**Guidance for Lab Startup**

Principal Investigators (PIs) are responsible for the health and safety of all personnel working under their authority. PIs may delegate safety duties but must ensure delegated duties are performed and safety obligations are fulfilled. As each laboratory has its own unique set of hazards, risk assessment and hazard Identification is a fundamental function for PIs in any laboratory, classroom, studio, or shop. PIs must determine and document safe procedures, necessary controls, and emergency responses while ensuring compliance with all federal, state, local, and university regulations. To assist PIs in this undertaking and to maintain compliance, Environmental Health, Safety and Emergency Management (EHS & EM) at App State established the Laboratory Safety Program. All labs, studios, and shops owned by the university are subject to this program and required to participate to the extent EHS & EM deems appropriate following an initial evaluation of all the spaces and documentation associated with a PI.

Below is an overview of the laboratory safety program and prompts to assist you completing a risk assessment of your area(s) and generating all the necessary documentation (lab safety plan, protocols) and procedures (SOPs) as you prepare your lab/studio/shop for startup.

Please contact the Lab Safety Program at LabSafety@appstate.edu with any questions!

**Laboratory Safety Program**

* Documentation
	+ **Lab Safety Plan** – Each lab is responsible for establishing a Lab Safety Plan that is specific to their spaces and procedures as means of identifying the hazards one may encounter and developing mitigation strategies and procedures.
		- This document should address at least the following:
			* Emergency contact information
			* Emergency response procedures (Exposures/injuries, spills)
			* General lab safety measures
				+ Engineering controls – infrastructure (ventilation), equipment (fume hood, biosafety cabinet)
				+ Administrative controls – established procedures (experimental, cleaning), training/medical surveillance requirements
				+ Signage – door, equipment
				+ Personal Protective Equipment (PPE)
				+ Lab security
			* Specific Hazards – biological, chemical, radiation. animal use, physical
			* Waste Management
		- A [template](https://appsafety.appstate.edu/safety/lab-safety-program/documentation) for this document is available through EHS & EM.
		- Should be reviewed annually by all staff
	+ **Standard Operating Procedures (SOPs) –** All labsshould also utilize established SOPs (biological, chemical, emergency response, experimental procedures). These documents may be from a general use perspective or lab specific.
		- [General use SOPs](https://appsafety.appstate.edu/safety/lab-safety-program/documentation) are available through EHS & EM.
		- [Templates](https://appsafety.appstate.edu/safety/lab-safety-program/documentation) for lab-specific SOPs are also available through EHS& EM.
		- The [chemical hazard category table](https://appsafety.appstate.edu/sites/default/files/sops_chemical_hazard_categories_-_ehsem.pdf) can help determine if a lab-specific SOP is required.
		- Should address the hazards associated with a specific agent/procedure and the means to mitigate exposure/injury and establish response procedures in the event of an exposure/release
	+ **Protocols** (IRB/IACUC/IBC) – Certain types of research may require prior regulatory approval.
		- Will you be conducting research involving **human subjects**? – If so, the [Institutional Review Board (IRB)](https://researchprotections.appstate.edu/human-subjects) must be contacted.
			* Obtain informed consent from all participants.
		- Will you be utilizing **animals**? – If so, the [IACUC](https://researchprotections.appstate.edu/animals) must be contacted for experimental review.
			* Submit protocol – protocol approval is required before starting work.
			* Complete appropriate [training](https://researchprotections.appstate.edu/animals-iacuc/iacuc-training) and the [Health Risk Assessment](https://researchprotections.appstate.edu/sites/researchprotections.appstate.edu/files/faculty.staff_.other_students_health_surveillance_version_5.pdf). The Health Risk Assessment is required by the US Public Health Service (PHS). It is used to assess the potential risks of exposure in relation to your self-reported medical history (allergies, etc.).
		- Will your research involve any **recombinant DNA work** (cloning, breeding recombinant animals, etc.)? – If so, you will need to consult with the [Institutional Biosafety Council (IBC)](https://researchprotections.appstate.edu/biosafety) to determine if a protocol is needed for proposed work per NIH requirements.
			* Submit protocol (if needed) – protocol approval is required before starting work.
			* Complete appropriate training
	+ **Permits/Licenses/Agreements**
		- Will you utilize **Controlled Substances**? – the PI may need to obtain a DEA license and adhere to storage, disposal, and record keeping requirements.
		- Will you need a **USDA or CDC permit**? – May be needed for the use and/or transport of any biological agent or toxin listed under the [Federal Select Agent Program](https://www.selectagents.gov/sat/list.htm), as well as soil, plants, or animals.
			* Contact the [University Industrial Hygienist](https://appsafety.appstate.edu/about/directory) if you are planning to utilize any select agents.
		- Will you have **collaborations** with entities outside of the university?
			* Contact the [Office of Research Protections](https://researchprotections.appstate.edu/).
			* Material transfer agreements and/or Export Control documentation may be needed, even for intellectual property.
* Inspections
	+ **Criteria and Procedures –** All labs will be regularly inspected by EHS & EM. These inspections will involve an evaluation of all the spaces and documentation (LSP, SOPs, training, permits, etc.) following a standardized [checklist](https://appsafety.appstate.edu/sites/default/files/inspection_checklist_-_ehs_em.pdf).
	+ **Frequency** of inspections will be based on the established risk level and safety record.
		- Maybe annual, biannual, triannual or every 6 months.
* Lab Safety Committee
	+ Comprised of a departmental member from several academic departments that have the highest percentage of research/teaching labs, a member of the Research Protections office, and a few members of the EHS & EM office.
	+ meets regularly to discuss progress with the program, issues, potential improvements, and general lab safety concerns on campus.

