I. BACKGROUND & SCOPE

The University of California ("University") is committed to providing a healthy and safe environment and workplace for all members of the campus community. It is University policy to comply with all applicable health, safety and environmental protection laws, regulations and requirements. This Policy operates in conjunction with other applicable regulations and UCLA policies, including but not limited to UCLA Policy 905, 907, 992, 994 and 996.

This Policy applies to all Undergraduate Researchers working and learning in research and teaching laboratories. Undergraduate Researchers doing clinical research involving humans are subject to additional requirements, including those of UCLA Health and Health Sciences.

II. DEFINITIONS

For the purposes of this Policy:

Direct Supervision is when the individual is being directly watched during experimentation by the Principal Investigator, Supervisor, the assigned mentor, or another fully trained lab member who is at least a graduate student, postdoctoral scholar, or staff member.

Principal Investigator is a faculty or staff member who is responsible for the research laboratory. A full administrative definition of a UCLA Principle Investigator can be found at UCLA Policy 900. Principal Investigator Eligibility.

Supervision is when the individual is not working alone due to the presence within the room or adjacent room within hearing range of the Principal Investigator, Supervisor, the assigned mentor, or another fully trained lab member who is at least a graduate student, postdoctoral scholar, or staff member.

Supervisor is an experienced researcher who provides guidance and training to the Undergraduate Researcher. The Supervisor can be the Principal Investigator, the assigned mentor, or another fully trained lab member who is at least a graduate student, postdoctoral scholar, or staff member. The Supervisor may not be another Undergraduate Researcher.

Undergraduate Researcher is a research participant who is an undergraduate student, whether from UCLA or another institution, and any other participant without an undergraduate degree such as a high school student (e.g. volunteer and minor). This applies to research participants in laboratories and not those doing clinical work where there are additional requirements, including those of UCLA Health and Health Sciences.
**Working Alone** is when an individual is working unaccompanied, such that assistance is not readily available should an injury, illness, or emergency arise. Alone is interpreted as being out of direct visual contact or hearing range with another lab worker for more than a few minutes. It can occur during normal working hours as well as during evening, night or weekend hours and even in the same general area as others.

### III. STATEMENT

UCLA recognizes that undergraduate students participating in research projects may not have the scientific background, technical knowledge, or practical experience to engage safely in all research activities. As a result, additional safety requirements are necessary for some research activities and other activities that involve highly hazardous materials and/or conditions are prohibited.

The safety requirements as outlined in this Policy pertain to all research and teaching laboratory environments.

#### A. General Safety Requirements for all Researchers

As outlined in various University and campus policies, UCLA has established a number of safety controls, protocols and trainings to ensure safety in research laboratories. The following apply to all researchers:

- Completion of Laboratory Safety Fundamentals online training course
- Review of the Laboratory Safety Manual, including the following key programs
  - UCLA Chemical Hygiene Plan
  - Departmental Injury and Illness Prevention Program
- Completion of required research-specific safety training (such as ARC-mandated courses and occupational health program enrollment, Biosafety ABC’s, IBC Compliance, Bloodborne Pathogen, Medical Waste Management, Radiation Safety, Laser Safety) as identified in the [UCLA Lab Safety Training Matrix](#)
- Completion of laboratory safety training mandated by the school or department hosting the research
- Review of the research group Laboratory Hazard Assessment Tool
- Completion of the laboratory safety orientation for the research group
- Completion of laboratory-specific safety training within the research group
- Inclusion of all appropriate researchers, including Undergraduate Researchers, on BUA and ARC protocols as required by laboratory research plans
- Adherence to the Personal Protective Equipment (PPE) standards established by [UCLA Policy 905](#)
- Use of added PPE required by the research group Laboratory Hazard Assessment Tool
- Use of additional PPE based on experiment hazard assessments
- Use of standard operating procedures (SOPs) on the safe use of equipment and chemicals
- Use of SOPs to guide safe execution of procedures

#### B. Additional Safety Requirements for Undergraduate Researchers

Some research activities require additional training by Undergraduate Researchers before they can conduct the research and some require added restrictions that aim to provide added safety protection. In addition to the general safety requirements outlined above, Undergraduate Researchers must comply with the following additional requirements:
• Undergraduate Researchers under 18 years old (minors) must comply with the UC Policy Minors in Laboratories and Shops and submit to their Principal Investigator a completed UC Release of Liability, Waiver of Claims, Express Assumption of Risks, and Hold Harmless Agreement https://www.ucop.edu/risk-services/_files/safety-resources/minors-in-labs-and-shops.pdf. Information factsheet is at: https://ucla.app.box.com/v/ehs-uc-minors-labs-impacts.

