STUDENT LABORATORY REPORT FORMAT
(Approved by the ECE Department, 12/7/00)

A Lab Report should be a clear and concise presentation of engineering work you performed, and must include all relevant aspects of the lab experiment or exercise. The report must be presented in an appropriate professional format such that it could be read and understood by any technical person, even if they were not familiar with the lab. The following format guidelines must be followed for all lab reports. **Additional special instructions may be given to you by your instructor or in the Lab Manual for the course.**

The lab report must be prepared (typed) with a word processor. Equations and schematics can be neatly drawn by hand if you don't want to use your wordprocessor's equation editor or drawing program. The report should include the following elements:

I. Title Page

Each report shall have a cover page (plain paper acceptable) which will contain the following information: 1) Lab Title/Experiment Number, 2) Course Number and Title, 3) Instructor's Name and TA Name, 4) Name of student, 5) Date.

The body of the lab report consists of the following parts: Introduction/Objectives, Results and Analysis, and Conclusions. Each of these sections should be introduced by a bold, left-justified heading.

II. Introduction/Objectives

This section introduces the reader to the problem you are trying to solve and guides the reader through your approach to solve the problem. In a few paragraphs a concise statement is to be made of the goal(s) and purpose(s) of the lab. It should summarize approaches adopted and methods involved in carrying out the different aspects of the lab: test and measurement, CAD/CAE simulation, design and verification, etc. A typical sentence from the Introduction/Objective might be, "We built and tested three biasing circuits to determine the advantages of each for temperature stability and sensitivity to poorly-controlled transistor characteristics such as the current gain $."

The introduction may contain preliminary hand calculations that you have performed. For instance, if the circuit is an amplifier, you might use hand calculations to establish a suitable bias condition and justify the selection of initial component values based on these calculations.

Note on Technical Writing Style: Formal technical reports should always be written in the past tense ("we measured the voltage..." not "we measure the voltage..."). The pronouns "we" and "our" are OK (yes, even if you did the experiment by yourself), but "I", "my", or "you" are not to be used.

III. Results and Analysis

This section can be divided into one "Results" section and one "Analysis" section, or for multipart labs you may include subsections to discuss together the results and analysis of each part. For this second alternative, put a left-justified subheading on a separate line with a title for each part of the lab (for example, "Part 1. Biasing of Transistors").

A. Results

In the "Results" section present all experimental output in a clear and effective manner. You can refer to steps in the "procedure" of the lab write-up in the Lab Manual, but key schematics of circuit or logic designs should be reproduced in the report. You can cut and paste a Xerox from the lab manual into the lab report–be sure to give it a figure number and caption. This will allow you to refer to the diagram in your text, for example, "The resistor value was adjusted to achieve a balanced output as described in the lab manual, and the current through the meter A1 in Figure 1 was measured as a function of the source voltage V1." All equipment and hardware utilized in obtaining the results of your lab work must be recorded (type, make, model, etc). This record is important for someone to repeat the work performed or simply for

identifying an equipment feature that influenced your results.

Results are brought together in graphs or tables of data whenever possible. Use EXCEL, MATLAB, or other graphing program. *All graphs should be properly titled, large enough, numbered, their axis properly labeled including units, and they must have captions and numbers for easy reference.* Axis labels should contain the description of the quantity, the symbol, and the units (for example, "Diode Voltage, V (mV)"). Figures and graphs may be inserted after the page on which they are referred to (better: inserted in a Figure box on the page) or collected together at the end of the report. In either case, each figure, graph, or chart must have a figure number and a caption (example: "Fig 3: Current vs. voltage through the diode D1 for the circuit in Figure 1 with the V1 source voltage amplitude of 100V at 60 Hz."). Hand-written figure numbers and captions are OK, but *each figure number must be referred to somewhere in the body of the text.*

Important note: The lab report is your explanation of what you did and what it means; it is not a dump of 10 pages of instrument or computer output. If you don't comment on a figure, the assumption is that you don't know what it means or why it is there. Output that is presented but not described in the write-up will be assumed to be incomprehensible to the student and will result in a reduced grade. A good starting point is to try to use the minimum amount of output and other supporting material to adequately document your work. If you don't need to refer to a figure, leave it out! If a figure is required, make sure you explain its significance and what conclusions can be drawn from it.

B. Analysis

In the Analysis section you examine your results in light of theoretical predictions. Appropriate analysis is needed to provide comparison for evaluating your results and assessing their validity. For results of design tasks it is necessary to evaluate both the "function" as well as "performance" of your design based, respectively, on intended behavior (what it does) and design specifications (how well it is done).

Reconcile experiment and theory by identifying factors that influence your results (as quantitatively as possible) and may account for any discrepancy observed. If possible, indicate the error on your data: for example, indicate the noise level by "+/-5 μV" in your tables and put error bars on the data points in your graphs. Comparison of theory and experiment could take various forms: a composite plot of a pair of graphs--one labeled "theory" (usually a line) the other "experiment" (usually discrete points), a combined table with experiment/theory entries, or an error/discrepancy figure calculated as % deviation, etc.

IV. Conclusions

The conclusion (or summary) is one or two concluding paragraphs to the project. This section describes the work you did, conclusions that you draw from the work, and what you learned from the lab. It also includes, in a descriptive way, the results obtained. A typical sentence sequence in the summary might be: "Our analysis of the circuit showed that the value of R_C must be chosen within 5% of 50K in order for the circuit to work at all. However, by replacing R_C with a current mirror and choosing a transistor with an Early voltage greater than 100 volts, this problem is eliminated." You are expected to draw conclusions, identify important or significant engineering implications, and even recommend possible applications stemming from the work done in the lab.

V. Appendices

Use appendices for program code, long printouts, or data tables that are important to verify your results but unnecessary to the flow of your report. Also include here any original sheets with data entries, circuit designs, etc.

In closing, you are encouraged before turning in your report to review it as a critic and make in it last-minute revisions to enhance its presentation. Remember, the report is a reflection of your ability to perform good-quality work and to communicate it to others clearly and effectively.