**ECE 491/591/595/599 Document**

**Dr. Umbaugh November 5, 2022**

The following procedure outlines the requirements for an independent study/project/thesis course, ECE491/ECE591/ECE595/ECE599, in the Electrical and Computer Engineering Department at Southern Illinois University at Edwardsville with Dr. Umbaugh. ECE 491 is for undergraduates ONLY, and requires senior status and a 3.3/4.0 GPA. In order to be eligible for ECE 591 you must have completed 15 hours of ECE graduate coursework with a minimum GPA of 3.3/4.0.

In order to be eligible to take ECE 595/599 you must have completed 24 hours of ECE coursework with a minimum GPA of 3.3/4.0. The student should have taken ECE 438, 439 and 538 or 539 or 535 with a grade average of 3.5.

I**) PROPOSAL**. A proposal must be written and approved **before the term start**s. This proposal should contain: 1) project definition ‑ a short description of the work to be done (what), 2) project objectives ‑ goals, 3) strategy for achieving the objectives (how), 4) plan of action to implement the strategy (schedule ‑ when), 5) reporting ‑ how often?, 6) a description

of what will be done in the event of schedule deviation.

**II) NOTEBOOK.** During the research you must keep an engineer’s notebook, that meets the following requirements:

The engineer's notebook is one of the most important tools for any experimental/research work. This includes: basic research, product development, or engineering design. It is

primarily for the engineer's own use, but another person with similar technical background should be able to understand and duplicate any experiment, data, and conclusion, or to prepare a technical report following only the engineer's notebook.

There are many reasons to keep an accurate and complete written record of work:

1) to establish the authenticity of the work.

2) to defend patents.

3) to act as a basis for technical reports and papers.

4) to avoid duplication of effort.

5) to avoid repetition of procedures.

Content requirements: The notebook must be understandable to a person with a comparable technical background. It must be legible. It must stand alone; that is, "I went to the library"

is NOT an acceptable entry. Any references used, notes taken, etc., will be entered in the notebook.

The notebook must answer the following questions:

1. *WHAT WAS DONE?*  This includes the approach to the problem or project, as well as the procedure. If internet research is performed be sure to record all the important information: date and time, web site address(s), browser used. If possible download and keep your own copies of any important papers you find, data or other materials that you used. Remember there is no guarantee that the information will be available at a later date from the same source. If library research is performed, include all pertinent reference data: library used, call number, title, author, publisher, date of copyright, page numbers, and any notes to be used in later papers. If code is written and debugged, write down exactly what you did ‑ file names, library used, errors found/fixed, etc. If time is spent learning to use a software tool, list all references used, page numbers, and procedures. If tests are conducted on some device/circuit, clearly identify that device and give theoretical or nameplate characteristics. Include wiring diagrams and identify measurement equipment. Do not waste space with trivial or obvious details (for example, "turned on scope"), but do provide all essential steps. Another person should be able to repeat the what you did using your notebook alone.

2. *WHO DID IT?* List all individuals involved, including yourself, at the beginning of each entry. Initial all following pages. Any corrections or alterations should also be initialed.

3. *WHEN WAS IT DONE?* It must be obvious to any reader when the work was performed. Date all entries, also, include the number of hours spent. Do not leave blank spaces and NEVER "back‑date" entries (NEVER make ANY false entries in your notebook).

4. *WHAT ARE THE RESULTS?* if entry involves an experiment.

5. *WHAT DOES IT MEAN?*  Make observations and draw conclusions from the results of your work. Be precise and concise. Compare results to theoretical (give references). Specifically, why do you believe or disbelieve your results? Discuss errors.

The typical engineer's notebook available in bookstores will be blue, brown or black, is approximately 9"×12", and has about 100 to 150 pages. The notebook will be bound, never

loose-leaf, and the pages should be numbered consecutively, preferably by the printer. For the EE 491/591/595/599 you may use spiral notebooks, as long as each page is numbered and each entry is dated. Note that can keep a notebook on your computer, if it is convenient for you and you have all the utilities you need to follow our format.