• Principal Investigators of Undergraduate Researchers under 18 years old (minors) must submit a Minors Research Proposal Registration Form to the chair of their department. Form is at https://www.ucop.edu/risk-services/_files/safety-resources/minors-in-labs-and-shops.pdf.

• Undergraduate Researchers must submit proof of health insurance to their Principal Investigator if not enrolled at UCLA.

• Undergraduate Researchers working in the UCLA Health and Health Sciences must register as “Volunteers”. Information at: https://www.uclahealth.org/volunteer/

• Undergraduate Researchers working in radiation use areas are subject to UCLA Procedure 994.2: Volunteers and Visitors in Non-Clinical Radiation Use Areas.

• Working with some materials or equipment may require additional training or direct supervision as determined by the Principal Investigator and/or Supervisor.

• Conducting many laboratory procedures requires Direct Supervision until proficiency is demonstrated. Only then can the procedures be conducted independently and this is set by the laboratory Principal Investigator and/or Supervisor.

• Performing operations which use an open flame require additional training and may not be done alone.

• Conducting any procedure involving hydrogen peroxide or organic peroxides must have a detailed protocol and must be approved by the Principal Investigator and/or Supervisor.

• Conducting a scale-up chemical procedure that is more than four times a prior experiment or uses more than 100 grams of substrate requires prior approval of the laboratory Principal Investigator and/or supervisor.

• Working with pyrophoric reagents requires additional training and can only be done under Supervision.

• Working with reactions under pressure, using glass or metal reactors, or which may become pressurized requires additional training and can only be done under Supervision.

• Performing radiosynthesis requires additional training and can only be done under Supervision.

• Working with radioactive compounds requires additional training and can only be done under Supervision.

• Performing flow cytometry requires additional training and can only be done under Supervision.

• Handling of BSL2 materials, including primary human cells/tissues/blood, but excluding established human cell lines, requires additional training and can only be done under supervision.

• Working in a BSL2+ facility requires additional training and can only be done under Supervision.

• Working in shops (e.g. machine or wood) requires additional training and may not be done alone.

• Performing any hot work (e.g. welding) which requires a permit may not be done alone.

• Working with open beam class IIIIB or class IV lasers requires additional training and must be done under Supervision. See Attachment B, item 6 for definitions and examples.

• Working with ultrafast lasers requires additional training and must be done under Supervision. See Attachment B, item 6 for definitions and examples.
C. Prohibited Research Activities for Undergraduate Researchers

Some research activities present hazards of such severity, that exposing Undergraduate Researchers to these materials cannot be justified. Therefore, the following activities are prohibited:

- Working with any materials or equipment not authorized for the Undergraduate Researcher by the Principal Investigator.
- Working with any materials or equipment which requires training where the Undergraduate Researcher has not yet been trained.
- Acting as the Supervisor for another Undergraduate Researcher for any of the safety requirements described in this Policy.
- Working with materials commercialized as, or under investigation as, explosives. Examples are listed in Attachment B, item 1.
- Working with materials understood to be potentially explosive under ambient conditions. Examples are listed in Attachment B, item 2.
- Working with potent oxidizing chemicals that when combined with common substances, which can act as potential fuels, are well understood to create explosive mixtures. Examples are listed in Attachment B, item 3.
- Working with Listed Carcinogens as identified in Attachment B, item 4.
- Working with neat (pure) chemicals, but not diluted solutions, with exceptionally potent health hazards as acute toxins, carcinogens, and reproductive toxins. (These are a subset of Particularly Hazardous Substances, see UCLA Policy 907.) Examples are listed in Attachment B, item 5.
- Working with replication-competent pathogens that require BSL2+ facilities (e.g. HIV).
- Working in BSL3 facilities.
- Operating or repairing equipment that requires specialized user training or certification.

