**THE UNDERGRADUATE THIRD / FOURTH YEAR & MSC LABORATORY GUIDE**

Here are a few general notes concerning use of the project laboratory during projects. You should also read and be familiar with the codes of practices governing your location\area of work and tasks carried out i.e room 6.12 MPEB project laboratory COP, Laser safety, Soldering etc.

If you have any queries about any of them or any topics not covered, please do not hesitate to ask.

## Contacts

There are five technicians of whom can be found in the teaching/project lab to assist you.

General Lab Email (contacts all below): teaching\_lab@ee.ucl.ac.uk

General Lab Telephone extension (contacts all below): 33053

Gerald McBrearty (Lab Manager / Lab Technician)

6.10 MPEB

Telephone extension 33053

email g.mcbrearty@ee.ucl.ac.uk

Andrew Moss (Lab Technician\Lab \safety Officer\SFEM\1st aider)

6.10 MPEB

Telephone extension 07857

email andrew.moss@ucl.ac.uk

Muhammad Omer (Lab Technician\FEM)

6.10 MPEB

Telephone extension 02395

email muhammad.omer@ucl.ac.uk

Noordeen Marikkar (Lab Technician\FEM)

6.10 MPEB

Telephone extension 54906

email n.marikkar@ucl.ac.uk

Martin Scott Moss (Lab Technician\PCB workshop technician)

room 6.10A

Telephone extension 3304

email uceesco@ucl.ac.uk.

**Safety & Security**

I fully realize that some of the requests made to you at times appear to be arbitrary and irrational, but we are bound by the College Safety & Security rules, which in turn follow the guidelines laid down by the HSE (Health and Safety Executive); a statutory body.

If you are asked not to follow a particular course of action it is because it is perceived that you may be placing yourself and/or others in a potentially hazardous situation or using equipment in the wrong manor that could cause damage. Please listen and act upon any advice you are offered.

If an emergency arises contact a technician or call 222 on the teaching lab phone Room 6.02 MPEB.

**Risk Assessment**

It is a mandatory requirement that your project work is accompanied by a risk assessment filled and approved by the manager of the location it will be carried out in before you begin your project.
The form you fill out is valid for up to one year but may be extended if your project starts in your third year and ends in your fourth year or if you have an extension.

If the nature of your project should change you will need to update or resubmit the form again, if this should occur seek advice from your supervisor and the safety officer.

The risk assessment form should be completed using the riskNet tools on the UCL safety webpage and approved by the laboratory PIs i.e. Gerald McBrearty and Andrew Moss.

Please read the risk assessment guide on the teaching lab intranet page to aid in completing the form.

<https://intranet.ee.ucl.ac.uk/dept-facilites/teaching-lab/3rd-and-4th-year-project-work>

You will need to submit the risk assessment to the following people when working in ether the project lab or teaching lab.

(1) The Laboratory Technicians (Andrew Moss & Gerald McBrearty, Room 6.10 MPEB) (Entered into the Approver/s List).

(2) Your supervisor (Entered into the Distribution list)

(3) Note the risk assessment number for yourself and save a copy for your records.

Detailed information can be obtained from the Departmental DSO.

If you DO NOT supply a valid risk assessment form you will be refused access to any lab to perform your project work.

## Working with the Mains Electricity

Students are not permitted to work directly with mains electricity under any circumstances unless they have special dispensation and specifically noted in the risk assessment. This includes changing fuses, wiring plugs, building power supplies, performing direct measurements, etc.

If you need to work with mains then you must list this on your risk assessment form and be closely supervised during the activity. Consult the technicians, your project supervisor and the DSO if considering working with mains electricity.

If you have special dispensation to work on mains related projects all circuits/wiring/enclosures must be checked by the technicians, pass visual and electrical safety tests (PAT testing) and conform to safety standards before being plugged into the mains under supervision.

## First Aid / Accidents

Note the locations of your nearest first aiders, contact details and location of first aid box. This can obtained from the Lab safety sign.

If you are injured or find someone injured in the lab seek a first aider.

When working in the project lab a first aid box can be found in room 6.10 technicians office next door.

All accidents, however small must be reported immediately. The College is legally required to log all accidents, using UCL riskNet tools.

RiskNet found at <https://www.ucl.ac.uk/safety-services/risknet>

If the situation is serious and decide an ambulance or other help is required, do not waste time looking for assistance dial 222 on any UCL phone and report the situation.

**Nearest 1st Aider**

Andrew Moss

Room 6.10 MPEB

Telephone extension 07857

## Opening & Closing Times

The project lab is open from 9:00 till 18:00 Monday to Friday during term times.

Out of term the lab closes at 17:00. There is usually no closure for lunch breaks.

The Laboratory is closed during the weekends, bank holidays and other days when the college/department is closed.

