Ryerson University *Department of Electrical & Computer Engineering*

*ELE 404*

***LAB RULES***


## Introduction

The following document outlines what is expected of students during lab sessions. Please read and follow it diligently.

**Attendance**

Attendance to all labs is mandatory. Lab sessions **start on-time as per Ryerson University policy,** in the room ENG 303.Students who arrive more than **30 minutes late** will receive a penalty of 25% of the corresponding lab mark. Students who arrive more than **60 minutes late** will receive a mark of **zero, irrespective of whether or not they participate**.

**Students must only attend their designated lab sections. No inter-section migrations will be permitted**. Students are asked to strictly adhere to their assigned timetable, section, and TA. If a change of section is required (e.g. due to a scheduling conflict) then the change must be done through the department, such that the course instructor and the student’s new TA can see the change in RAMSS and D2L.

**Failure to attend either a lab** without a verifiable medical reason **will result in an** **automatic zero** for that particular lab, and **there will be** **no make-up session**. If a lab or quiz has been missed due to a medical reason, students must provide their home department with the proper documentation. Additionally, students are responsible for asking their home department to inform the course instructor that the proper documentation was received. The course instructor will then determine how to handle the missed assignment.

**Lab Kit**

**Each lab partner must have their own lab kit. In addition, you will need a breadboard and a sufficient number of jumper wires** as the lab kit does not include them.Students without a lab kit will not be permitted to participate and will receive a mark of **zero** for that particular lab. Lab kits are sold by the department at the beginning of the term; the announcement will be made through D2L. The students, however, have the choice of buying the components elsewhere. Please see the list of lab kit components at the end of this document should you wish to pursue that option.

## Labs

Each lab consists of three parts:

1. An **individual pre-lab** assignment;
2. The lab work (i.e. the experiment itself) and delivery of a completed “**TA Copy**” page of the experimental results; and
3. A formal group lab report.

The three parts are explained below:.

## 1) Pre-lab Assignment

Pre-lab assignments are important **individual activities.** A pre-lab assignment consists typically of two parts: an analysis exercise (with manual calculations) and a simulation study. The purpose of the pre-lab assignment is to determine, theoretically, what one should expect to see during the experiment. Thus, the analysis exercise provides preliminary results while the simulation study provides some level of verification for those results. Not only do pre-lab assignments help with learning the material, but they also reduce the chance of both lab partners having inaccurate values coming into the lab.

To do a pre-lab assignment, print out the lab manual, complete the pre-lab tables on the printed lab manual, and answer pre-lab questions on the manual. Append extra sheets both for manual calculations that could not be fitted on the manual and for the simulated waveforms. Make sure that the attachments are well-presented, legible, and labeled properly (they do not have to be typed up, though). Although simulation software may automatically label the graphs, you must properly re-title the graphs, include units in the axis labels, and re-scale the axes to properly fit and present the graphs. **Failure** **to present the complete pre-lab assignment** **at the beginning of a lab session** **will result in an automatic mark of zero** for that particular lab. Further, t**o receive the pre-lab assignment mark, all work must be shown**. The TA must clearly see all of the analysis steps taken, in order to grant full mark. Note that simulation results cannot substitute manual calculations (i.e., the analysis) required by a pre-lab assignment; **both the analysis and simulation results must be presented.**

**Make sure that the TA signs your pre-lab before you start the experiments.**

## 2) Lab Work (Experiment)

Each experiment is performed by a **group of no more than two students**, although one-member groups are permitted if the availability of workstations permits. Although the lab work is typically performed in groups of two students, it should not be considered as a group activity. Rather, students are grouped solely due to lab resource limitations. Therefore, **every student** **is** **individually responsible** for his or her own learning and **should not expect to be necessarily partnered with another student**.

**Each lab partner must have their own lab kit.** Students without a lab kit will not be permitted to participate and will receive a mark of **zero** on that particular lab. Lab kits are sold by the department at the beginning of the term. Lab kit components are listed in the last two pages of this document, for students who wish to purchase their components elsewhere.

