## ECE 294-101: Analog and Digital Circuits Laboratory (0-4-2) Fall 2024

Instructor:	Amir Bahador Javadi email: aj772@njit.edu		
Meeting times:	Tuesdays 6:00-10:05 P.M., FMH 211		
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:	<ol> <li>Students will be able to:         <ol> <li>Use basic electronic instruments (DC power supply, waveform generator, multimeter, and analog and digital oscilloscopes) to analyze and debug circuits.</li> <li>Verify experimentally basic circuits laws (Ohm's, Kirchhoff's) and explain differences between theoretical and measured values.</li> <li>Measure amplitude and phase of sinusoidal signals on components of RC and RLC circuits.</li> <li>Measure parameters of passive resonance circuits and filters.</li> <li>Design and construct combinatorial circuits using discrete logic gates.</li> <li>Design and construct sequential circuits using flip-flops.</li> </ol> </li> </ol>		
Student Outcomes:	<ol> <li>An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (CLO 1-6)</li> <li>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)</li> <li>an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (CLO 1- 6)</li> </ol>		

## **Course Schedule:**

Week	Experiment	Topic
1-2	1	Combinatorial Circuits
3	2	Sequential Circuits
4	3	Shift Registers
5	4	Counters
6	5	Design Project – A Gate Function Detector
7	6	Introduction to Basic Instruments, the Oscilloscope
8	7	Superposition Principle and Thevenin Equivalent Circuits
9	8	Internal Impedance of Instruments
10	9	AC Measurements
11	10	Input Impedance of an Oscilloscope and the Scope Probe
12	11	The Diode and Diode Circuits
13	12	The Transistor – Comparison of MOS and Bipolar
Grading Policy	y:	For each experiment
		Prelab: 30% (individual)
		Demo: 20% (group)
		Lab Report: 50% (group)

Experiments are equally weighted, except Experiment 1, which is weighted double since it spans two weeks.

## 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.

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