



EXPERIMENT DESIGN GUIDE

Karadeniz Technical University Of Technology Faculty Electronics and Communication Engineering Department students will design and implement an experiment to replace the final exam in the laboratory courses they take in the 7th and 8th semesters. This file is prepared to guide them for "Experiment Design". Students have to apply the steps listed in this manual in their experimental designs.

Steps to follow:

1. For the first 5 (five) weeks from the beginning of the semester, observe and note the relevant laboratory, the experiments performed in the laboratory and the experimental materials used, including measuring instruments.
2. Make a list of experiments that cannot be done in the laboratory, but can be done with the equipment and measuring instruments available, and decide to do one of them.

As an experiment; input and output characteristics of a machine, electrical or electronic circuit, transient and/or steady state behavior, variations of output magnitudes with respect to inputs, obtaining the transfer function, demonstrating the accuracy of the mathematical model, deriving the equivalent circuit or testing the accuracy of the existing equivalent circuit, measuring the equivalent circuit parameters, fault detection tests, leak detection tests, software development for tests, development of computer-connected test systems, computer storage and evaluation of real data, or designs involving similar current topics thought by students can be realized.

3. Prepare an experiment sheet with the following content for the design of the experiment.
 - i. Subject title of the experiment. Give your experiment a suitable name.
 - ii. Purpose of the experiment: The purpose of the experiment should be stated in one sentence.
 - iii. Necessary equipment and measuring instruments: The machinery-equipment and measuring instruments to be used should be listed with their main features such as AA, DA, strong current, weak current, etc.
 - iv. Preparation questions: Questions should be listed to check whether other students are ready for the experiment.
 - v. General description of the experiment: Explain what will be measured and why and how the measurements will be evaluated.
 - vi. Theoretical relations: In the experimental setup to be established, mathematical relations between the inputs to be applied and the quantities to be measured and calculated should be given. Depending on the nature of the design, calculations can be made with values in continuous operation or with values and equations related to the transient solution.
 - vii. Connection diagram: The general wiring diagram of the experiment should be drawn and explained, and if there are any changes connected in different tests, these should be given separately and necessary explanations should be made.
 - viii. Measurement charts: Drafts of the charts where the data to be measured in the experiment will be entered should be prepared and placed in the experiment sheet. In these charts, it should be indicated what will be measured and the places where the measurements will be written should be left blank.
 - ix. Calculation charts: If calculations are made using measured quantities and new data are obtained, blank charts should be prepared for these and how the calculations will be made should be explained.
 - x. Result graphs: Explain which graphs should be drawn at the end of the measurements and calculations.
 - xi. Information about how to prepare a report at the end of the experiments should be given.



4. Submit the experiment you have designed to the laboratory supervisor and get approval for its feasibility.
5. Under the supervision of the laboratory supervisor or a research assistant assigned by him/her, perform the experiment you have designed on the day and time given to you and prepare an experiment result report. For this, follow the steps below.
 - i. Before you start performing the experiment, prepare a cover for your report. The cover should include a small logo of our university, the name of the university, the name of the faculty, the name of the department, the name of the relevant laboratory course, the name of the designed experiment, the number and name and surname of the student who designed it. The first page of the experiment result report should include the name of the experiment, the purpose of the experiment, the list of machinery and equipment to be used and the list of measuring instruments.
 - ii. Answer the preparation questions. Answer the preparation questions by continuing from the first page or starting from the second page.
 - iii. Draw the experimental connection diagram and additional diagrams, if any.
 - iv. Set up the connection setup of the experiment and perform the necessary tests. Record your measurements and fill in the measurement data sheets.
 - v. Calculate the data to be calculated and fill in the relevant calculation charts.
 - vi. Plot your data using appropriate software (MATLAB, MS EXCELL etc.) and explain and interpret them by transferring them to the results report. In particular, evaluate and comment on their conformity with theoretical expectations.
 - vii. Finish your report with an evaluation of the experiment. In this evaluation, it should be evaluated whether the experiment has achieved its purpose, what the student has gained and what can be done in the future if it is improved and suggestions should be made.
6. Submit the experiment sheet and the result report to the laboratory supervisor in a file.