

# UC DAVIS

**ELECTRICAL &  
COMPUTER  
ENGINEERING**

**INJURY AND ILLNESS  
PREVENTION PROGRAM**



JULY 1, 2009

# UC DAVIS

## **ELECTRICAL & COMPUTER ENGINEERING**

### **INJURY AND ILLNESS PREVENTION PROGRAM**

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This Injury and Illness Prevention Program has been prepared by the University of California, Electrical & Computer Engineering department in accordance with University Policy (UCD Policy & Procedure Manual Section 290-15: Safety Management Program) and California Code of Regulations Title 8, Section 3203 (8 CCR, Section 3203).

# UC DAVIS

## ELECTRICAL & COMPUTER ENGINEERING

### INJURY AND ILLNESS PREVENTION PROGRAM

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# Department Information

Department Name: **Electrical & Computer Engineering**

Department Chair: **Prof. Richard Kiehl**

Address: **2064 Kemper Hall**

Telephone Number: **752-0583**

## Buildings Occupied by Department

**1. Building: Kemper Hall**

**Unit(s): 079, 083, 088, 121, 122, 125, 127, 131, 154, 154X, 1107, 1127, 1127A, 1207, 1209, 1217, 2001, 2003, 2031, 2035, 2037, 2038, 2039, 2040, 2041, 2064, 2064A, 2064B, 2064C, 2064D, 2064E, 2101, 2104, 2107, 2110, 2112, 2113, 2115, 2117, 2119, 2147, 2151, 2152, 2154, 2155, 2156, 2157, 2158, 2161, 2201, 2201A, 2206, 2211, 2212, 2219, 2221, 2225, 2227, 2229, 2230, 3007, 3087, 3089, 3101, 3103, 3110, 3112, 3114, 3116, 3117, 3118, 3119, 3120, 3122, 3123, 3124, 3125, 3127, 3129, 3131, 3135, 3137, 3139, 3141, 3145, 3161A, 3161B, 3163, 3165, 3167, 3169, 3171, 3173, 3174, 3174A, 3175, 3176, 3176A, 3177, 3179, 3181, 3182, 3183, 3185, 3187, 3189, 3193**

**Contact: Lance Halsted (Safety Coordinator) / Linda Potoski (MSO)**  
**Phone: 752-8959 / 752-9548**

**2. Building: TB207**

**Unit(s): TB-114, TB-115, TB-117, TB-119, TB-121, TB-123, TB-125, TB-127, TB-129, TB-131, TB-133**

**Contact: Lance Halsted (Safety Coordinator) / Linda Potoski (MSO)**  
**Phone: 752-8959 / 752-9548**

**3. Building: Academic Surge**

**Unit(s): 2346**

**Contact: Lance Halsted (Safety Coordinator) / Linda Potoski (MSO)**  
**Phone: 752-8959 / 752-9548**

**4. Building: Watershed**

**Unit(s): 2101, 2102, 2104, 2201, 2203, 2204-Y**

**Contact: Lance Halsted (Safety Coordinator) / Linda Potoski (MSO)**  
**Phone: 752-8959 / 752-9548**

## **I. Authorities and Responsible Parties**

The authority and responsibility for the implementation and maintenance of the Injury and Illness Prevention Program (IIPP) is in accordance with University Policy (UCD Policy & Procedure Manual Section 290-15: Safety Management Program) and California Code of Regulations (8 CCR, Section 3203) and is held by the following individuals:

1. Name: **Professor Richard A. Kiehl**

Title: **Department Chair**

Authority: Authority and responsibility for ensuring implementation of this IIPP

Signature: ON FILE IN DEPARTMENT Date: \_\_\_\_\_

2. Name: **Lance Halsted**

Title: **Safety Coordinator**

Authority: Direct authority and responsibility for implementing and maintaining this IIPP

Signature: ON FILE IN DEPARTMENT Date: \_\_\_\_\_

3. Name: **Linda Potoski**

Title: **MSO**

Authority: Direct authority and responsibility for implementing and maintaining this IIPP

Signature: ON FILE IN DEPARTMENT Date: \_\_\_\_\_

## **ECE Safety Committee**

The Electrical & Computer Engineering department has established a safety committee, consisting of faculty and staff members, to maintain the safety program of the department. This committee supports the role of the Department Safety Coordinator. Communication on safety issues within the department is enhanced by committee participation of both faculty and staff.