In general, performing a lab experiment is simply a matter of following the steps specified in the lab manual of the corresponding lab. During the experiment, students are expected to follow all the departmental guidelines. Students please read the lab rules and emergency procedures posted on the entrance door, in particular take note that, **no food or drinks are allowed in the labs.** Food and drink must be kept sealed in your bag and under the lab bench.

Once a group has finished their experiments, the corresponding **“TA Copy”** page must be completed and submitted to the TA. Also, the **TA shall sign your experimental results**. If the manual asks **for oscilloscope screenshots, make sure that the date and time stamps are correct and captured**, as these will be checked by the TAs on your lab report. **Only the measurements included in the “TA Copy” page will be marked on the final lab report**. Therefore, it is up to the student to ensure that the **“TA Copy”** page is complete.

## 3) Lab Report

Each group will submit a lab report, which is formal in the sense that it must be typed up and properly formatted. All of the required figures and tables must be included, and they must be labeled clearly and properly.

The following are the integral parts of a lab report (no more, no less):

1. **The standard cover page** indicating the name of the lab, date, and names and student numbers of the group members;
2. **A statement of the objectives**, in a few short sentences (not a copy and paste reiteration of the Introduction statement of the lab manual);
3. **Signed-off pre-lab assignments of the group member(s)**; and
4. Experimental results (including the tables and **oscilloscope screenshots with the date and time stamps**). **Make sure that the screenshots and tables are labeled according to the lab manual**.
5. **Elaborate answers to the questions in the “Conclusions and Remarks” section** of the lab manual. Simple one-sentence answers are not sufficient. While some answers may be considered technically correct, the TA will also be looking for your demonstrated understanding of the theory behind the experiment. Explanations must be provided when experimental results do not agree with results obtained in the pre-lab assignment.

Note that **no credit will be given to reiteration of what is already stated in the lab manual** as the introduction, theory, steps, and so on.

**Each lab report is due on the next date when the TA is to be seen in the lab**. The deadlines are also mentioned in the course outline. The lab reports must be handed in directly and personally to the TA. Consequently, lab reports that have been slid under any office door, or given to the front office staff of the department, or communicated through any method other than being directly handed to the TA in charge, will receive a grade of **zero**. **Late submissions will be penalized by 25% of the entire mark per day, including the weekends.**

**Academic integrity is taken** **very seriously**. If a pre-lab assignment, or a lab report is identified by the TA as having been copied, all the parties involved in the misconduct will receive a mark of **zero** for that particular lab.

## Required Electronic Components

The following list indicates the components present in a standard lab kit. Please note that **you shall also need a breadboard and a sufficient number of jumper wires.**

