit.edu.

Generative AI:

The use of generative AI systems is prohibited in this course. Any exceptions to this policy will be announced in class.