ECE 214-342-343 Laboratory Notebook Guidelines

General Comments

- All work is to be recorded in PEN. If you make a mistake, draw a single line through it, leaving it legible. Some of the greatest advances in modern technology began as mistakes.
- Do not skip any pages or leave blank spaces in a page.
- Do not remove any pages from the notebook.
- No loose leaf papers are to be included in the lab notebook.
- All entries should be made by hand except for computer printouts of schematic diagrams, or computer generated plots. All printouts should be trimmed to fit one page of the notebook and glued or taped into the notebook. Do not use staples.
- All data should be recorded directly in to the notebook at the time it is taken. Never write data on scrap paper.

Table of Contents

- Pages 1-3 of the notebook should be label “Table of Contents” at the top of the page, followed by the course name.
- The table of contents should have 3 columns. A first column labeled: “LAB #,” a second column labeled: “Description,” and a third column labeled: “Page #’s”.
- Include a table of contents entry for each of the major lab sections: Introduction, Design, Simulation, Measurements, and Conclusion) as well as any item specifically called out in the laboratory procedure.

Page Header

- All pages, excluding the Table of Contents and Appendix, should have a header that contains the following:
    - Lab #.
    - Signature of notebook owner/writer.
    - Name of lab partner.
    - Date. Each page should have at least one date, and all pages should be dated consecutively.
- Begin each lab on a new page.
- When continuing work on a lab on a new date, but on the same page as a previous dates work, add the new date to the beginning of the new work.

Contents

- **Introduction**
    - For ECE 214, the pre-lab includes the “introduction,” as well as the “design and simulation” sections for the lab. For ECE 342,343, these sections are to be completed according to the project timeline
    - Begin with the label “Introduction” followed by the title of the lab.
    - In the introduction, explain the ***what and the why***: objectives of the lab, what will be done, critical design equations to be used, as well as specifications, figures, or schematics that indicate the circuits/components which will be investigated.

- **Design** (this can be combined with the simulation section) and should include the following:
    - A complete schematic for each circuit designed. Label the values of each component, with appropriate units.
    - Complete the design in the notebook! Cross out errors, and x out complete pages if the work is completely wrong. By crossing out a complete section of work it indicates to the reader that the process or result is incorrect. This must be done to ensure the reader understands where valuable information can be found.
    - All circuit equations, such as equations from nodal analysis, should be included in the notebook.
    - Highlight, box or underline the final calculated results
    - Intermediate results carried out on a calculator do not need to be entered in the notebook.
    - Write small phrases or sentences transitioning between design steps so that another individual can recreate the same result reading your notebook

- **Simulation**
    - Label section “Simulation”, and the Lab #
    - Before each simulated result, indicate <u>what type of simulation is done and why</u>, and include all simulated plots and simulated schematics. All simulation results and schematics must be printed and taped or glued into the lab notebook.
    - All simulated final results must be printed. Intermediate steps can be shown but are not always needed. For example, if one resistor value was adjusted 10 times, only the final simulation needs to be shown.
    - The simulated schematic can be hand-drawn, although it must be indicated that the figure is the simulated schematic.
    - Make sure plots are legible, so that anyone can read the plots and or schematics. Also make sure that all specifications are indicated on the plots. For example, if you are to show the oscillation frequency of the oscillator in the time domain, show the trace points of the period so that the TA can calculate the frequency.
    - Include all re-calculations and re-simulations performed due to identified errors and or changes in the design.
    - The figures can be plotted in the simulator environment (e.g. Microcap) or another software package, such as Matlab, Origin, etc. The important point is that they should be formatted properly so that a third person can easily understand what is being plotted and the purpose of these plots.

- **Measurements** (including construction, testing and verification)
    - Label “Measurement” and the Lab #.
    - The notebook should contain a written description of each measurement. The description should be sufficient so that a reader could follow the work done and identify the results.
    - Describe the experimental setup completely. Indicate which instruments were used for which measurements, including make, model and serial number .
    - Include a schematic diagram for each circuit you constructed and measured. Label the values of each component.

- Indicate clearly the points in the circuit where voltage or current measurements were taken.
- Multiple or sequential measurements should be recorded in a table. Table headings should include the name of the variable and the units.
- Label each axis of a graph, including units, and give each graph a title and description.
- If something does not work or behaves unexpectedly, make a note of it. When you fix something, describe what was wrong and how you fixed it.
- Indicate all changes in the design, and include all re-calculations and re-simulations performed due to identified errors and or changes in the design.
- For each design or design change include:
  - Updated schematic (can be hand-drawn but must be indicated on the figure)
  - All measured results (plots) with specifications indicated on plots
  - It is highly suggested but not required (unless indicated) to measure component values used in the final schematic using an LCR or multimeter.
- Use tables to organize the collected data. For example: bias voltages on a MOSFET, peak amplitude values for incremental changes in the input, etc.

- **Conclusion**
  - Label “Conclusion,” and the Lab #.
  - Start the conclusion with a table comparing the designed, simulated, and measured results of the lab.
  - Also include changes in critical component values used to design the final circuit.
  - % Error is encouraged, but if % Error analysis is conducted, equations and method used to calculate % Error must be indicated
  - Write all objectives completed, and what was learned in the lab. Also include sources of error, additional questions you will ask the TA/Instructor, and indicate the final measured results.

Appendix

- In the back 10 pages of the lab notebook, Label and write “Appendix”.
- This section is used to record useful equations, learning objectives from the lab, references, as well as resources which can be used during open-notebook exams in ECE 214.