**Training/Vaccines/Medical Surveillance**

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|[ ]  Are you and your staff aware of all training requirements (Federal, University, Lab-specific)? Has everyone including yourself completed the necessary training prior to starting any work? |
|  |[ ]  Will you be using chemicals or working in areas where chemicals may be stored? If so, **Chemical Hygiene Training** is required. |
|  |[ ]  Will you be utilizing compressed gases? If so, **Compressed Gases Training** must be completed.  |
|  |[ ]  Will you be using radiation? If so, **Radiation Training** is required for Radiation Use Authorization (RUA) approval.  |
|  |[ ]  Will you be utilizing x-ray equipment? If so, **X-Ray Producing Machines Safety Training** is required for Radiation Use Authorization (RUA) approval. |
|  |  | * **Machine specific training** is also required and must be approved by the Radiation Safety Officer.
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|  |[ ]  Are you planning to utilize lasers? If so, **Laser Safety Training** must be completed by anyone using Class 3b or Class 4 lasers. |
|  |[ ]  Have electrical safety guidelines been reviewed by all lab personnel? **Electrical Safety Training** should be completed by anyone working in a lab, studio, or shop environment. |
|  |[ ]  Will you be utilizing power tools? If so, **Shop Safety Training** must be completed by all personnel. |
|  |[ ]  Are you planning to ship any biological/infectious material, chemicals, or dry ice? If so, **Dangerous Goods Shipping Training** must be completed and renewed biannually.  |
|  |[ ]  Will you be using human specimens in your research? Could you possibly be exposed to human blood, bodily fluid, or tissue? If so, [**Bloodborne Pathogens Training**](https://appsafety.appstate.edu/safety/biological-safety/bloodborne-pathogens) is required and must be updated annually. |
|  |[ ]  Will you be using BSL-2 listed material? If so, all personnel must complete **BSL-2 Training**.  |
|  |[ ]  Will your research involve the use of recombinant material? If so, [**IBC/NIH Recombinant DNA Training**](https://researchprotections.appstate.edu/biosafety) is required.  |
|  |[ ]  Will animals be utilized in your research? If so, [**IACUC**](https://researchprotections.appstate.edu/animals) **Training** – general and species-specific – may be required.  |
|  |[ ]  Will *any* of your work be performed in the field/outside the lab? If so, **Field Safety Training** should be completed. |
|  |[ ]  Have all **Lab Specific Trainings** been completed? – May include BSC cabinet use, waste disposal, autoclave use, etc,  |
|  |[ ]  Have all relevant staff been offered the **Hep B Vaccine**? – All staff that may be exposed to human blood or other potentially infectious body fluids must be offered the Hep B Vaccine.  |
|  |[ ]  Do you plan to wear a respirator for your job? If so, contact the [University Industrial Hygienist](https://appsafety.appstate.edu/about/directory) for information on the **Respiratory Protection Program** at App State.  |
|  |[ ]  Will your research involve the regular use of high noise equipment or procedures? If so, contact the [University Industrial Hygienist](https://appsafety.appstate.edu/about/directory) for information on the **Hearing Conservation Program** or if you have any concerns about the noise levels in your work area(s). |

