University of Pittsburgh
Department of Electrical and Computer Engineering
ECE 1895: Junior Design Fundamentals
Dr. Samuel Dickerson

Assignment 1: Intro to SPICE and the 555 Timer

This first exercise is an "engineering design" warmup. Prior to attempting this assignment, you should have completed the LTSPICE tutorials listed on CANVAS

For this assignment, you are to

- Design a square wave oscillator using the 555 timer
- Design a circuit that produces a square wave with a period between 20us to 500 us
- The circuit is unloaded
- Verify your design using LTSPICE
    - Edit→Component→MISC→NE555

For more information on how the 555 timer chip operates, refer to its datasheet (posted on CANVAS)

Prior to completing this design, it is recommended that you review the A-stable operation of the 555 timer and replicate the example waveform in SPICE.

Submission:

Please submit a PDF document with the following:

- A schematic showing your final design (a screenshot is acceptable). Make sure that all component values can be clearly seen
- The details of your calculations
- A waveform (from LTSPICE) showing that your circuit behaves according to the specifications
- Also upload a separate zip file containing your SPICE project folder.

Late Policy:

All work submitted after the specified date and time deadline will receive a **30% deduction** penalty. An additional 30% deduction will also occur for **every class period that occurs** after the assignment deadline if the late assignment has not yet been submitted.

Grading Rubric

Calculations (25 points)

The following calculations must be shown to receive full points:

- Calculations for the period of the 555-timer square wave output
- Calculations for the duty cycle, time high, and time low of the 555-timer square wave output
- Calculations for all necessary resistor and capacitor values in the circuit. If no calculations were required, an explanation for why the component value was selected must be included

Calculations missing or largely misapplied. (0 points)	Major errors in calculations / Incomplete (5 points)	Minor errors in calculations / Incomplete (15 points)	All necessary calculations present and correctly applied. (25 points)

Schematic (25 points)

The following must be included to receive full points:

- A schematic of your a-stable 555-timer with all components labeled with a name (R1, C1, etc.) and value if applicable
- The circuit must be designed according to the provided specifications in assignment instructions

Schematic missing (0 points)	Schematic largely incorrect, or unreadable (5 points)	Minor errors in schematic / some parts unclear (15 points)	Schematic present, legible, and correct (25 points)

Simulation (50 points)

The following must be included to receive full points:

- The simulated wave form results must follow the provided specifications in the assignment instructions
- The simulated waveform characteristics must resemble the solved for values from your calculations

Simulation is non-functional (0 points)	Major errors in simulations / Incomplete or not readable (20 points)	Design meets requirements, waveform unclear contains minor errors (35 points)	Design meets requirements, waveform clearly presented (50 points)