ECE Department
Undergraduate Laboratory

Safety and Operations Manual

Revision 2
July 27, 1999

1. Emergency Telephone Numbers

On-Campus:	6400	(switchboard)
	6491	(after hours)
	6666	Campus Safety

For Emergencies dial 9-911

Potsdam fire department	265-3311
Potsdam police department	265-2121
Canton-Potsdam Hospital	265-3300

Poison Control 800-252-5655

Lab Supervisor	Ted Hintopoulos	Office 2128
		Home 265-2903

Department Safety Officer

Paul Mcgrath	Office: 7606/7725
	Home: 265-5646

Dialing instructions: on-campus phones: dial the 4 digit extension

Off campus local: dial 9, then the 7 digit number

Long distance toll free: dial 9-1 followed by the toll free number

Responsibilities

1.1 It is the responsibility of each laboratory user to be familiar with the safety policies, procedures and hazards associated with the laboratory work being performed. This document enumerates basic laboratory policies primarily for the ECE laboratory in CAMP 195, but also applicable for similar work in other areas. For safety issues not covered in this document, ask your supervisor, course instructor, or department safety officer for the appropriate procedures prior to performing the work in question. Also, the Laboratory Health and Safety Manual (LHSM) in the Instrument Room specifies the University wide operating policies.

1.2 This document does not address issues associated with the use and handling of chemicals. Chemical use and handling is not a normal activity for CAMP 195. Refer to the (LHSM) and appropriate Material Safety Data Sheets (MSDS) for location and procedures for any procedures involving chemical use and handling.

1.3 Significant or repeated failure to follow safe laboratory practices will be grounds for your removal from the laboratory and/or lab course. Additionally, you may be charged for any damage that you cause.

2. Emergency procedures.

2.1 In all cases where emergency treatment is required, inform your lab instructor or Instrument Room staff member immediately.

2.2 Never attempt a rescue if it requires that you place your health or life in jeopardy. Multiple casualties only compound further rescue efforts.

2.3 In case of electrical shock:

- 2.3.1 Do no touch someone who is being electrocuted.
- 2.3.2 If possible to do so safely, turn off the power supply, either at the lab bench or at the main lab bench breaker panels (see lab map)
- 2.3.3 If it is unsafe to turn off the power supply, use a piece of lumber or other non-conducting material to separate the person from the energized conductor.
- 2.3.4 Check the afflicted person for pulse and respiration. Only qualified individuals should attempt CPR. If you are untrained, seek a qualified person to apply CPR
- 2.3.5 In cases of electrocution, medical assistance should be summoned immediately

2.4 In case of fire:

- 2.4.1 Turn in a fire alarm if you have any doubt that you may fail to put out the fire. Turn in a fire alarm for any serious emergency such as toxic gas release or explosion.
- 2.4.2 Use a laboratory fire extinguisher on incipient fires. When possible, use CO_2 units instead of dry chemical units where instruments are involved to minimize damage.
- 2.4.3 Take an extinguisher with you to check out an area where there may be a fire.
- 2.4.4 After using a fire extinguisher, turn it in to the Department Safety Officer for replacement.
- 2.4.5 If an individual's clothing is on fire, roll them on the floor and wrap them in a coat or blanket if possible.
- 2.4.6 If you hear a fire alarm in your building, leave the building immediately.

2.5 Chemical spill:

- 2.5.1 See 2.2 regarding the normal use of chemicals in CAMP 195
- 2.5.2 In case of accidental chemical spill or release of fumes, evacuate the area and inform the appropriate safety personnel

2.6 In case of other personal injury

- 2.6.1 Turn off any machinery involved
- 2.6.2 Perform appropriate first aid
- 2.6.3 Inform Lab personnel, seek medical assistance as appropriate

3. Emergency equipment

Locations of emergency equipment are depicted in the map on page 7. See the department safety officer to replace any used equipment

3.1 Fire Extinguishers- use only CO2 extinguishers on electrical fires. Appropriate extinguishers are located in the lab.
3.2 Sink- use to wash off any corrosive chemicals or to irrigate a wound
3.3 First Aid Kit- for minor injuries
3.4 Main Lab bench power supply breaker panels
3.5 Eye wash station is located in the High Bay area.

4. General Procedures

4.1 The laboratory shall not be used without supervision by an instructor and/or member of the instrument room staff
4.2 Lab benches must be kept in neat order and returned to the condition found when you are finished.
4.3 Be familiar with the proper operation of all equipment and instrumentation before attempting to use it. Refer to the Equipment User's Guide if necessary.
4.4 Professional conduct must be observed at all times in the laboratory
4.5 No pets.
4.6 Food and drink may not be consumed at the lab benches.
4.7 Do not drop any equipment.
4.8 Any circuit which employs a voltage of more than 40 volts must be operated using Medium voltage precautions listed below.
4.9 Make circuit connections with the all power sources off.
4.10 Activate adjustable power sources at a low level when powering an untested circuit
4.11 Make sure that all components and instrumentation have the proper ratings and are used on the appropriate range. Determine whether a piece of test equipment uses a grounded lead, and, if so, which lead is grounded. Use equipment accordingly.
4.12 Do not use a pen as a pointer when reading meters or oscilloscope

5. Proper Attire

5.1 Long hair must be tied or restrained to prevent accidental contact with lab equipment
5.2 Loose or hanging clothing must not be worn. This includes ties, scarves, etc.
5.3 Loose jewelry must be avoided.
5.4 Shoes must be worn at all times in the lab
5.5 A shirt or other top must be worn at all times
5.6 Long pants must be worn when soldering, using high voltage equipment, or using machine tools. They are recommended for all other activities in the laboratory

6. Equipment malfunctions

6.1 All equipment malfunctions must be reported to the instructor or Instrument Room staff. Damaged equipment can be dangerous. It cannot be repaired unless the appropriate individuals are informed.