### **Duties of the ECE Safety Committee**

The safety committee has the following duties and responsibilities:

1. Coordinate activities of department/unit safety coordinators, provide direction, and facilitate the dissemination of safety information.
2. Meet at least quarterly.
3. Review results of inspections conducted by the department safety coordinators and audits or inspections by groups outside of the department/unit, e.g., EH&S inspections, Department of Health Services inspections.
4. Review investigations of accidents and cases of injury and illness, and make recommendations regarding prevention.
5. Develop strategies for implementing new safety management programs.
6. Develop standardized procedures to make sure all students and staff using any of the labs are properly trained related to safety.
7. Submit recommendations in response to employee safety suggestions.
8. Coordinate department safety issues with the college and the campus.
9. Appoint ad hoc committees as required.
10. Keep written records of meetings and make them available to department/unit employees

## II. System of Communications

1. Effective communications with **Electrical & Computer Engineering** employees have been established using the following methods:

- Standard Operating Procedures Manual
- Material Safety Data Sheets
- Monthly departmental operations meetings
- Internal media (department intranet)
- EH&S Safety Nets
- Training videos
- Safety Newsletter
- Handouts
- Building Evacuation Plan
- E-mail
- Posters and warning labels
- Job Safety Analysis – Initial Hire
- Job Safety Analysis – Annual Review
- Other (list):

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ECE Department Safety web page linked to ECE Dept. homepage.

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2. Employees are encouraged to report any potential health and safety hazard that may exist in the workplace. **Hazard Alert Forms (Appendix A)** are available to employees for this purpose. Forms are to be placed in the Safety Coordinator's departmental mail box. Employees have the option to remain anonymous when making a report.
3. Employees have been advised of adherence to safe work practices and the proper use of required personal protective equipment. Conformance will be reinforced by discipline for non-compliance in accordance with University policy ([UCD Procedure 62 - Personnel Policies for Staff Members, Corrective Action](#)).

### **III. System for Assuring Employee Compliance with Safe Work Practices**

Employees have been advised of adherence to safe work practices and the proper use of required personal protective equipment. Conformance will be reinforced by discipline for non-compliance in accordance with University policy ([UCD Procedure 62 - Personnel Policies for Staff Members, Corrective Action](#)).

The following methods are used to reinforce conformance with this program:

1. Distribution of Policies
2. Training Programs
3. Safety Performance Evaluations

Performance evaluations at all levels include an assessment of the individual's commitment to and performance of the accident prevention requirements of his/her position. The following are examples of factors considered when evaluating an employee's safety performance.

- Adherence to defined safety practices.
  - Use of provided safety equipment.
  - Reporting unsafe acts, conditions, and equipment.
  - Offering suggestions for solutions to safety problems.
  - Planning work to include checking safety of equipment and procedures before starting.
  - Early reporting of illness or injury that may arise as a result of the job.
  - Providing support to safety programs.
4. Statement of non-compliance will be placed in performance evaluations if employee neglects to follow proper safety procedures, and documented records are on file that clearly indicate training was provided for the specific topic, and that the employee understood the training and potential hazards.
  5. Corrective action for non-compliance will take place when documentation exists that proper training was provided, the employee understood the training, and the employee knowingly neglected to follow proper safety procedures. Corrective action includes, but is not limited to, the following: Letter of Warning, Suspension, or Dismissal.

## **IV. Hazard Identification, Evaluation, and Inspection**

Job Hazard Analyses and worksite inspections have been established to identify and evaluate occupational safety and health hazards.

### **1. Job Safety Analysis:**

Job Safety Analysis (JSA) identifies and evaluates individual employee work functions, potential health or injury hazards, and specifies appropriate safe practices, personal protective equipment, and tools/equipment. JSA's have been completed for the following job categories:

- A. Kemper Hall faculty and staff offices, conference rooms**  
**TB207 faculty and staff offices, conference rooms**  
**Kemper Hall 131, 2211, 2219, 2221, 2225, 2227, 2229, 2230, 3174, 3174A**  
**Kemper Hall 1101, 1105, 2107, 2110, 2112, 2157, 2161, 3189, 3193**  
**Academic Surge 2346**
  - General office environment
  - Teaching labs
  
- B. Kemper Hall 125, 127, 154, 154X, 1207, 2212**
  - Chemical hazards
  - Physical hazards (lasers, compressed gas)
  - General office environment
  
- C. Kemper Hall 3176, 3176A**
  - Chemical hazards
  - General office environment
  
- D. Kemper Hall 1217**
  - Chemical hazards
  - Radioactive hazards
  - Physical hazards (compressed gas)
  - General office environment
  
- E. Kemper Hall 121, 122, 1107, 3182**
  - Physical hazards (lasers, compressed gas, microwave-producing equipment)
  - General office environment
  
- F. Kemper Hall 2147, 2151, 2155, 2201, 2201A**
  - Tool hazards (drill, soldering iron, drill press, Exacto knife, Dremel tool, etc.)
  - General office environment

**Job Safety Analysis Forms** are located in **Appendix B. Completed Job Safety Analyses are to be signed by each employee and kept on file in Kemper Hall 2064 or 2152.**

Before a person (whether an employee or not) will be given access to a research lab with safety hazards, the individual must meet with the Department Safety Coordinator to discuss what safety training will be required and when it will have to be completed. The Department Safety Coordinator, if so needed in consultation with faculty responsible for the lab, will determine the

required safety training consistent with the Job Safety Analysis for that research lab. Once the safety training is completed, documentation for record keeping must be filed with the Department Safety Coordinator.