D. Exemptions

Principal Investigators may request exemptions to the requirements set forth herein by submitting a written request to the Office of the Vice Chancellor for Research Safety Oversight Committee (OSOC) (osoc@research.ucla.edu). OSOC will evaluate the request and provide a written response back to the Principal Investigator. The request should include:

- Names of the Principal Investigator, Undergraduate Researcher, and mentor (if applicable)
- Description of the research activity involving hazardous materials, as listed in Attachment B, that the Undergraduate Researcher will undertake
- Reasons that it is appropriate for the Undergraduate Researcher to conduct the research activity involving hazardous materials
- Enhancements to safety procedures that will be implemented to allow the Undergraduate Researcher to safely conduct the research activity involving hazardous materials

OSOC will review all requests for exemptions and make a determination whether to grant the request under the authority of the Vice Chancellor for Research. OSOC may consult with EH&S and others and may request additional information from the Principal Investigator before making its decision. OSOC may impose additional conditions or restrictions as part of the approval process. The Undergraduate Researcher will not begin the research activity involving hazardous materials unless and until the request is approved.
IV. RESPONSIBILITIES

Preventing laboratory injuries and illnesses is the responsibility of every member of the campus community. Specific responsibilities are assigned to designated campus authorities and members of the research and teaching community in order to implement and ensure compliance with this Policy.

A. Principal Investigators

The laboratory where Undergraduate Researchers are conducting research must have a responsible person who is a Principal Investigator (See: UCLA Policy 900: Principal Investigator Eligibility). The Principal Investigator must:

- Ensure that every Undergraduate Researcher has completed all of the required General Safety training as outlined in Section III.A. Attachment A, “Safety for Undergraduate Researchers Checklist” is attached to assist in this process
- Consider assigning a specific graduate student, postdoctoral scholar, or staff member as the official mentor or Supervisor for each Undergraduate Researcher
- Ensure that every Undergraduate Researcher adheres to:
  1. all safety requirements set by UCLA (see Section III.A)
  2. all safety requirements set by the host school and department
  3. all safety requirements set by the research laboratory
  4. all additional safety requirements detailed herein (see Section III.B)
  5. all prohibited research activities detailed herein (see Section III.C)
- Determine when an Undergraduate Researcher must work under Supervision or under Direct Supervision and ensure that these requirements are met

B. UCLA Office of Environment, Health & Safety (EH&S)

UCLA EH&S is responsible for many aspects of laboratory safety (see UCLA Policy 811) and must:

- Advise Principal Investigators on all aspects of laboratory safety, including participation of Undergraduate Researchers
- Identify laboratories that have minors and Undergraduate Researchers working in them and ensure that required documentation and protocols are in place
- Notify Principal Investigators of any safety deficiencies involving Undergraduate Researchers and advise on recommendations for resolutions and hazard abatements
- Communicate with campus safety committees on safety requirements for Undergraduate Researchers

V. ADDITIONAL INFORMATION

Questions can be sent to the Office of the Vice Chancellor for Research Safety Oversight Committee (OSOC) at osoc@research.ucla.edu.

VI. REFERENCES

1. UCLA Policies 811, 905, 907, 992, 994, 996;
2. UC Policy Minors in Laboratories and Shops.
VII. ATTACHMENTS

A.  Example: Undergraduate Researcher Safety Training Checklist
B.  Examples of Hazardous Materials

Issuing Officer

/s/Roger Wakimoto
Vice Chancellor for Research

Questions concerning this policy or procedure should be referred to the Responsible Department listed at the top of this document
EXAMPLE: Undergraduate Researcher Safety Training Checklist

The following checklist may be used by Principal Investigators to ensure that every Undergraduate Researcher in their area of responsibility has completed all of the required General Safety training as outlined in UCLA Policy 906, Section III.A. UCLA Policy 906 sets forth the safety requirements for Undergraduate Researchers and it is strongly recommended that you read the Policy prior to completing the checklist.

Use of this checklist is not required, though ensuring completion of all required training is mandatory. The list under Section II of this checklist may be modified as needed and this may not be an exhaustive list of all required training.

I. Identities
Undergraduate Researcher name: UID #:
Principal Investigator:
Direct Supervisor/Mentor:
Main laboratory room(s) where Undergraduate Researcher will work:
Date Undergraduate Researcher joined research group:
Was Undergraduate Researcher under 18 years old as of that date? ______ Yes ______ No

