

## Senior Design / Enterprise Lab Policies & Info

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Note: Room 733 is dedicated to Senior Design. Rooms 621 and 637 are Enterprise labs. Room 609 is a Senior Design and Enterprise shop available by card access. Other labs, such as the Antenna Lab Room 818, may be needed and used with your advisor's permission. Some of the policies below are particularly for 733, but should be adapted appropriately for each Enterprise.

### 1. Safety first:

- 2-Person Safety Rule – IMPORTANT! DON'T MISS THIS ONE! You are not allowed to work on lab bench experiment, the drill press, or the soldering station unless there is someone else in the room with you. This goes for any room you will be working in. However, it is ok to work on the computer by yourself or study anywhere in the room. Anything else is forbidden. So, what if you are working on an experiment and the one other person in the lab departs the lab for a few minutes? You must cease working on the experiment until someone returns. Don't test us on this rule, whether you like it or not. We will deliver consequences if you violate it. And we do wander around quite a bit. Why is this so important? It's too easy for something to go wrong in the lab – we don't want you to be alone if something happens.
- Drill Press – Caution – Wear safety glasses EVERY TIME. Always use the drill press vice to hold the item you're drilling. Do not hold the item with your fingers while drilling. It's VERY EASY to hurt yourself if the work-piece starts spinning when you don't expect it to.
- Soldering - Caution- Wear safety glasses when soldering. Careful with the hot iron. Always return to the soldering iron holder. Turn off all soldering equipment when not in use. If you have never used the new Zephertronics soldering station in room 609, see John Miller in 727 for instruction before using.
- Chemicals - Caution- Wear safety glasses (splash resistant) when using chemicals that could have a splash hazard. All chemicals, including poster adhesive sprays, paints, etc., must have an MSDS on file. There is an MSDS folder mounted on the room door. It is your responsibility to up-date that folder if you purchase chemicals. You can download the MSDS from the web. Go to the chemical company's web site and follow links to MSDS. Also, all chemicals have to be labeled. Even the water bottle on the solder bench. Any non-labeled bottle can result in a fine by OSHA if audited (and we do get audited). Any unlabeled bottle will to be treated as hazard waste and cost a bundle to dispose of. All flammable chemicals have to be stored in the flammable cabinet (Rm733). Label them with your team # and date.

2. All SD benches have a computer, basic scope, and power supply. You also have a Fluke Multimeter in your tool box (which can be signed out through John or Mike in (Room 727)). In the cabinet in room 733 are some specialized items of equipment to be used as needed on a first come first serve basis.

- Two 100 MHz Agilent 54624A 4ch scopes with floppy drives
- One 100 MHz Agilent 54622A 2ch scope with floppy drive

- Thee 60 MHz Agilent 54621D Logic scopes with floppy drives
- Three 60 MHz Tektronix TDS1002 scopes (output via Wavestare software in file cabinet)
- Four 80 MHz Agilent 33250A Arbitrary Waveform Generators
- Three 20 MHz Agilent 33220A Arbitrary Waveform Generators
- Two 15 MHz Agilent 33120A Arbitrary Waveform Generators
- Five 10 MHz HP 3312A Function Generators

This should be adequate equipment for most projects. If special equipment is needed see John or Mike in 727.

3. There are tool boxes with a good Fluke Multimeter and an assortment of tools that can be signed out by your team leader. We purchased good Excelite tools for the heavy usage items (wire cutters, needle nose pliers, etc.) and a cheap but adequate set of wrenches, etc.

It is extremely important that you don't use the small wire cutters to cut steel or anything heavy. Use only to cut small gauge copper wires. If special tools are needed, see John or Mike in 727. Use the list in your tool box to check inventory, let us know if anything is missing. At year end, you will be responsible to have a complete tool box or pay for missing tools from your team's budget. (You will not be libel for normal wear or breakage). Sorry about the cheap tool cases.

4. **Be extremely careful not to scratch or burn the new white bench tops.** All benches have white electrostatic tops. They will scratch fairly easily. Be careful with sharp objects. There are scrap pieces of Masonite in the corner by the cabinets in room 733 to put down to protect your bench top if necessary. Be careful not to get glue or spray paint on the benches.

5. The labs have all new thin profile (RG174) coaxial cables. Some have mini grabbers for working with super strips. Careful – they're fragile! There is an assortment of BNC Tee's, Barrels, etc. in each desk drawer. Were doing away with the banana leads, but if you need some banana leads for special purposes, see John or Mike in 727.

6. There are boxes of scrap wire in room 609. You may want to cut some off and keep in your desk drawer.

7. All file cabinets and benches have lockable drawers. Bring the "FR" or "MB" number (on lock) to John or Mike in 727 for a key if you want a key.

8. Label everything! First of all – label your work area with Team #, project name, sponsor, and faculty advisor. You design and affix the sign to your work area. Be creative! We will be bringing visitors and VIPs through the labs regularly. Your area should reflect your professionalism. Tape a label onto all of your specialized equipment and parts (other than the standard bench equipment) with team number, project name, advisor, and date. At year end, everything not labeled will get tossed or dismantled and computers erased. Labeling and documentation is extremely important if you have an ongoing project. You can find labeling macros in Word and use standard mailing labels for this.

9. There is a basic stock of common items and a complete stock of all standard resistor values in room 733. **Don't put low cost items back in stock once they're used** (especially resistors and IC's). It is easy to contaminate the stock and nothing can be more frustrating than to take a component out of stock only to find it isn't the value the drawer label indicates. Plus, we don't want defective components or components with bent leads, in with the new stock. Most items are low cost and it isn't worth the risk of stock contamination to return used items to stock. Switches and other higher cost items that are obviously good can be returned to stock

10. Claim and label a few shelves in one of the project cabinets for your team and store everything that you are not immediately working on in the cabinets marked "student projects."

11. Purchasing - You will have to fill out a purchase requisition form, signed by your advisor, with John in 727 for orders over \$50. For orders under \$50, you will be required to purchase them on your own (personal credit card or cash and Michelle our secretary will re-emburse you. Be sure not to pay tax as you won't get re-embursed for tax.) If the vendor requires a tax exempt form you can download one from the Purchasing Department's web site. See John in room 727 for questions or purchasing forms.

12. Circuit boards - If you need to make circuit boards you will need to bring the Gerber files for your design to John in 727. There will be a class or two later in the semester on how to do this. The first, and most important, is to ensure that you have a good working design. Build up the circuit on a breadboard first to see if it works. I've made many boards for students in the past that didn't work because they didn't take the time to verify their design first. You will also have to fill out a purchase requisition for each board made. See John in 727 for costs.

13. Read the manuals first! Manuals for the new equipment including the Fluke Multimeters are in the file cabinets labeled "Equipment Manuals." Understand the operation and the specifications. You'll be surprised how much time you save! Also – you won't do something stupid to destroy the instrument.

14. 818 equipment – Don't even *touch* equipment in 818 unless you have been OFFICIALLY CERTIFIED by Mike in 727. It's too easy to blow out the front ends of RF hardware. So get that certification first.

15. FOOD AND DRINK – No . . . zero . . . nada . . . food or drink on the lab benches, drill press bench, or soldering station. You MAY have food and drink on the conference tables. But clean up every crumb before you leave.

16. Keep the lab doors locked and closed. Don't prop them open. We only want people in the room who have card-swipe access. If you see someone who doesn't belong, ask him if he's lost or needs help. That's the polite way to find out if someone is out of place. Please help us be security conscious. We've had theft every year which reduces our ability to buy good instruments.

17. Clean up! Clean up! Clean up! There is a broom and dust pan available. The only way you will have a nice lab to work in is if you take care of it. Yes, you may have to sweep up after someone else. Sponsors and VIPs do come through the Labs. Let's keep it looking professional.