## 2. Undergraduate Lab Course Safety Analysis

Lab Safety training will be completed for all undergraduate lab courses that have any potential health or injury hazards before the lab is used. Lab courses that have been identified as having potential safety hazards are required to provide training to the students in appropriate safe practices, personal protective equipment, and tools/equipment. The following courses have been identified as having potential safety hazards for which the students must be trained:

- A. EEC132
  - Chemical hazards
  
- B. EEC136
  - Power and hand-tool hazards, drill press
  
- C. EEC194 (Micromouse)
  - Power and hand-tool hazards, drill press
  
- D. EEC195 (Natcar)
  - Power and hand-tool hazards, drill press

The Department Safety Coordinator, along with the course instructor, will coordinate safety training for the students before giving them access to lab facilities or equipment with safety hazards. Students must attend the required safety training session and documentation must be kept verifying each student's successful completion of the required training. Example safety training information for EEC132 is included in **Appendix F**.

### 3. Worksite Inspections

Worksite inspections are conducted to identify and evaluate potential hazards. Types of worksite inspections include both periodic scheduled worksite inspections as well as those required for accident investigations, injury and illness cases, and unusual occurrences. Inspections are conducted at the following worksites:

1) CIS/CUPA Self-inspection

This inspection covers all labs that contain chemicals and/or compressed gas;

Location: **Kemper Hall 121, 125, 127, 131, 1207, 1217, 2212, 3176**

Frequency: **Annual**

Responsible Person: **Lance Halsted**

Records Location: **2152 Kemper**

2) Worksite Inspection & Fire Self-inspection

**All offices** (faculty and staff). **All labs** (teaching and research). **All conference rooms**. In addition, **all corridors** connected to any ECE office, lab or conference room. In short, these inspections cover **all ECE space**.

Location: **All ECE space as listed on p. 4**

Frequency: **Annual**

Responsible Person: **Lance Halsted**

Records Location: **2152 Kemper**

**Worksite Inspection Forms** are located in **Appendix C**. Completed Worksite Inspection Forms will be kept on file in Kemper Hall 2152.

## V. Accident Investigation

1. **Electrical & Computer Engineering faculty, staff and student employees** will immediately notify their supervisor when occupationally-related injuries and illnesses occur, or when employees first become aware of such problems. **Electrical & Computer Engineering undergraduate students** will immediately notify their Teaching Assistant in the case of any injury sustained during a lab session.
2. **Supervisors** will investigate all accidents, injuries, occupational illnesses, and near-miss incidents to identify the causal factors or attendant hazards. Appropriate repairs or procedural changes will be implemented promptly to mitigate the hazards implicated in these events. **Teaching Assistants** will immediately report any accidents, injuries, and near-miss incidents to the course instructor and/or the Department safety coordinator.

The **Accident Investigation Form (Appendix D)** shall be completed to record pertinent information and a copy retained to serve as proper documentation.

3. **Note: Serious occupational injuries, illnesses, or exposures must be reported to Cal/OSHA by an EH&S representative within eight hours after they have become known to the supervisor. These include injuries/illnesses/exposures that cause permanent disfigurement or require hospitalization for a period in excess of 24 hours. Please refer to EH&S SafetyNet #121 for OSHA notification instructions.**

## VI. Hazard Correction

Hazards discovered either as a result of a scheduled periodic inspection or during normal operations must be corrected by the **Supervisor** in control of the work area, or by cooperation between the department in control of the work area and the supervisor of the employees working in that area. Supervisors of affected employees are expected to correct unsafe conditions as quickly as possible after discovery of a hazard, based on the severity of the hazard.

Specific procedures that can be used to correct hazards include, but are not limited to, the following:

- Tagging unsafe equipment “Do Not Use Until Repaired,” and providing a list of alternatives for employees to use until the equipment is repaired.
- Stopping unsafe work practices and providing retraining on proper procedures before work resumes.
- Reinforcing and explaining the need for proper personal protective equipment and ensuring its availability.
- Barricading areas that have chemical spills or other hazards and reporting the hazardous conditions to appropriate parties.

Supervisors should use the **Hazard Correction Report (Appendix E)** to document corrective actions, including projected and actual completion dates.