II. General Safety Requirements – UCLA Training

<table>
<thead>
<tr>
<th>Date</th>
<th>Initials</th>
<th>Topic</th>
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<tbody>
<tr>
<td>_____</td>
<td>_____</td>
<td>Laboratory Safety Fundamentals online training course</td>
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<td>_____</td>
<td>_____</td>
<td>Inclusion on IBC, ARC, RSC protocols as required by research plan</td>
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<tr>
<td>_____</td>
<td>_____</td>
<td>Completion of relevant biological safety courses:</td>
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<tr>
<td>_____</td>
<td>_____</td>
<td>B Virus Exposure (online)</td>
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<tr>
<td>_____</td>
<td>_____</td>
<td>Biosafety ABC's - Biosafety Level 2 Training (in-person)</td>
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<td>_____</td>
<td>_____</td>
<td>Biosafety Level 2 with Biosafety Level 3 Practices (in-person)</td>
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<tr>
<td>_____</td>
<td>_____</td>
<td>Bloodborne Pathogens (online)</td>
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<td>_____</td>
<td>_____</td>
<td>Medical Waste Management (online)</td>
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<td>_____</td>
<td>NIH Guidelines for UCLA Researchers: IBC Compliance (online)</td>
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<td>_____</td>
<td>_____</td>
<td>Safe Use of Biosafety Cabinets (online)</td>
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<td>_____</td>
<td>_____</td>
<td>Shipping of Biological Materials (online)</td>
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<td>_____</td>
<td>_____</td>
<td>Completion of relevant animal research courses:</td>
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<tr>
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<td>_____</td>
<td>Aseptic Techniques training (online and wetlab)</td>
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<tr>
<td>_____</td>
<td>_____</td>
<td>Medical History Questionnaire (online)</td>
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<tr>
<td>_____</td>
<td>_____</td>
<td>Species-Specific training (online and wetlab)</td>
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<td>_____</td>
<td>_____</td>
<td>Completion of relevant radiation safety research courses:</td>
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<tr>
<td>_____</td>
<td>_____</td>
<td>Radiation Safety Training for Users of Radioactive Materials (online)</td>
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<tr>
<td>_____</td>
<td>_____</td>
<td>Radiation Safety for Users of Radiation Producing Machines (online)</td>
</tr>
</tbody>
</table>
Beyond the General Safety requirements are additional research-specific required trainings (such as Biosafety ABC’s, IBC Compliance, Bloodborne Pathogen, Medical Waste Management, Radiation Safety, and Laser Safety) as identified in the [UCLA Lab Safety Training Matrix](UCLA Lab Safety Training Matrix).

### III. Laboratory-Specific Requirements

In addition to the General Safety requirements, the Principal Investigator will 1) develop safety enhancements applicable to the Undergraduate Researcher and 2) review the additional safety requirements and prohibitions with the Undergraduate Researcher as outlined in UCLA Policy 906, Section III. B&C.

<table>
<thead>
<tr>
<th>Date</th>
<th>Initials</th>
<th>Topic</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Review of the Laboratory Safety Manual, including the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o UCLA Chemical Hygiene Plan</td>
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<tr>
<td></td>
<td></td>
<td>o Departmental Injury and Illness Prevention Program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Review of research group Laboratory Hazard Assessment Tool (LHAT)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completion of lab safety orientation for the research group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completion of laboratory specific safety training within the research group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completion of laboratory safety training mandated by the department</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Review of PPE standards established by UCLA Policy 905</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Knowledge of PPE required by the research group LHAT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Knowledge of additional PPE based on experiment hazard assessments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Review of laboratory SOPs on the safe use of equipment and chemicals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Review of laboratory SOPs to guide safe execution of procedures</td>
</tr>
</tbody>
</table>
Examples of Hazardous Materials

The following list of hazardous materials are examples of materials that require additional training by Undergraduate Researchers before they can conduct the research or are materials that are prohibited for use by Undergraduate Researchers. For more information, see UCLA Policy 906.

1. Examples (not a complete list) of materials intended as explosives
   - Cyclotrimethylenetrinitramine (RDX)
   - Dynamite
   - Nitroglycerin
   - Pentacyclohexyl tetranitrate (PETN)
   - Triacetone triperoxide (TATP)
   - Trinitrotoluene (TNT)

2. Examples (not a complete list) of materials with known explosive properties
   - Diazocompounds
   - Diazonium salts
   - Fulminate salts
   - Perchlorate salts

3. Examples (not a complete list) of potent oxidizing chemicals
   - Hydrogen peroxide or organic peroxides that are concentrated during the experiment
   - Liquid oxygen
   - Nitrogen tetroxide
   - Perchlorate salts

