Dyson School of Design Engineering

DE 1.3 Electronics Laboratory Oral Examination Guidelines

Peter Cheung, version 3.0

19 June 2020

Assessment on Home Laboratory this year will be in the form of a 15-minutes oral examination for each student on Thursday 25 June 2020 from 10.00am to 5.00pm. This will be conducted via Teams. **Your assessor will call you at the scheduled time and you MUST be on Teams ready to reply**.

A schedule for the examination can be found on the course webpage and is also attached here. **This is a formal assessment and you are REQUIRED to participate. Due to the tight schedule, please be sure that you are on standby to answer the MS Teams call at least 5 minutes before your allotted time.**

The purpose of the Oral examination is to establish how much you have learned from these Home Lab Sessions and to give you a chance to show what you have accomplished on the Challenges. Questions will be asked to establish your level of understanding and how well you have conducted the experiments, including the effective use of your logbook. You are not required to memorize anything. To save time, you should have your logbook open ahead of the Oral Assessment session, ready to share your screen with your Examiner.

Your examiner will ask you questions from the four lab sessions, often requiring you to refer to your electronic logbook. For example, he may ask you to show a measurement of a signal in Lab 1 and explain your measurement. You will then be asked to show the Challenge(s) you have achieved. You should record a video ahead of time of your Challenge(s), in case live demonstration is not possible or not working at the time.

Your assessor will then complete a feedback form. A copy of the feedback-assessment form is attached here. The completed form will be returned to you as feedback within two weeks.

The Oral Assessment is worth 30% of the module.

Learning Outcomes of Home Laboratory

This section serves as a checklist for you to assess how much you have learned from the four experiments that you have completed.

Lab 1: Using the Oscilloscope

Measurement of AC and DC voltages with proper scaling in voltage and time axes; Make measurements on time and period with appropriate adjustment of the time axis; Make relative measurements; Effective use of the trigger mechanism to get a steady waveform; Using the scope to measure various type of signals with appropriate degree of accuracy; Make sense of complex digital signal such as a UART signal.

Lab 2: Electronic circuits

Voltage divider circuit and its use; Thévenin equivalent circuit; Effect of loading on a signal source; Nodal analysis with KCL/KVL to predict voltage measurements; RC network response to a rising step signal; RC time constant and its measurement; Trading off R with C in a RC network; frequency response of a RC circuit in log/log axes; meaning of dBs for voltage ratio measurements; Corner frequency and its relationship to RC time-constant.

Lab 3: Operational Amplifiers

The principle of operation of a unity gain buffer amplifier and why it is useful; Designing and testing of non-inverting amplifier using opamp and how its gain is determined; Why AC coupling is necessary and how it is achieved; How to bias an AC coupled amplifier with a separate voltage reference; Gain-bandwidth Product of an op-amp; Two-stage amplification; Amplifying a real-life signal (e.g. ultrasound); Audio amplifier for driving speaker or low impedance load.

Lab 4: MicroPython, Sensors and Drivers

Using Python on the ESP32 module; digital I/O; analogue I/O; PWM signal and using it to control DC motor speed; Hall-effect sensor; servo motor principle; neopixel strip and how to use it; principle of the rotary encoder; Use of OLED display; High-level understanding of embedded software running on a microcontroller.

Home Lab Oral Schedule – Thursday 25 June 2020

Surname	Given Names	Time	Examiner
Planck-Prideau	Leo	10.00 - 10.15	Boyle
Field	Robert	10.00 - 10.15	Cheung
Cutner	Louis	10.00 - 10.15	Cullen
King	Amber	10.00 - 10.15	McInery
Lee	Michelle	10.15 - 10.30	Boyle
Mak	Justin	10.15 - 10.30	Cheung
Li	Shijing	10.15 - 10.30	Cullen
Rebollini	Daniel	10.15 - 10.30	McInery
Castillero Garc	Paula	10.30 - 10.45	Boyle
Vohla	Leonhard	10.30 - 10.45	Cheung
Teoh	Khai	10.30 - 10.45	Cullen
Driessen	Jasper	10.30 - 10.45	McInery
de Pedro Saras	Itziar	10.45 - 11.00	Boyle
van der Klink	Marie	10.45 - 11.00	Cheung
Pill	Owain	10.45 - 11.00	Cullen
Al-Azzawi	Leila	10.45 - 11.00	McInery
Li	Kevin	11.15 - 11.30	Boyle
Ehrmann	Theo	11.15 - 11.30	Cheung
Schlote	Harry	11.15 - 11.30	Cullen
Grunberg	Nadav	11.15 - 11.30	McInery
Tang	Chuankai	11.30 - 11.45	Boyle
Syn	Julian	11.30 - 11.45	Cheung
Li	Yangfangzhen	11.30 - 11.45	Cullen
Perez-Rasilla N	Diego	11.30 - 11.45	McInery
Lombard	Martin	11.45 - 12.00	Boyle
Yan	Jiawei	11.45 - 12.00	Cheung
Bralsford	Alana	11.45 - 12.00	Cullen
Stephenson	Benjamin	11.45 - 12.00	McInery
Yang	Ruyuan	12.00 - 12.15	Boyle
Xu	Jiajun	12.00 - 12.15	Cheung
Faraud	Sylvain	12.00 - 12.15	Cullen
Redgrave	Ellen	12.00 - 12.15	McInery
Boguslavskiy	Matvey	13.00 - 13.15	Boyle
Del Portillo	Esther	13.00 - 13.15	Cheung
Matthews	Theo	13.00 - 13.15	Cullen
Solan	Guy	13.00 - 13.15	McInery
Al Quraishi	Mustafa	13.15 - 13.30	Boyle
Barker	Michaela	13.15 - 13.30	Cheung
Barzykina	Irina	13.15 - 13.30	Cullen
Stubbs	Eleanor	13.15 - 13.30	McInery
Fattal	Carine	13.30 - 13.45	Boyle
Kutluay	Sena	13.30 - 13.45	Cheung
McDermott	Tomas	13.30 - 13.45	Cullen
Rass	Mattias Erik	13.30 - 13.45	McInery