A neat, organized and complete notebook record is as important as the investigation itself. The notebook is the original record of what was done. It is not a report to be written after completing an investigation. Do not write on scratch paper expecting to transfer it later to the notebook. Use a blue or black non‑erasable pen. Errors are not erased, but simply marked through with a single line so that they still can be read ‑ later you may discover that your "error" contains important information.

Leave the first page or two in the notebook blank for a Table of Contents. This is necessary so that each entry can easily be found. Use only the right‑hand, odd‑numbered pages for the notebook record. Use the left‑hand, even‑numbered pages for sketches, rough calculations, and memos to yourself. You may also place wiring diagrams and graphs on the left, opposite corresponding procedures and calculations. Do not leave any blank spaces/pages in the notebook.

**Format ‑ Technical Diary**

Organization of this format type is largely left to the engineer. Notes taken, wiring diagrams, experimental lists, procedures, data, and calculations are blended together

logically and chronologically to form a step‑by‑step diary describing work. Observations and conclusions are entered as they are made, and summarized at the logical end of a section.

This format is well suited for research and experimental work.

The notebook will be reviewed by the professor at regular intervals. It will also be utilized to write the periodic progress reports, and the final report:

**III) PERIODIC PROGRESS REPORTS**. Although not part of the notebook, the periodic report format will be used for supplemental reports at various times. The purpose of this format is to concisely report the conclusions, results, and a summary of the procedures of your work as the term progresses. It is not simply a typed copy of your notebook and should not contain that much detail. In industry, experimenters are often required to make periodic progress reports to inform supervisors about the important aspects of their work. It is important for engineers to be able to extract and effectively communicate essential details of their work. The periodic report should be typed using a word processor, pages numbered in the upper right‑hand corner, and double‑spaced. It should include the following parts:

1. Title page. This includes a descriptive title, date, name of the author, name of the person to whom the report is submitted, and course number.

2. Abstract. Give a brief summary of the work done and the results. Typically, this will be to one or two paragraphs, and one‑half to one page.

3. Table of Contents. This should contain a listing of all sections, subsections and the associated page numbers. Also, a list of figures and tables, with page numbers, should be included.

4. Body of report. Do not recopy the notebook. Summarize the important information. A circuit or block diagram or program listing (well‑commented!) may replace words. All diagrams, graphs and figures should be clear and concise.

5. Results and conclusions. It may be appropriate to include graphs here if they present results you were seeking; e.g., algorithm performance or operational characteristics of a device. Include examples of calculations that are critical to your results and conclusions.

6. References. This will contain all sources of reference: texts, lab manual, equipment manuals, etc. The information should be complete so that the necessary information can be easily found.

7. Appendices. As required. This will depend on the type of work and the specific requirements. It may include: supplemental graphs, calculations, equipment lists, theoretical derivations, copies of notebook entries, program listings, etc.

**IV) ECE 491/591/595 FINAL REPORT.** The final report will be submitted in two stages. First, a preliminary report will be reviewed, edited by the professor. This will be returned to the student, with comments, for a final edit. This edited version will be turned in and graded for the term grade. The format is the same as for the periodic report. It is the student’s responsibility to get the preliminary report turned in to the professor with enough time to have it reviewed, returned to the student, edited, and graded before the term ends. This normally means at least two weeks before the term ends. If this cycle is not completed before the end of the term, an incomplete will be assigned. If the course is not completed before the next term starts, an automatic reduction of one letter grade per term will occur. A new independent study course cannot be initiated while the student has a pending 491/591. Only one project course, ECE 595, is allowed.

***OR***

**IV) ECE 599 THESIS.** The thesis will be submitted in multiple stages. It is recommended that the student submit one chapter at a time. The general chapter outline of the thesis is as follows: 1) Introduction/Background, 2) Literature Review, 3) Materials and Methods, 4) The Research, 5) Discussion and Results, 6) Conclusions, 7) Future Work, 8) References. The thesis will be used for the Final Examination and Master’s Presentation which is the final step for completion of a Master’s Degree in Electrical and Computer Engineering.