4. Listed Carcinogens
The term “listed carcinogen” refers to a specific list of 13 chemicals regulated by Cal/OSHA. These chemicals have specific use and handling requirements that requires evaluation by EH&S and reporting to Cal/OSHA, even if work is contained within a laboratory fume hood.
   - 2-Acetylaminofluorene
   - 4-Aminodiphenyl
   - Benzidine (and its salts)
   - 3,3'-Dichlorobenzidine (and its salts)
   - 4-Dimethylaminoazobenzene
   - alpha-Naphthylamine
   - beta-Naphthylamine
   - 4-Nitrobiphenyl
   - N-Nitrosodimethylamine
   - beta-Propiolactone
   - bis-Chloromethyl ether
   - Methylchloromethyl ether
   - Ethyleneimine
5. Chemicals with extremely potent health hazards

Neat (pure), but not diluted solutions of, acute toxins with a LD$_{50}$ of less than 5 mg/kg (oral), 50 mg/kg (dermal), 100 ppm (gases), 0.5 mg/L (vapors), or 0.05 mg/L (dusts/mists).

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Health Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylenedicarboxylic acid monopotassium salt</td>
<td>Aconitine</td>
</tr>
<tr>
<td>Acrolein</td>
<td>Acryloyl chloride</td>
</tr>
<tr>
<td>Aflatoxin B1</td>
<td>Allyl chloroformate</td>
</tr>
<tr>
<td>Allylamine</td>
<td>Azide salts</td>
</tr>
<tr>
<td>bis(2-chloroethyl) sulfide</td>
<td>1,2-Bis(trimethoxysilyl)ethane</td>
</tr>
<tr>
<td>Blasticidine S hydrochloride</td>
<td>2-Chloroethanol</td>
</tr>
<tr>
<td>Cholera toxin</td>
<td>Colchicine</td>
</tr>
<tr>
<td>Crotonaldehyde</td>
<td>Cyanide salts</td>
</tr>
<tr>
<td>Cyanogen bromide</td>
<td>1,3-Dichloroacetone</td>
</tr>
<tr>
<td>Diethyl chlorophosphite</td>
<td>1α,25-Dihydroxyvitamin D3</td>
</tr>
<tr>
<td>1,6-Diisocyanatothexane</td>
<td>Dimethylmercury</td>
</tr>
<tr>
<td>Diptheria Toxin</td>
<td>Divinyl sulfone</td>
</tr>
<tr>
<td>Eserine hemisulfate salt</td>
<td>Ethidium bromide</td>
</tr>
<tr>
<td>Ethyl chloroformate</td>
<td>Fluorine</td>
</tr>
<tr>
<td>Hydrofluoric acid</td>
<td>Hygromycin B</td>
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<tr>
<td>Iron(0) pentacarbonyl</td>
<td>Mechlorethamine</td>
</tr>
<tr>
<td>Methacryloyl chloride</td>
<td>Methanesulfonyl chloride</td>
</tr>
<tr>
<td>Methanesulfonyl fluoride</td>
<td>Methyl chloroformate</td>
</tr>
<tr>
<td>N,N-Diethylaniline</td>
<td>N,N-Dimethyl-p-phenylenediamine</td>
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<tr>
<td>1,4-Naphthoquinone</td>
<td>Nitric oxide</td>
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<tr>
<td>Nitrogen dioxide</td>
<td>Osmium Tetroxide</td>
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<tr>
<td>Paraquat dichloride</td>
<td>Phenyl Isocyanate</td>
</tr>
<tr>
<td>Phenyl Thiourea</td>
<td>Phorbol esters</td>
</tr>
<tr>
<td>Phosgene</td>
<td>Putrescine</td>
</tr>
<tr>
<td>Strychnine</td>
<td>Tetramethyl orthosilicate</td>
</tr>
<tr>
<td>2,4-Toluene diisocyanate (TDI)</td>
<td>(+)-Valinomycin</td>
</tr>
<tr>
<td>Warfarin</td>
<td>Wortmannin</td>
</tr>
</tbody>
</table>

6. Examples of laser hazards

Open beam laser is defined as a system where any part of the laser path is exposed.

A class IIIB visible laser is defined as any visible laser with 5 to 499 mW of power.

A class IV laser is any visible laser with greater than 500 mW of power.

Ultrafast lasers are considered herein as the same as class IV lasers for safety enhancements.

Any ultrafast laser, defined as having pulse durations < 1 ns, has the potential for severe eye damage regardless of power.