If an imminent hazard exists, work in the area must cease, and the appropriate supervisor must be contacted immediately. If the hazard cannot be immediately corrected without endangering employees or property, all personnel need to leave the area except those qualified and necessary to correct the condition. These qualified individuals will be equipped with necessary safeguards before addressing the situation.

## VII. Health and Safety Training

Health and safety training, covering both general work practices and job-specific hazard training is the responsibility of the **Department Safety Coordinator** and **immediate Supervisor(s)** as applicable to the following criteria:

1. Supervisors are provided with training to become familiar with the safety and health hazards to which employees under their immediate direction and control may be exposed.
2. All new employees receive training prior to engaging in responsibilities that pose potential hazard(s).
3. All employees given new job assignments receive training on the hazards of their new responsibilities prior to actually assuming those responsibilities.
4. Training is provided whenever new substances, processes, procedures or equipment (which represent a new hazard) are introduced to the workplace.
5. Whenever the employer is made aware of a new or previously unrecognized hazard, training is provided.

## **VIII. Recordkeeping and Documentation**

Documents related to the IIPP are maintained in the **Electrical & Computer Engineering** main office:

### **2064 Kemper Hall and/or 2152 Kemper Hall.**

The following documents will be maintained within the **IIPP Addendum Binder** for at least the length of time indicated below:

1. Hazard Alert Forms (Appendix A form).  
Retain for three (3) years.
2. Employee Job Safety Analysis forms (Appendix B form)  
Retain for the duration of each individual's employment.
3. Worksite Inspection Forms (Appendix C form).  
Retain for three (3) years.
4. Accident Investigation Forms (Appendix D form).  
Retain for three (3) years.
5. Hazard Correction Reports (Appendix E form).  
Retain for three (3) years.

The following documents will be maintained within the **IIPP Training Records Binder** for at least the length of time indicated below:

1. Employee Safety Training Attendance Records.  
Retain for three (3) years.

## **IX. Resources**

1. Office of the President: [University Policy on Environmental Health and Safety](#), 10/22/86
2. UC Davis Policy and Procedure Manual, [Section 290-15](#), Safety Management Program
3. California Code of Regulations Title 8, Section 3203, ([8CCR §3203](#)), Injury and Illness Prevention Program
4. Personnel Policies for Staff Members, Corrective Action, [UCD Procedure 62](#)
5. University of California Policy on Management of Health, Safety and the Environment, <http://www.ucop.edu/riskmgmt/ehs/policy.html>
6. UC Davis Environmental Health & Safety
  - [EH&S Website](#)
  - [EH&S SafetyNets](#)
  - [Material Safety Data Sheets](#)

# HAZARD ALERT FORM

Department: \_\_\_\_\_

## I. Unsafe Condition or Hazard

Name: (optional) \_\_\_\_\_ Job: \_\_\_\_\_

Title: (optional) \_\_\_\_\_

Location of Hazard: \_\_\_\_\_

Building: \_\_\_\_\_ Floor: \_\_\_\_\_ Room: \_\_\_\_\_

Date and time the condition or hazard was observed:

Description of unsafe condition or hazard: \_\_\_\_\_

What changes would you recommend to correct the condition or hazard?

Employee Signature: (optional) \_\_\_\_\_

Date: \_\_\_\_\_

## II. Management/Safety Committee Investigation

Name of person investigating unsafe condition or hazard:

Results of investigation (What was found? Was condition unsafe or a hazard?): (Attach additional sheets if necessary.)

Proposed action to be taken to correct hazard or unsafe condition: (Complete and attach a Hazard Correction Report, IIPP Appendix E)

Signature of Investigating Party: \_\_\_\_\_

Date: \_\_\_\_\_

**IIPP-Appendix A  
March 2006**

Completed copies of this form should be routed to the appropriate supervisor and department Safety Coordinator, and must be maintained in department files for at least three years.

EMPLOYEE:	JOB SAFETY ANALYSIS		DEPT: EEC	LOCATION	JOB TYPE
JOB FUNCTION	POTENTIAL HEALTH OR INJURY HAZARDS	SAFE PRACTICE, APPAREL, OR EQUIPMENT			
<b>General office environment</b>	<p>Backstrain, eyestrain, repetitive motion injury.</p> <p>Physical injuries due to slips, trips and falls, and falling objects.</p> <p>Electrical hazards.</p> <p>Physical injuries due to fires, earthquakes, bomb threats and workplace violence.</p>	<p>Ensure that workstations are ergonomically correct.</p> <p>Keep floors clear of debris and liquid spills. Keep furniture, boxes, etc. from blocking doorways, halls and walking space. Do not stand on chairs of any kind, use proper foot stools or ladders. Do not store heavy objects overhead. Do not topload filing cabinets, fill bottom to top. Do not open more than one file drawer at a time.</p> <p>Do not use extension cords in lieu of permanent wiring. Ensure that high wattage appliances do not overload circuits. (Plug high wattage appliances directly into wall outlet.) Use GFIs in receptacles in potentially wet areas. Replace frayed or damaged electrical cords. Ensure that electrical cords are not damaged by being wedged against furniture or pinched in doors.</p> <p>Attend emergency action and fire prevention plan training including emergency escape drills.</p>			
SIGNATURE					
DATE				PAGE	OF
				1	1

EMPLOYEE:	<b>JOB SAFETY ANALYSIS</b>	DEPT: <b>EEC</b>	LOCATION:	JOB TYPE:
JOB FUNCTION	POTENTIAL HEALTH OR INJURY HAZARDS	SAFE PRACTICE, APPAREL, OR EQUIPMENT		
Perform research in an environment involving <b>chemical hazards</b> .	Exposure to chemicals via inhalation, contact, ingestion or injection.	Avoid all unnecessary exposures. Reduce exposures that cannot be avoided by minimizing exposure duration and concentration. Proper selection and use of personal protective equipment including gloves, protective eyewear, lab coats, and in some instances respiratory protection. Implementation of proper personal hygiene habits, including washing hands and face before eating and smoking. During the first 6 months of employment, personnel will receive basic training in Chemical Laboratory Safety, Hazardous Waste Management and Minimization Training that will be coordinated by the ECE Safety Officer. Training in other applicable safety courses will coordinated by ECE Safety Officer on an individual basis after consultation with faculty advisor.		
SIGNATURE				
DATE		PAGE      OF 1      1		

EMPLOYEE:	<b>JOB SAFETY ANALYSIS</b>	DEPT: <b>EEC</b>	LOCATION:	JOB TYPE:
JOB FUNCTION	POTENTIAL HEALTH OR INJURY HAZARDS	SAFE PRACTICE, APPAREL, OR EQUIPMENT		
Perform research in an environment containing <b>physical hazards</b> .	Injury from physical hazards including high voltage, <b>lasers</b> and ultraviolet light, <b>microwaves, compressed gases</b> and liquids, cryogenic materials, and specialized equipment as well as falling objects.	<p>Avoid unnecessary exposures. Proper selection and use of personal protective equipment including gloves, protective eyewear and specialized equipment. Employees are not to enter restricted areas unless accompanied by a properly trained individual familiar with the hazards of the area. Personnel are not to operate specialized equipment without proper training and documentation. Watch for overhead hazards and wear head protection if needed. During the first 6 months of employment, personnel routinely entering areas where lasers are used will receive laser safety training that will be coordinated by the ECE Safety Officer. Training in other applicable safety courses will be coordinated by ECE Safety Officer on an individual basis after consultation with faculty advisor.</p>		
		SIGNATURE		
		DATE	PAGE	OF
			1	1

EMPLOYEE:	<b>JOB SAFETY ANALYSIS</b>	DEPT: <b>EEC</b>	LOCATION:	JOB TYPE:
JOB FUNCTION	POTENTIAL HEALTH OR INJURY HAZARDS	SAFE PRACTICE, APPAREL, OR EQUIPMENT		
Perform research in an environment involving <b>radiological materials</b> .	Exposure to radiological agents via inhalation, contact, ingestion or injection.	<p>Avoid all unnecessary exposures. Adhere to radiological material handling procedures including limiting exposures through combination of minimizing time, maximizing distances and use of appropriate shielding. Proper selection and use of personal protective equipment including gloves, protective eyewear, lab coats, and in some instances respiratory protection. Implementation of proper personal hygiene habits, including washing hands and face before eating and smoking.</p> <p>During the first 6 months of employment, personnel will receive basic training in Radiation Safety that will be coordinated by the ECE Safety Officer. Training in other applicable safety courses will be coordinated by ECE Safety Office on an individual basis after consultation with faculty advisor.</p>		
SIGNATURE				
DATE		PAGE	OF	
		1	1	

EMPLOYEE:	<b>JOB SAFETY ANALYSIS</b>	DEPT: <b>EEC</b>	LOCATION:	JOB TYPE:
JOB FUNCTION	POTENTIAL HEALTH OR INJURY HAZARDS	SAFE PRACTICE, APPAREL, OR EQUIPMENT		
Perform research in an environment containing power- or hand- <b>tool hazards</b> .	Injury from tools or equipment including hand drill, drill-press, exacto knives, soldering iron, Dremel tool, or other hand tool .	Personnel are not to operate specialized equipment, such as a drill press, without proper training and documentation. Use personal protective equipment including gloves, protective eyewear and specialized equipment. During the first 6 months of employment, personnel will receive safety training that will be coordinated by the Lab Supervisor and the ECE Safety Officer.		
		SIGNATURE		
		DATE	PAGE	OF
			1	1

# WORKSITE INSPECTION FORM

## Laboratory Environment

Location: \_\_\_\_\_ Date: \_\_\_\_\_

Inspector: \_\_\_\_\_ Phone: \_\_\_\_\_

Department: \_\_\_\_\_

### General Hazards

Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	1.	Are aisles, exits, and adjoining hallways maintained free of obstructions that would hinder emergency access or exiting?
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	2.	Are there at least 18 inches (47 cm) of vertical clearance between all stored items and the ceiling-mounted fire sprinklers? (If there are no sprinklers, measure to the ceiling itself.)
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	3.	Are approved sharps waste containers available for disposal of needles, blades, and other sharps? (Reminder: There should be a proper procedure for disposal of broken glass.)
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	4.	Has furniture and equipment over five feet tall been bolted to the wall or otherwise secured?

### Emergency Equipment

Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	5.	Are all emergency eyewash and shower stations free of obstructions that would prevent quick access by someone temporarily blinded by a chemical splash? Are they within 100 feet of the laboratory (or approximately 10 seconds)?
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	6.	Are the emergency eyewashes for the laboratory tested (flushed) monthly and are the tests documented?

### Laboratory Equipment

Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	7.	Look inside each refrigerator and freezer in your lab to ensure flammables are stored in units that are suitable for storage of flammables. Is each refrigerator and freezer in the laboratory labeled as either "safe" or "unsafe" for storage of flammables?
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	8.	Look inside each refrigerator and freezer in your lab to ensure food is stored only in units designated "food only." Are all refrigerators, freezers, and microwave ovens properly labeled either "Food Only" or "No Food or Drink Allowed?"
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	9.	Are all compressed gas cylinders adequately secured with non-combustible restraints to keep the cylinders from falling? (Bench clamps are not adequate to secure large cylinders. Gas cylinders should be capped when not in use.)

### Chemicals

Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	10.	Does the lab have a Chemical Hygiene Plan (CHP)? If yes, is it up to date and has it been reviewed and signed within the past year? If no, all labs that contain chemicals are required to maintain a CHP. Complete a lab specific CHP using the EH&S template ( <a href="http://ehs.ucdavis.edu/chem/chem_mnl/clsm_apps.cfm">http://ehs.ucdavis.edu/chem/chem_mnl/clsm_apps.cfm</a> ).
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	11.	Has the laboratory's chemical inventory been completed or updated within the last year (or within 30 days of a significant change such as a move to a new location or addition of new chemicals) and entered into the EH&S Chemical Inventory System (CIS)?

Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	12.	Are chemical fume hoods kept uncluttered so that air flows properly (e.g., is storage minimized and are adequate work areas provided)? Can ALL chemical work be done more than six inches into hood? (Note: Chemical fume hood sashes must be in good condition and be used at the proper setting, typically 18 inches from the work surface.)
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	13.	Are all chemical containers and hazardous waste containers kept closed when not in use?
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	14.	Are all chemical containers (including squirt bottles and unwanted hazardous materials containers) clearly labeled with their contents and primary hazard(s) and are they in good condition (not corroded or leaking)?
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	15.	Are corrosives stored below eye level and are incompatible chemicals stored appropriately (e.g., acids separate from bases, oxidizers separate from flammables)?
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	16.	Is a spill kit available? Is the location known to all employees in the laboratory? Has there been training in the past 12 months?
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	17.	Are peroxide formers (such as isopropyl ether and diethyl ether) stored away from light and heat and labeled with the date they were opened and the expiration date?

**Electrical**

Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	18.	Are extension cords used only as temporary wiring (<30 days) and not connected in a series (daisy-chained) with other extension cords or power strips? (Cords must be in good condition with no breaks or exposed wiring.)
Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	19.	Is high voltage equipment clearly labeled, properly guarded, and is its use restricted to trained personnel only?

**Ergonomics**

Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	20.	Are ergonomic issues being addressed for employees using computers or at risk of repetitive motion injuries?
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**Other Hazards**

1.	
2.	
3.	
4.	
5.	

**Comments**

# ACCIDENT INVESTIGATION FORM

Name of Injured Person: \_\_\_\_\_ Date of Injury: \_\_\_\_\_

Name of Supervisor: \_\_\_\_\_ Telephone #: \_\_\_\_\_

Department: \_\_\_\_\_ Location of Injury: \_\_\_\_\_

Brief Description of Accident:

Nature of Injury (describe all body parts affected):

Was Training Provided?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	NA	<input type="checkbox"/>
Were established procedures followed?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	NA	<input type="checkbox"/>
Were tools or equipment adequate for task?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	NA	<input type="checkbox"/>
Were environmental conditions a factor in the incident?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	NA	<input type="checkbox"/>

Elaborate on Responses:

Proposed Corrective Action:

Supervisor: \_\_\_\_\_ Date of Report: \_\_\_\_\_

Signature: \_\_\_\_\_

**IIPP-Appendix D**  
**March 2006**

Completed copies of this form should be routed to the department Safety Coordinator and kept in department files for at least three years.

# HAZARD CORRECTION REPORT

Department: \_\_\_\_\_

**This form should be used in conjunction with the “Hazard Alert Form” (IIPP Appendix A), as appropriate, to track the correction of identified hazards.**

**All hazards should be corrected as soon as possible, based on the severity of the hazard. If a serious imminent hazard cannot be immediately corrected, evacuate personnel from the area and restrict access until the hazard can be addressed.**

Supervisor/Safety Coordinator Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Supervisor/Safety Coordinator Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Description and Location of Unsafe Condition	Date Discovered	Required Action and Responsible Party	Completion Date	
			Projected	Actual

**IIPP-Appendix E  
March 2006**

Completed copies of this form should be routed to the department Safety Coordinator and kept in department files for at least three years.

# **APPENDIX F**

## **132 B/C DARKROOM PROCEDURE**

## **EEC 132 B/C DARKROOM PROCEDURE**

***PLEASE WEAR GLOVES WHEN YOU ARE WORKING WITH CHEMICALS.  
PLEASE DO NOT OPEN CUPBOARDS UNDER REGULAR LIGHT.***

### **Outline of Procedure:**

*Red light only:*

- Load film holder
- Develop, fix film

*Yellow light:*

- ▽ Coat board with photoresist, develop board.

*Film:*

- Expose: 20 seconds
- Develop: 2 1/2 to 2 3/4 minutes (pull out and check)
- Fix: 2 minutes
- Wash: 1 minute

● = a procedure that must be done under a red light

▽ = a procedure that must be done under a yellow light

*Board:*

- Clean: with propanol and steel wool (very lightly)
- ▽ Coat: uniformly with KPR resist
- ▽ Bake: one hour
- ▽ Expose: 3 to 3.5 minutes
- ▽ Develop: 3 to 3.5 minutes

Rinse:

Dry uncoated side

Tape back

Etch: 10-20 minutes

NOTE: Big boards take longer to etch and are likely to develop irregularities such as ragged edges, pinholes, etc. Keep boards small. Small boards with little surplus to be trimmed give good results predicted by Libra. Big boards that must be trimmed excessively, do not.

● = a procedure that must be done under a red light

▽ = a procedure that must be done under a yellow light

## DARKROOM PROCEDURE

### PRECAUTIONS

The procedure of photography, developing and fabrication of circuit boards involves the use of **hazardous** chemicals, which have the capacity of causing **temporary or permanent damage to health.** Therefore, it is **MANDATORY** that the following precautions be observed at all times during the process:

- (a) Use laboratory coats or aprons at all times
- (b) Use gloves at all times when handling chemicals
- (c) Use goggles for eye protection

### PHOTOGRAPHY

1. ● Under the red light take a 4x5" Kodalith film sheet from the cupboard and load it into the film holder.

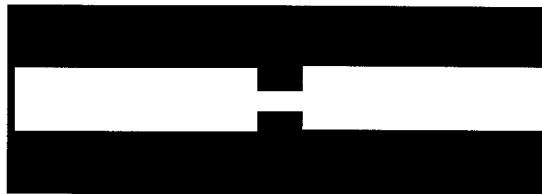
The dull or darker emulsion side faces out toward the light source. Replace the remaining film back in its box and put back in cupboard.

- (a) Remove the slide from the film holder.
- (b) Open the hinged light trap.
- (c) Slide the film into the film holder, keeping both edges of the film behind the guide rails. The film must be perfectly flat in the film holder.
- (d) Close the hinged light trap.
- (e) Replace the slide into the slot on the same side as the film.
- (f) Load the film holder into camera, remove the slide and expose the film to the picture of the circuit on the wall for 20-25 seconds at f8 (this is using the fluorescent lights from ceiling. Or, if using approx. f11 with incandescent light source at 8 seconds.

