

EE321 COURSE EVALUATION

Unique #: 14755

Instructor: Buckman

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The Lab Sessions

In our lab sessions we are to work a combination of computer simulations using Pspice software and experiments using actual components. Dr. Buckner mentioned that the 3-hour weekly lab sessions would probably be inadequate to complete the work and that we would need to come in at other times. Since I had Pspice on my computer at home, I elected to do the simulations at home and the lab work at school. I hoped to be able to work ahead to avoid any end-of-semester crunch. I was successful to some extent but found myself in the position of “pioneer” when it came to working through snags in equipment or procedures and also found myself testing the abilities of our TA.

The Teacher’s Aid Our TA, Vidhya Krishnan, is a graduate student who has previously taken EE 321. I found her to be dedicated, friendly, hard-working, and genuinely interested in helping her students. Unfortunately, she didn’t remember anything from her EE 321 experience. I don’t mean this as an affront against Vidhya, but see it as evidence of a serious problem with this course that in my estimation extends to lab courses in general. Other students reported similar experiences with their TAs. Vidhya was unable to answer most of my questions but would pledge to research the subject and have an answer by the next session. This was as much as she could do but was not adequate for my needs.

The Webb Mask The lack of knowledgeable leadership in the lab resulted in some creative problem-solving. For example, neither the TA nor I knew what a “Webb mask” was or how to use it. So I went to the supply room and asked for a Webb mask. What they handed me was indeed a Webb mask, just as I had hoped. I could infer from the pieces of tape that were stuck to the Webb mask that it was to be attached. There were no instructions with the Webb mask and I don’t think I ever used it correctly but it was interesting to try to figure it out and is probably an experience I will remember from the class.

The “Pioneer” Since I was often the first to attempt an experiment, I was asked a lot of questions by both students and the TA. I am happy to help, and often I was helpful; other times it was just a case of the blind leading the blind. Here is an example:

D-G-S or S-G-D? The use of the FET is introduced in Unit 4. This would be a good place to put an illustration showing the pinout of the J2N3819. I asked the TA what the pinout was and she didn’t know. Since I needed that information to proceed, I proposed that I ask at the Parts Bin and she said to let her know if I found out. The people at the Parts Bin told me that the pinout was D-G-S when looking at the top of the FET, flat side toward the viewer. And that is how this became the standard for our class. I understand that the source and drain are interchangeable to some extent so hopefully this didn’t hurt

the class too much. It was not until studying for the second proficiency exam that I discovered the conflicting pinout diagram located in the study material on page 171 of the manual. This is the wrong place to introduce this information. I was confronted with this new information when I began studying for the exam and had to spend most of my study time verifying the “new” pinout.

Is it Worth it? Laboratory classes involve an expense to the institution in terms of equipment, maintenance, space/time requirements, and staffing. What I mean by space/time is that the square footage per student in the laboratory is high compared to the classroom and that a 3-hour lab course actually consumes 5 hours of scheduled time plus whatever extra lab time is required. There is a tendency for this expense to be well out of proportion to the learning value. The EE 321 course provides an excellent example of this problem.

Off to a Rough Start The first lab sessions were omitted due to problems with the lab equipment and the recruiting and scheduling of TAs. This is not unusual. Classroom instruction was compromised by the failure of projection equipment on which the instructor relied heavily. As a result, the effectiveness of this class was severely compromised from the beginning. An apology was given, but no refunds were offered for failure to deliver expected lab and classroom services.

The “Golden Hour” It is my observation that the first days classes in general are compromised by a lack of preparedness. This may simply be a failure to have the syllabus printed, lack of a prepared lecture, or just getting hung up with roll call and administrative housekeeping. These early class days can be compared with the “golden hour” of a trauma victim. This refers to the first hour following an accident when treatment is most effective. For the student, the first days of class are the time when he or she is least encumbered by stress and workload and is most receptive to learning. The first session should always contain a lecture and a constructive assignment so that this valuable period is not wasted.

The Laboratory Workbook

I found the fall 1998 *EE 321 Electrical and Computer Engineering Lab I Laboratory Workbook* to have some shortcomings. First, pages are supposed to have only one page number. Each page of this workbook has one page number at the bottom and a different page number at the top. While it appears that every effort has been made to number the pages, there are no references to page numbers within the text of the workbook.

Locating Figures There are numerous references to figures by figure number. At one time, this method served to relieve the writer/publisher of the difficult task of tracking the page number on which a figure appeared. With modern software such as Microsoft Word, it is possible to apply a caption style to the figure’s caption and insert a page number cross-reference field in the location where the page number is mentioned. That way, as the manual is revised and the figure shifts position, page number references are easily updated. Additionally, a few clicks of the mouse produces a “List of Figures,” something else this workbook lacks.

There are several important figures in this workbook that are first referred to in the text in an instructive way and are later referred to as part of an exercise, i.e. “construct the circuit of Fig. 4.9.” In this case, the instructions appear on page 146 while the figure is on page 139 near the location where it was originally mentioned. To locate the figure, one must flip through the pages searching for other figures to use as reference points. These figure numbers must be picked out of an array of page numbers, section numbers, subsection numbers, plot numbers, unit numbers, task numbers, and equation numbers. When the figure is an integral part of an exercise, it would be best to repeat the figure next to the instructions.

Typos The errors in this workbook are of the type that will pass the spell check. But even an innocent little typo can be injurious to the fragile learning process. Examples of errors in this workbook are: p. 89 “The circuit if Fig. 3.1 provides,” p. 99 “a sine wave as the either the analog oscillator,” p. 99 “the sine save output of the analog,” and p. 133 “the circuit in Fig. 4.2.” The last example is in an exercise in which we are to use the circuit in Fig. 4.2, but 4.2 is actually a graph; the circuit we are to use is in figure 4.4.