There are certain other times of the year when it may be necessary to close the labs at short notice, whenever possible notice will be given to you normally by an email or message on the lab door.

It is not possible to open the lab out of hours under any circumstances.

Working past 17:00 is at the discretion of lab technicians of which one must be present at all times.

No student is allowed to work in the labs past 18:00, during weekends and when college is closed.

## Eating & Drinking

No food or drink is to enter or be consumed in any laboratory; this is strictly prohibited and a UCL wide policy. If you need to eat or drink there are seating areas you can sit outside of the laboratory in the lift lobby.

If you are found to be eating or drinking in the lab you will be asked to leave room. If it continues then you will have your computer account suspended and will not be permitted to work in the lab.

No food or drink is to be left in the lab fridge. This is for chemistry, solder pastes and any agents that require a cool environment. Any food or drink found in the fridge will be disposed of immediately.

## Fire and Alarms

Periodically, the fire alarm will sound. In the past years there have been a number of fires in this building, so all alarms must be treated as genuine and not as drill or false alarm.

The nearest fire marshals are:

Andrew Moss (SFEM)

6.10 MPEB

Telephone extension 07857

email andrew.moss@ucl.ac.uk

Muhammad Omer (FEM)

6.10 MPEB

Telephone extension 02395

email muhammad.omer@ucl.ac.uk

Noordeen Marikkar (FEM)

6.10 MPEB

Telephone extension 54906

email n.marikkar@ucl.ac.uk

When the fire alarm sounds switch off your equipment especially soldering irons, heaters, laser sources, etc.

Exit the building via nearest the fire escape route. The laboratory safety sign will tell you the best route unless you are directed by a fire marshal to a different route.

In either case go to ASSEMBLY POINT D (Anatomy Yard) outside the print room café; Follow the green signs to the assembly point just past the D.M.S Watson library. If you cannot get access to this area because of the fire or fire marshals redirecting you then proceed to wait outside the front of the engineering building past the main gate.

DO NOT stand in the main drive way or building keep this area clear or you may get hit or run over by a fire engine.

## Coats and Bags / Personal music etc

Do not place coats and bags on the desk or in walk ways, please store bags under the bench and coat on the chair back.

Please do not listen to loud music/videos/etc other people use the laboratories, you may not hear announcements and can cause distractions to other users.

Avoid using ear buds or head phones so you can hear any announcements. If these are necessary for your project please keep the volume low so you can hear alarms and any verbal notifications.

**Soldering**

Please read, understand and follow the soldering codes of practice.

There are multiple soldering positions setup in the project laboratory. Each station is fitted with fume extraction, hand soldering irons with changeable tips, hot air soldering stations and microscopes.

Make sure the fume extraction is on and working before commencing any soldering.

A surface-mount Infra-Red re-work station with lookup\down camera for small/complex package placement is also available lab. Ask a technician for an induction before using this equipment.

There are 2 Reflow ovens to solder PCBs; 1 small static oven for small to medium PCBs and 1 conveyer belt oven for large or multiple PCBs.

The hot air soldering stations have variable temperature and flow rate, when the hot end is in the cradle it points upwards so pay attention to where the directed hot air is pointing otherwise it will melt or burn surrounding equipment.

Solder paste can be found in the laboratory fridge, the fridge is NOT for food or drink. Any food or drink found will be removed.

All soldering should be lead-free and rosin free. If leaded solder is required or working with parts containing lead or other harmful materials consult the technicians otherwise the equipment will be contaminated and will need replacing.

NOTE: Lead is very toxic to the human body.

**Tools**

Tools such as wire strippers, wire cutters, pliers, screw drivers, probes and cables can be found in the blue cabinets within the project lab. Please keep these tidy and return all tooling to the correct locations.

We also have a complete range of larger hand tools such as drills, security drivers, torx drivers, hex keys, glue gun, spanners, crimps, files, cutters etc

All tooling should be covered in your risk assessment especially any powered tools.

**EE Mechanical Workshop**

If your project requires any machining, fabricated parts and engineering materials such as metal/wood/plastic/glass etc. the workshop facilities are available to help you i.e. manufacture of jigs, circuit enclosures, precision drilling/milling and laser cutting, water jet cutting and High accuracy 3D prints.

Please not that any requests made to the workshop will take a little time to be dealt with due to manufacturing processes, materials to be purchased and other pending jobs.

Please have a clear idea and some kind of plan or drawing to aid your workshop request.

The workshop is located on the 6th floor of the Roberts building at the end of the corridor past the goods lift.

Workshop contacts:

Workshop job submission system

 Email: workshop-jobs@ee.ucl.ac.uk

Telephone Ext: 33965

Tom Hamer

Email: thomas.hamer@ucl.ac.uk

Joseph Edwards

Email: joe.edwards@ucl.ac.uk

**3D Printing**

There are 4 3D printers in the teaching lab (Lulzbot TAZ) for small to large prints.