Surname	Given Names	Time	Examiner
Skinner	James	13.45 - 14.00	Boyle
Hwang	Junseo	13.45 - 14.00	Cheung
Chen	Xingtong	13.45 - 14.00	Cullen
Mahal	Aran	13.45 - 14.00	McInery
Soligo	Anna	14.15 - 14.30	Boyle
Grut	Ruby	14.15 - 14.30	Cheung
Lefevre	Tim	14.15 - 14.30	Cullen
Giulia Billari	Camilla	14.15 - 14.30	McInery
Lowe	Joshua	14.30 - 14.45	Boyle
Qiao	Qingchen	14.30 - 14.45	Cheung
Allday	Rebecca	14.30 - 14.45	Cullen
Williamson	Eve	14.30 - 14.45	McInery
Kim	Tae	14.45 - 15.00	Boyle
Foong	Samantha	14.45 - 15.00	Cheung
Seymour	Lewis	14.45 - 15.00	Cullen
Uvovo	Tristan	14.45 - 15.00	McInery
Liu	Zhiyuan	15.00 - 15.15	Boyle
Gao	Tianying	15.00 - 15.15	Cheung
Rerolle	Sibylle	15.00 - 15.15	Cullen
Guss-Renton	Imogen	15.00 - 15.15	McInery
Tsang	David	15.30 - 15.45	Boyle
Wang	Wenhao	15.30 - 15.45	Cheung
Taylor	Archibald	15.30 - 15.45	Cullen
Panpoonsup	Pitiporn (Fern	15.30 - 15.45	McInery
Knight	Hannah	15.45 - 16.00	Boyle
Bachowski	Jan	15.45 - 16.00	Cheung
Wood	Madelaine	15.45 - 16.00	Cullen
Smith	Freya	15.45 - 16.00	McInery
Cox	Augustus	16.00 - 16.15	Boyle
Mandal	Naini	16.00 - 16.15	Cheung
Lee	Lok	16.00 - 16.15	Cullen
Folkes	Joseph	16.00 - 16.15	McInery
Marshall	Elyse	16.15 - 16.30	Boyle
Wisskirchen	Sean	16.15 - 16.30	Cheung
Widjaya	Michael Adhip	16.15 - 16.30	Cullen
Gunn	George	16.15 - 16.30	McInery
Santosa	Mikael	16.30 - 16.45	Boyle
Espinoza	Fernanda	16.30 - 16.45	Cheung
Kalogroulis	Christopher	16.30 - 16.45	Cullen
Lim	Tristan	16.30 - 16.45	McInery
Godden	Thomas	16.45 - 17.00	Boyle
Wang	Tianxiao	16.45 - 17.00	Cheung

Imperial College London

DE 1.3 Electronics 1 – Oral Examination Feedback Sheet (25 June 2020)

Name of Student:

Oral Grade:

Names of Assessors:

1. Mastery of the practical skills such as the use of the scope to make measurements

☐ Excellent   ☐ Good   ☐ Acceptable   ☐ Poor   ☐ V. Poor

2. Understanding of the theories behind the experiments

☐ Excellent   ☐ Good   ☐ Acceptable   ☐ Poor   ☐ V. Poor

3. Ability to relate experimental observations to theories

☐ Excellent   ☐ Good   ☐ Acceptable   ☐ Poor   ☐ V. Poor

4. The Challenges

☐ Level 4 - Impressive   ☐ Level 3 – Very good   ☐ Level 2 – Competent   ☐ Level 1 - Adequate

5. Based on evidence presented, how much has the student done?

☐ Beyond Expected   ☐ Fully   ☐ Mostly   ☐ ¾ to ½   ☐ Less than ½

6. Logbook Effectiveness

☐ Highly effective   ☐ Effective   ☐ Acceptable   ☐ Poor   ☐ non-existent

FEEDBACK TO STUDENT: