



School of Electrical Engineering and Telecommunications

Term 3, 2021
Electrical Technical Stream - Lab Program

ENGG1000 Introduction to Engineering Design and Innovation

Electrical Technical Stream Lab Program

The motivation behind these laboratory exercises is to expose you to some of the technical concepts and ideas that will be useful for you in designing electrical circuits for your ENGG1000 projects.

Due to time limitations, we cannot provide more than an introduction and brief explanation of these concepts, and our aim here is more to expose you to some basic features of electronics. For more detailed explanation you are encouraged to consult textbooks and websites on this material.

Your most important resource in the labs is lab tutors. You're wasting a valuable and important resource if you are not regularly asking these tutors questions and for explanations.

The second point to emphasize is to take accurate notes when you work through these exercises. Many of the ideas you see here will be useful in your design project, and you want to make sure you can accurately repeat what you do here in your design development work. A journal recording of your circuits, settings, and measurement results will be a valuable asset to you later on and is something that should become a habit whenever you do experimental work in the laboratory.

Electrical Technical Stream Lectures

The electrical technical stream has recorded lectures. These are released before your lab session according to Table 1. You **must** watch these recorded lectures sometime before your technical laboratory session on the Thursday. Not watching these recorded lectures will mean you may not understand the content in the laboratory session which may negatively affect your technical stream mark.

Table 1: Electrical Stream Lectures.

Week	Date that recording is released on Moodle	Lab content relates to	Content covered
2	23/09/2021	Lab 1	Introduction to voltage, current, resistance, power and energy and resistors
2	23/09/2021	Lab 1	Important circuit equations, useful simple circuits, and voltage sources
3	30/09/2021	Lab 2	Introduction to diodes, LEDs, photodiodes, phototransistors
3	30/09/2021	Lab 3	Introduction to transistors
4	7/10/2021	Lab 4	Introduction to DC motors and electric drive circuits

Assessment Guidelines

The breakdown of the electrical technical stream assessment items is shown in Table 2.

Table 2: Electrical technical stream assessment breakdown.

Assessment Item	Percentage of Final Course Grade
Laboratory Work	20%

Laboratory Work (20%)

Checkpoints are listed throughout the four laboratory task sheets. There are four checkpoints in labs 1 and 2 and five checkpoints in labs 3 and 4. This means that there are 18 checkpoints in total. You will achieve 1.33% for each checkpoint, which means that you will need to do 15 checkpoints to get the full 20% of the technical stream assessment.

Each checkpoint will have a task that you need to complete. This generally involves designing a circuit and demonstrating correct functionality. You should show your functioning circuits to a lab demonstrator to be signed and noted as having completed that checkpoint.

The labs and the associated content covered is shown in Table 3. Note that the final Laboratory Work marks will be totaled at 5pm Thursday Week 8.

Table 3: List of laboratory programs for the electrical technical stream.

Lab. No.	Week No.	Content Covered
1	3	Circuits on TinkerCAD, resistors, breadboards, important lab equipment, introduction to component ratings
2	4	Voltage/current divider circuits, batteries LEDs, IR LEDs, phototransistors
2	5	Same as above
1-2	6	Optional open lab session
3	7	Temperature sensors, force sensors, transistors, transistor motor drive circuits
4	8	Voltage regulators, DC motors, H-drive motor drive circuits, servo motors, ultrasonic distance sensors

General Guidelines for Electronics

Particularly when you begin to work on larger, more complex circuits, there are many things that can go wrong. It is unrealistic to expect to connect all the components together and expect them to immediately work. It is important that you incrementally test every component and connection as you build your circuit.

Only if every unit works can you expect the entire circuit to function properly. When debugging a circuit bear this in mind, and progressively check each component to verify that it is working as expected and that they are connected in the correct orientation. As a last resort, ask a demonstrator for assistance.

If you are unsure about anything during a session, please ask a demonstrator.

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