6.2 A blown fuse or circuit breaker is evidence that something is wrong with your circuit. Determine and rectify the problem before replacing the fuse or resetting the circuit breaker.

6.3 Inspect all equipment for loose or damaged wiring before use. In particular, check the BNC to banana cables on the oscilloscope and function generator for good connection.

7. Medium Voltage Precautions

This section contains additional safety guidelines specific to laboratory work on medium (40-240) voltages. These procedures do not apply for voltages above 240 volts. Voltages above 240 volts are not a part of normal usage of CAMP 195, and require special approval and performance rules.

7.1 There shall be no unsupervised operation of medium voltage equipment. Approval is required either from the instructor in charge of the lab course, or from the advising faculty member in an independent project.

7.2 Equipment for which the sole contact with medium voltages is through the standard power plug is not considered medium voltage equipment. Equipment with safety grounds must be operated with the safety ground connected to qualify for this exemption.

7.3 An instructor must approve any circuit designs before construction and operation in lab. Prior to energization, an untested circuit must be examined by the lab instructor or appropriate designee.

7.4 Testing involving live circuitry requires a minimum of two group members to be present for the work. Additionally, the group must inform either instrument room personnel or a lab course instructor present in the lab that energized medium voltage work is being undertaken.

7.5 Protective eye-wear is required when dealing with energized medium voltage circuits. Exceptions to this requirement require written work rules from the work supervisor outlining the conditions of the exemption.

7.6 Do not touch any live components or connectors in a powered circuit. Any circuit changes must be made with the circuit de-energized.

7.7 One person in a lab group shall be charged with operating power switches and monitoring status of these switches. Other group members must not change these switch settings except under the direction of the person in charge, or in the case of an emergency. Prior to energizing a circuit, the switch controller must suitably warn other group members.

7.8 A double shutoff for high power circuits is recommended when significant circuit modifications are being performed. Turning off the switch and unplugging the power source is a suitable double shutoff.

7.9 All metering and wiring must be of appropriate capacity for the expected use. Use appropriate probes for oscilloscopes and other measurements. Use of protoboards is limited to situations where the board potential difference is low.

7.10 Place sufficient metering appropriately to determine overload conditions.

7.11 Lay out your circuit to eliminate the necessity of reaching over bare energized parts to adjust or read instruments when the circuit is energized.

7.12 In limited cases, meter connections can be moved on an operating circuit. This must be done in accordance with all safety rules. Appropriately insulated meter leads must be used for this process, and must be inspected prior to use. When moving meter leads, the person doing is must be in a standing position apart from others and must keep one hand behind his/her back.

7.13 Make sure that all connections are secure and tight.

8. Rotating machine precautions (for laboratory machine ratings over 100 watts)

8.1 All operation of rotating machinery must be done as part of a lab or design course or a formal independent study with a faculty member.

8.2 All operation of rotating machinery must be done with more than one person present.

8.3 An instructor must approve any circuit designs before construction and operation in the lab. The instructor or designee must examine lab setup prior to initial energization

8.4 All rotating parts must be shielded or appropriately located to prevent the possibility of inadvertent contact.

8.5 All metering and wiring must be of appropriate capacity for the expected loads

8.6 Visually inspect the rotating equipment for proper mounting and loose parts prior to energization.

8.7 Layout equipment to eliminate the need for reaching over it to adjust or read instruments when the circuit is operating.

9. Electrostatic Discharge Precautions

9.1 Before touching any ES sensitive device, touch a grounded plate or chasis to remove residual ES voltage

9.2 CMOS chips should be stored in ES-resistive foam carriers when not in use.

9.3 Eliminate ES sources from the work area as much as possible. These include plastics, styrofoam, and synthetic and wool garments

Antistatic spray may be used to reduce ambient ES charge in the work area.

10. Machine Shop Precautions

A minimal number of machine tools are located in CAMP 195. Procedures for using these tools include:

10.1 You must have received appropriate training for use of the equipment. Instrument room staff must be informed you will be using the equipment prior to use.

10.2 Machine tools may only be used when another person is present to respond in case of emergency.

10.3 Follow appropriate safety rules regarding dress and conduct

10.4 Safety glasses must be worn at all times when using machine tools or when in the vicinity of machine tools being used.

10.5 Clean up the shop area when you are finished using it. Maintain the area as needed during work for safe operation.

10.6 Visually inspect machine tools for good condition before use. Report any damage or worn parts.