DE1.3 Electronics 1
Planning Document for Remote Delivery

Peter Cheung, 4 May 2020

Introduction

Due to the worldwide measure in combating the spread of the Coronavirus causing Imperial College to shutdown the campus, all teachings and assessments in the Summer Term of 2020 will be delivered remotely away from the campus. This document describes my plans for delivering Electronics 1 and its learning outcomes without students physically attending classes, tutorials and laboratory sessions. Everything is new to everyone. Therefore, this plan is preliminary and is subject to change based on the changing circumstances and experience gained during the term.

Guiding Principles

This module was originally designed to following some guideline principles. These principles remain unchanged. You can read about this from the document "*Course Design for Year 1 Design Engineering EE Module*", 1 Feb 2015, on the course webpage. (See QR code.) This module has been delivered four times previously and has been very successful. Students not only enjoyed learning about electronics, some for the first time, they also had fun along the way.

However, remote teaching means that I have to adapt this module and the way it is delivered in a completely new way. Here are the guiding principles in addition to the five principles laid out before due to the current crisis:

1. **Maintain practical component where possible** – My module has always been hands-on with rigorous theoretical underpinning. I therefore strive to provide practical experimentation to support learning.
2. **Maintain group learning** – In previous years, students work in pairs, then groups of fours in the lab. This meant that students learned as much from each other as from me. This should continue remote in spite of everyone being separated.
3. **Anytime, anywhere, and in bite sizes** – Now that everyone are not together and there are really no convention lectures, I will endeavour to deliver the teaching materials offline, and in smaller quantities (bite size). Each topic or sub-topic can now form an integral unit in a session that is much shorter than the previous 2-hour slot. Each can then be supported by work exercises, practical experiment, tutorial and quiz (to check that you have learned what's required).
4. **Small group teaching** – Talking to everyone as a group of 87 is not going to be practical or efficient. I will try to minimize these all-class sessions. Instead, I will organize weekly tutorials where small groups of students have access to one of four tutors to ask questions and for us to keep check on your progress.

Practical Experimentation – Home Lab

Since you will not have access to the Electronics lab, I have designed an alternative scheme. This module will start in the week beginning May 4. I plan to send to all students by the week of May 11 a package containing instruments and components that support home laboratory sessions for this module. I will be giving you written instruction each week on the various experiments that I want to carry out. They will be based on the same four to five laboratory sessions that were designed for DE students in the past, but modified for working from home.

Assessment

Assessment for this module will consists of three components: written examination at the end of the term (60%), an assessment on the practical home lab sessions and further challenges (30%), and finally weekly multiple choice quizzes that is completed (full marks) or not (zero mark) (10%). There is a further 5% bonus marks awarded at my discretion based on contributions and engagements on the Forum within MS Teams group for this module.

The Teaching Team

Module Lead:	Prof Peter YK Cheung
Module Co-lead:	Dr David Boyle
Teaching Assistants:	Mr Ian McInerney, Mr Andrew Cullen

Recommended Textbook

"*Practical Electronics for Inventors*", 4th Edition, Paul Scherz & Simon Monk.

https://www.amazon.co.uk/gp/product/B01D5LXUYI?pf_rd_r=0X6KX4M075AHGACHK0YE&pf_rd_p=e632fea2-678f-4848-9a97-bcecda59cb4e

This is an excellent book that is very reasonably priced (under £30) and will be useful throughout your career. It serves both as a textbook for this module and a reference book in the future when you need to look up a topic on electronics. Although you can get by without owning this book, I strongly recommend it. You are likely to find it helpful.

Whole class teaching

I will be delivering the taught materials during the schedule sessions on Tuesday and Thursday mornings between 10 am and 12 noon. The exact form of delivery is yet to be decided, but I will be using MS Teams. An invitation will be sent out to you to join.

Small group support

The three-hour laboratory sessions on Thursday afternoon (2pm to 5pm) will become small group teaching. You will be divided into small teams, and each team will spend 30 minutes with a member of the Teaching Team to discuss your progress and to answer questions. We will check how the entire team is doing during these sessions.

Quizzes

There will be five quizzes, one per week starting on the 2nd week of the module (week starting 11 May) in the form of online multiple-choice questions. The quiz will be posted on MS Teams on Friday and you have until 12 noon on Monday to complete. The answers to the quiz will become available immediately after the completion deadline for you to check for yourself. Each quiz carries 2% marks awarded for participation (not for getting the right answer). Of course, I encourage you to attempt to do your best, and then check the answer to see if you understand the topic in the quiz.

Course Materials

All my course materials and contents will be posted on my own course webpage. This can be found on: http://www.ee.ic.ac.uk/pcheung/teaching/DE1_EE/

Teaching Schedule & Topics (preliminary)

This module is scheduled for two 2-hours teaching sessions (Tuesday and Thursday 10 am to 12 noon), and one 30 minutes tutorial session (in small group) per week for 7 weeks. The tutorial will be scheduled to fall between 2pm and 5pm on Thursday.

The final week is for written examination and oral assessment of the Home Lab.

Week Starting	Topic	Home Lab	Home work
27 April	1 – Introducing the module	None	Read this document
4 May	2 – Current, voltage, power & Ohm's Law 3 – Resistors and resistor circuits 4 – Nodal analysis & Kirchhoff 's Laws 5 – Introducing the Home Lab Kit	Watch video on multimeter & oscilloscope	Problem Sheet 1
11 May	6 – Electrical signals Demo 1 – setting up the signal generator 7 – Linearity, superposition & equivalent circuits 8 – Measuring electrical signals	Lab 0: Unpacking the Kit and get ready for Labs Lab 1: Measurements using the multimeter & Scope	Problem Sheet 2 & Quiz 1
18 May	9 – Capacitors and RC circuits 10 – Frequency response & transient behaviour in circuits 11 – Diodes & transistors, idea of amplification 12 – Lab 2 explained	Lab 2: Circuits based on resistors & capacitors	Problem Sheet 3 & Quiz 2
25 May	13 – Operational Amplifier circuits 14 – Number systems, digital signals & logic gates 15 – Simplified view of a computer system 16 – Lab 3 explained	Lab 3: Operational Amplifiers	Problem Sheet 4 & Quiz 3
1 June	17 – ESP32 & Micropython 19 – Inductors, transformer and electromagnets 19 – Drive: PWM, H-bridge, Servo motors, Neopixels	Lab 4: Programming ESP32 using Micropython	Problem Sheet 5 & Quiz 4
8 June	20 – Lab 4 explained 21 – Sense: transducers and sensors 22 – Link: UART, I2C, SPI, Bluetooth, Wifi 23 – Source: batteries, solar panel, dynamo	Lab 5: Challenges with Stretched Goals – part 1	Problem Sheet 6 & Quiz 5
15 June	24 – Revision lecture 1 25 – Revision lecture 2	Lab 6: Challenges with Stretched Goals – part 2	
22 June	Written Examination (date TBD)	Practical Remote Assessment (date TBD)	