**Lab Kit Components**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Quantity** | **Part No.** | **Description** | **Check** |
| 1 | 2 | 10r | ¼ Watt 5% Resistor |   |
| 2 | 2 | 91r | ¼ Watt 5% Resistor |   |
| 3 | 2 | 100r | ¼ Watt 5% Resistor |   |
| 4 | 2 | 180r | ¼ Watt 5% Resistor |   |
| 5 | 2 | 220r | ¼ Watt 5% Resistor |   |
| 6 | 2 | 270r | ¼ Watt 5% Resistor |  |
| 7 | 2 | 330r | ¼ Watt 5% Resistor |   |
| 8 | 2 | 470r | ¼ Watt 5% Resistor |   |
| 9 | 2 | 560r | ¼ Watt 5% Resistor |  |
| 10 | 2 | 820r | ¼ Watt 5% Resistor |  |
| 11 | 2 | 910r | ¼ Watt 5% Resistor |   |
| 12 | 2 | 1k0 | ¼ Watt 5% Resistor |   |
| 13 | 2 | 1k2 | ¼ Watt 5% Resistor |   |
| 14 | 2 | 1k5 | ¼ Watt 5% Resistor |   |
| 15 | 2 | 2k2 | ¼ Watt 5% Resistor |   |
| 16 | 2 | 2k7 | ¼ Watt 5% Resistor |   |
| 17 | 2 | 3k3 | ¼ Watt 5% Resistor |   |
| 18 | 2 | 3k9 | ¼ Watt 5% Resistor |   |
| 19 | 2 | 4k7 | ¼ Watt 5% Resistor |   |
| 20 | 2 | 5k6 | ¼ Watt 5% Resistor |   |
| 21 | 2 | 6k8 | ¼ Watt 5% Resistor |   |
| 22 | 2 | 9k1 | ¼ Watt 5% Resistor |   |
| 23 | 2 | 12k | ¼ Watt 5% Resistor |   |
| 24 | 2 | 15k | ¼ Watt 5% Resistor |   |
| 25 | 2 | 22k | ¼ Watt 5% Resistor |   |
| 26 | 2 | 27k | ¼ Watt 5% Resistor |   |
| 27 | 2 | 33k | ¼ Watt 5% Resistor |   |
| 28 | 2 | 47k | ¼ Watt 5% Resistor |   |
| 29 | 2 | 56k | ¼ Watt 5% Resistor |   |
| 30 | 2 | 62k | ¼ Watt 5% Resistor |   |
| 31 | 2 | 68k | ¼ Watt 5% Resistor |   |
| 32 | 2 | 91k | ¼ Watt 5% Resistor |   |
| 33 | 2 | 180k | ¼ Watt 5% Resistor |   |
| 34 | 2 | 220k | ¼ Watt 5% Resistor |   |
| 35 | 2 | 330k | ¼ Watt 5% Resistor |  |
| 36 | 2 | 820k | ¼ Watt 5% Resistor |  |
| 37 | 2 | 910k | ¼ Watt 5% Resistor |   |
| 38 | 2 | 1M0 | ¼ Watt 5% Resistor |   |
| 39 | 2 | 2M2 | ¼ Watt 5% Resistor |   |
| 40 | 2 | 10M | ¼ Watt 5% Resistor |   |
| 41 | 10 | 10k | ¼ Watt 5% Resistor |   |
| 42 | 10 | 100k | ¼ Watt 5% Resistor |   |
| 43 | 2 | 0.022uF | 100V Polyester Capacitor 223 |   |
| 44 | 2 | 0.01uF | 100V Polyester Capacitor 103 |   |
| 45 | 6 | 0.1uF | 100V Polyester Capacitor 104 |   |
| 46 | 4 | 1.0uF | 100V Polyester Capacitor 105 |   |
| 47 | 2 | 100uF | 35V Electrolytic Capacitor Radial |   |
| 48 | 4 | 10uF | 35V Electrolytic Capacitor Radial |   |
| 49 | 4 | 1N4004 | SI-Rectifier Diode |   |
| 50 | 8 | 1N4148 | Small Signal Diode |   |
| 51 | 2 | 1N4729A | SI-Zener Diode 3.6 Volt |  |
| 52 | 2 | 1N4735 | SI-Zener Diode 6.2 Volt |   |
| 53 | 2 | 2N3904 | BJT Transistor NPN |   |
| 54 | 2 | 2N3906 | BJT Transistor PNP |   |
| 55 | 4 | BU-60 | Standard Alligator Clip (Barrel Connection for Banana Plug) |   |
| 56 | 1 | Hook up Wire | #22 1 Meter long |   |
| 57 | 1 | Scope Probe | 60Mhz Scope Probe 10:1 Circuit Test OP-60A |   |
| 58 | 1 | 1k Trim Pot | Mini Trim pot |  |
| 59 | 2 | 10k Trim Pot | Mini Trim pot |   |
| 60 | 4 | Test Leads | Alligator Clip Test Leads |   |
| 61 | 2 | ALD1106PBL | N-Channel MOSFET Transistor Array |   |
| 62 | 1 | ALD1107PBL | P-Channel MOSFET Transistor Array |   |
| 63 | 5 | SSL-LX5093HD | Red LED |   |
| 64 | 2 | MCL053GD | Green LED |  |
| Kit Supplier | Active Tech Electronics Canada |
|  | 416-498-9886 |
|  | Please check kit to ensure completeness. |
|  | You have 2 weeks from the date of purchase to claim missing items. |
|  | See Jim Koch in ENG418. |