● = a procedure that must be done under a red light

▽ = a procedure that must be done under a yellow light

- (g) ● Replace the slide. Be sure you've put the slide in the frontmost slot where it will keep light from the film, and then remove the film holder from the camera.
- (h) ● Remove the film from the film holder. Submerge the film in A&B solution (developer). Slip the film into the developer at once, emulsion side up so that the entire film is immersed simultaneously.
- (i) ● Agitate once every 30 seconds by lifting one end of the developing tank about 1/2" off the counter, and setting it back on the counter. Continue agitating until the 2.5 minute mark (5 agitations total during development).
- (j) ● At 2 minutes, 45 seconds, pick up the film from the tank and let drain until the 3 minute mark.
- (k) ● Submerge film into photo fixer solution for 2 minutes. Agitate the same way as developer. (The fixer stops development and makes the film no longer light-sensitive).
- (l) Take the film out and wash under running water for 1 minute. Hang the film up to dry. The dried film is the mask for your circuit board. Handle it carefully and keep it clean. It should look something like this:



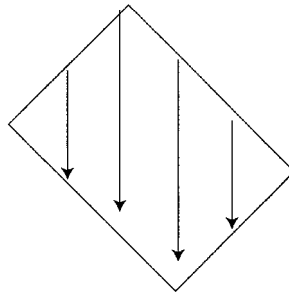
Tongs or forceps may be used to handle the film during development, but for best result, use your fingers. Just be sure to wash your hands after getting them in chemicals!

● = a procedure that must be done under a red light

▽ = a procedure that must be done under a yellow light

## FABRICATION OF CIRCUIT BOARD

- (a) Cut a minimum size circuit board piece appropriate for your circuit dimensions. You should know the dimensions before you start. Use the cursor in Libra to measure your layout.
- (b) Buff and rub (very lightly) one side of the circuit board piece with fine steel wool (#000).
- (c) Use propanol and Kimwipes to take dirt and dust off from the buffed side.
- (d) The surface of the circuit must be dust-free and very clean. Handle the cleaned board only by the edges.
- (e) ▽ Wearing gloves for this part of the procedure is mandatory under yellow light in the darkroom. Take the bottle of photoresist (KPR) and pour a uniform layer of KPR on your circuit. Don't let your circuit touch anything. Pour a small amount at one edge of the board. Rock the board side-to-side as you let the KPR work its way to the opposite edge, uniformly coating the cleaned side of the board.
- (f) ▽ Let the chemical drip off by holding your circuit as the figure below illustrates:



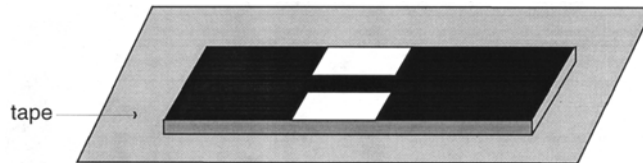
**Note:** To keep the board from falling while the KPR drains, carefully tape it to the side of the fume hood. Apply a small piece of tape to the backside (non-KPR-coated) of the board, but do NOT let the coated side come into contact with the side of the fume hood. Lean the board against the fume hood, tape the top corner of the board.

▽ = a procedure that must be done under a yellow light

- (g) Do not relayer circuit, because relayering the circuit causes a multilayer of KPR photo resist on circuit board that causes uneven etching and non-uniform circuit dimensions. If the coated side falls on anything before it has been baked, use KPR developer as a solvent to remove all of the KPR resist. Clean the board with propanol and steel wool and start again.
- (h) ▽ Bake your circuit in the oven for 60 minutes. Replace the oven door lid and leave the lid open about 1" at the bottom.
- (i) ▽ Take your circuit out of the oven. Let it cool down. Please be careful as the oven is very hot!
- (j) ▽ Lay the film mask on the KPR-coated side of the circuit board. Place the mask, emulsion side down, on the contact printer glass, the board will be on top of the negative. Expose 3 minutes under ultraviolet light. **DO NOT LOOK INTO THE ULTRAVIOLET LIGHT DIRECTLY! IT IS HARMFUL TO THE EYES!**
- (k) ▽ Submerge the circuit into KPR developer for a minimum of 3, maximum 3.5 minutes; agitate once. Replace the cover, keeping the KPR tank in the fume hood. Continue agitating as was done with the film developer.
- (l) Remove the board after 3 to 3.5 minutes developing time. Rinse under running water. Dry the board thoroughly. Do not scratch the KPR side. Handle the board by the edges only.

▽ = a procedure that must be done under a yellow light

(m) Tape the bottom of the circuit board with paper underneath the tape (minimizing clean up). Make sure that the tape has stuck to the bottom firmly. It must cover the entire bottom of the board. You do not want the etchant to come into contact with the bottom of the board.



(n) Mix determined amount of ammonium peroxodisulfate powder in hot water and keep the solution (etchant) warm by placing the solution in a container on the burner in low heat (11 o'clock). The etching process should be done inside the hood only. Submerge the circuit into the etchant and gently agitate the circuit until the copper etches away.

**DO NOT TOUCH THE SURFACE OF THE CIRCUIT!**

This should take 25-35 minutes. Do not let the etchant boil. Never set the hotplate thermostat past 12 o'clock. After etching, rinse the circuit with water and remove the masking tape