These are filament-based printers which can print almost any material such as PLA, ABS, Transparent materials, Silicon/rubber flexible, etc.

These printers are for projects and teaching related tasks NOT personal prints.

All models must be checked by the technicians first before printing and must be printed during the day not unattended overnight unless special arrangements are made.

All 3D prints must be in an STL format and have a flat build surface and please keep over hangs to a minimum.

A high accuracy SLS powder printer is available in the EE mechanical workshop (see above Tom Hamer for more info) this printer uses 1 type of solid nylon material and can print in all colors.

**Laser Cutting**

There is a laser cutter in the laboratory (Glowforge PRO) that can cut, score or engrave materials up to 6mm thick.

Maximum size 450mm x 250mm.

This can only cut light and medium duty materials such as:

plastic sheets

wooden sheets

Paper\card

Some textiles e.g. leather

It is not designed to cut metal.

A larger laser cutter is in the EEE mechanical workshop.

## Printed Circuit Boards

It is highly recommended that you prototype all of your circuits on bread board followed by a design on paper before designing your PCB in a cad package this is to avoid errors and silly mistakes made on the PCB layout such as missing out mounting holes, placement of displays and buttons, connections to power sources, etc.

It will take more time to produce and test 2 or 3 PCBs to get a suitable working PCB than it is to prototype your design once and make one PCB.

When you come to design your PCB it is important to note design constraints not only of your design but also the manufacturing process so care must be taken when producing the design. Please see Martin Scott for this information.

PCB technician

Martin Scott

Email: uceesco@ucl.ac.uk

Telephone ext: 07858

To make your PCB we need your design in an electronic format sent to

pcb-jobs@ee.ucl.ac.uk

Please state material type/thickness and any special requirements.

When designing a PCB Diptrace is the preferred package and a normal saved file is fine but if you used an alternative package then we need the files in a GERBER or DXF format with the Drill Holes in an NC-Drill / Excellon Format. These files can be imported into Diptrace to check compatibility and dimensions prior to manufacture.

In the lab we use Diptrace to produce all PCB and Schematic designs we have a license for unlimited size and layers. Diptrace can be downloaded free with limited pins but more than enough for the majority of designs.

There is normally a queue for PCBS so please be patient, we cannot promise a specific time for completion of a board. If there is no queue the board could be ready the following day depending on the circuit dimensions and the time received. The boards are made in the EE PCB workshop of the teach lab in MPEB.

Any questions about PCB layout, components, design, etc can be directed to Martin Scott, Andrew Moss or Gerald McBrearty.

## Components & Placing Orders

A limited range of components are stocked in the in the teaching lab; a list can be found on the teach lab intranet.

It is difficult to predict what you require for your project so we only stock the most commonly used components or items that past students required.

If there is sufficient demand for a component that is not stocked please let Andrew Moss or Gerald McBrearty know then we will look into prospect of stocking it for future usage, if the components in the lab carousel have run out or are running low please let us know so we can restock ASAP.

For one off or special items which you require for your project you will need to order them. This is done by filling out the next order section of the collab web page. The preferred suppliers of electronic products are listed on the next orders page of collab. Orders placed with these normally take 2 to 3 days to arrive after approval.

<https://collab.ee.ucl.ac.uk/teachinglab/>

If you need components from other suppliers, ebay, amazon, etc you MUST speak with the technicians and have very specific reasons.

All parts delivered are collected from the Departmental Office 7th floor then a technician will sort your parts and for collection.

Please continue to monitor Collab for messages about your order i.e problems and arrivals.

 **Responsibility For Equipment**

The equipment and components in the project trays and on benches is your responsibility.

Make sure the equipment/tools are used correctly and for the task which they are designed for.

Despite what your supervisor may say YOU DO NOT HAVE PERMISSION TO REMOVE ANY ITEM FROM THE LAB.

If you need to borrow anything for whatever reason, see one of the technicians; a small amount of paperwork maybe required or notes recorded about the loan!

If an item of equipment has disappeared from the lab please let us know as soon as possible.

If you think any of the equipment has developed a fault, please report it as soon as possible.

## Lab Computers & Development boards

All of the computers in the lab are installed with the same software and similar hardware configuration.

If you require any software or devices to be installed for your project you will need to consult system support (support@ee.ucl.ac.uk) or the lab technicians before you start your project.

All the computers are fully networked with internet access and all the usual computing rules apply.

Do not save your work on lab computers we tend to update/reinstall when necessary into improve performance and security; instead save work to your M:\ drive this is your own storage space on the network and backups are kept.

You also have access to various development boards and microcontroller boards, i.e. Arduino, MSP, PIC, Atmel, STM. Please see a lab technician to find out what we have and to gain access.

DO NOT attempt to connect any hardware to the network unless you have permission from computer support.