Pspice Parameters The use of Parameters in Pspice is confusing and Pspice Help is no help. It would be helpful to have an example of the procedure for using parameters in the workbook. I did this in my notes--it only takes a couple of paragraphs.

Organization There are some good points to the organization of the workbook. The use of a different font to show tasks to be performed is very helpful. Goals are clearly presented in introductory sections. However, the student tends to get lost in the instructions so that goals are quickly forgotten in the interest of conquering the assignment. The most difficult task in the organization of a lab course seems to be presenting the instructions clearly enough that they can be executed successfully while the student remains cognizant of the lesson that he or she is learning.

Taking the Wrong Path A common result of laboratory work, is for the student to “disprove” accepted laws of physics without any idea of why it has happened. And after hours of carefully executing the instructions, the student has little ambition to spend more hours trying to correct the (unknown) problem. Of course, the purpose of the exercise has long been forgotten. And after all of this, what has the student learned? That valid laboratory results are sometimes elusive? This can be communicated without a demonstration.

It is clear that time-consuming laboratory work must be successful at all costs, even if this means handing the student the answers. Instructions should be painfully clear, step-by-step, with the purpose of each step and its anticipated results given so that the student remains aware of the significance of the exercise and does not embark on long, meaningless processes. The focus of the student’s work needs to return to the subject of the course and not be devoted to the interpretation of instructions.

For example, after grading one of the units of my lab book, the TA returns it to me and calls my attention to a particular graph I have plotted. The graph is not correct and she explains what it should look like. At this time I am deeply focused on the next unit and don't really recall much about the exercise. However I do recall executing the experiment because I questioned the results I was getting. For this reason I came in for extra time and conducted the experiment three times. Only when I was certain that I had faithfully executed the instructions did I complete the graph. What did I learn? The unit has been graded and I now have more important things to do.

Unclear Instructions An example of unclear instructions is found in the five-step method at the bottom of page 132. This is actually a subset of the instructions in Task 1 of Section 3.3. on page 135. These instructions should tell us what circuit to use but they don't. They do say to use the five-step method in Section 3.1 and just above step one it mentions that these steps can be used to measure parameters using "a circuit like that in Fig. 4.5." A careful rereading of the instructions and the five steps reveals that no other circuit is mentioned so we must assume the circuit in Figure 4.5 is the one. We begin the five-step process on page 132 applied to the circuit on page 124 to complete the chart on page 135 at some initial level of confusion.

I know I read through these five steps at least ten times, trying to understand what to do. The greatest improvement to this problem would be to put the circuit diagram on the same page as the five steps. I ended up redrawing the Figure so I could see the circuit and the instructions at the same time. Another source of confusion for me was in the table on page 135 where we are to put our data (an implied interpretation of the instruction). The headings look exactly like this:

RmO =					
Rml =					
vGS	volt	amplitude	current	amplitude	r

The vGS column is already filled in. Note the unusual spacing of the four words in the middle. How many columns is that? Where does my data go? After some false starts, I ended up composing my own table which helped me to understand that the workbook table has four columns and no place for my data, but only space for the calculated results.

The instructions on page 135 say to determine r for "an operating-point drain-to-source voltage $V_o = 0.5V$." This value varies when vGS is changed. I think we are supposed to readjust to hold the 0.5V value. Most students caught this, but it would be better to have this information in the instructions themselves.

In Task 2 of the problem on page 138, the instructions say, "Plot the results of Task 1 below. Provide an appropriate scale and units for the vertical axis." The horizontal axis is marked vGS (volts) but the vertical axis was unmarked. Although the instructions don't say which variable to assign to the vertical axis, it may be clear to the reader here that it would be r . Perhaps that is because here r is mentioned on the same page. In the

workbook, it is three pages back. It was not my first impulse to plot r , but I got that straightened out and redrew the graph.

The Class Newsgroup

The class newsgroup is a good way to distribute information. Unfortunately it did present some problem for me. I commute to UT from out of town. I have an internet account with a service provider (not UT). I have an Unix/PC account in the ECE department, but this is not a dial-up account.

Due to the configuration of the UT class newsgroups, it is not possible to access the newsgroups using an off-campus internet service provider. When doing so, the following error message is received: "Netscape is unable to locate the server: news.ece.utexas.edu The server does not have a DNS entry." I commute to school from Leander and can access the newsgroup at school on Monday, Wednesday, and Friday. It would be nice to have access during the rest of the week. The problem has been reported to the webmaster who acknowledges that it exists and suggests that I use Telnet.

Telnet is a relic from the dark ages and does not reproduce the images that the instructor sometimes uses to communicate information. I can understand that the college might not want its newsgroups to be public, but it is possible to set them up to require a password and be accessible using modern software. In fact, I subscribe to a newsgroup service that works that way. Presumably someone at a college of computer and electrical engineering would know how to set up the UT newsgroups so that they could be accessed off-campus using the student's username and password or ID number.

Conclusion

Instructors have no doubt heard complaints about the labs before. Perhaps this is taken as just the normal base level whining from students who don't want to do the work. In my case, I don't mind doing the work. I like to be involved with instruments, software, electrical circuits, etc., and I think my fellow students do as well. However, I do like to achieve something in the process. The engineering student has a heavy workload and time management is critical. When the student is spending time that he or she knows has limited productive value, it is only natural to be concerned about it. It is of particular concern when it involves a lab class due to the investment of lab fees and extra class time.

I do not offer a satisfactory solution to the problem. I do suggest that the entire concept of lab use be reevaluated. It is the sort of problem that may require revolutionary thought rather than an attempt to refine the existing situation.