Biological Hazards

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|[ ]  Will you be using any biological material? (If no, skip this section.) |
|  |[ ]  Have you completed a **risk assessment**? Should consider agent and procedure awareness; mitigation strategies. |
|  |[ ]  What BioSafety Level (BSL) is associated with agent(s)? (BSL1 [ ]  , BSL2 [ ]  ) |
|  |[ ]  Will you be utilizing any BSL-2 listed material? If so, a **BSL-2 SOP** must be developed. All personnel must review and sign annually. [A template is provided by EHS & EM](https://appsafety.appstate.edu/safety/lab-safety-program/documentation). |
|  |[ ]  Is appropriate PPE available in the lab (e.g., full face protection is needed when working with BSL-2 agents on the open bench)? |
|  |[ ]  Are appropriate engineering controls available? Access to a biosafety cabinet is necessary for work with BSL-2 material especially in situations where aerosol generation (centrifugation, vortexing) is a concern.  |
|  |[ ]  Are Safety-engineered sharps utilized with BSL-2 material as required by OSHA? |
|  |[ ]  Is a sink available for handwashing? Is an eyewash available? |
|  |[ ]  Are the Biosafety Cabinets certified? NIH/CDC requires annual certification. Should establish a regular certification with vendor. |
|  |[ ]  Is appropriate disinfectant available in the lab? Surfaces must be disinfected with either 10% bleach solution (prepared freshly-at minimum weekly) or an EPA registered disinfectant such as Vindicator following any work involving BSL-2 material. |
|  |[ ]  Is all biological waste handled appropriately? Infectious waste must be chemically inactivated, or steam sterilized prior to discarding into the sink as dictated by the Town of Boone. If steam sterilization is utilized, waste must be sterilized at 1210C/15 psi/60 mins as specified by [NC DEQ](https://files.nc.gov/ncdeq/Waste%20Management/DWM/SW/Programs%20and%20Planning/MedicalWaste/Section.1200.pdf).  |
|  |[ ]  Are biologically contaminated glass instruments (slides, glass Pasteur pipettes) appropriately disinfected prior to discarding into a broken glass container or discarded directly into a sharps container? |
|  |[ ]  Have you developed and posted procedures for biological spills and exposures? |
|  |[ ]  Does all equipment have appropriate signage? Biohazard stickers should be placed on equipment used to manipulate biologicals. |
|  |[ ]  Is proper door signage in place? All biohazards, entrance requirements (training, vaccines), and emergency contact are listed as required by the NIH/CDC. Sample door signs are included as the last page in the templates for the [Lab Safety Plan and the BSL2 SOP](https://appsafety.appstate.edu/safety/lab-safety-program/documentation). |
|  |[ ]  Have you taken the appropriate training to ship biological/infectious material? Is the training current? |

Chemical Hygiene

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|[ ]  Are chemicals utilized in your area(s)? (If no, skip this section.) |
|  |[ ]  Have you and your staff completed chemical safety training? |
|  |[ ]  Are you aware of the OSHA Hazard Communication Standard? |
|  |  | * An up-to date inventory must be maintained and will be reviewed at the time of the inspection.
* Chemicals should be dated upon receipt and discarded if expired.
* Safety Data Sheets for all chemicals used/stored in your area(s) must be readily available (digital access is acceptable),
* All containers must be clearly labeled in a manner that allows staff to easily identify its contents and associated hazards.
 |
|  |[ ]  Are appropriate SOPs available (general/lab specific)? Have lab specific SOPS been generated? |
|  | [ ]  | Have all personnel reviewed all relevant SOPS? |
|  |[ ]  Are appropriate engineering controls in place? Is there a well-functioning certified chemical fume hood or other containment equipment available for use with volatile/toxic chemicals? Is the space well ventilated? |
|  |[ ]  Is there safety shower/eyewash station available within 10 seconds (about 55 feet) of corrosive work area(s) and properly maintained (documented weekly operational checks) as specified by the American National Standards Institute’s (ANSI) standard Z358.1. |
|  |[ ]  Are [chemicals properly stored](https://appsafety.appstate.edu/sites/default/files/flyer_-_chemical_storage_guidelines_-_ehsem.pdf)? |
|  |  | * Chemicals should be stored within compatible groups.
* Chemical containers should be closed unless you are actively adding or taking from the container.
* Secondary containment must be utilized in certain situations (e.g., on the floor, near a drain, or in the same cabinet of incompatible chemicals)
* Hazardous chemical or glass containers should not be stored above eye-level or within a fume hood.
* Chemicals should be stored in appropriate cabinets. Flammables should be stored in a flammable cabinet; flammable storage outside of a cabinet should be limited. Corrosives should not be stored in metal cabinets as these materials may lead to corrosion of the cabinet or shelving.
 |
|  |[ ]  Are you aware of the [chemical waste disposal guidelines](https://appsafety.appstate.edu/safety/chemical-safety/hazardous-chemical-waste) for App State? Have you established appropriate waste streams and developed lab specific procedures on how to dispose of any waste generated within your space(s)? You should review the [Drain Disposal Guidance](https://appsafety.appstate.edu/sites/default/files/flyer_-_drain_disposal_guidance_-_ehsem.pdf) if you are considering discarding any material down the drain.  |
|  |[ ]  Are waste containers appropriately [labeled](https://appsafety.appstate.edu/safety/chemical-safety/hazardous-chemical-waste) once waste is added? |
|  |[ ]  Have you developed and posted procedures for chemical spills and exposures? |

Physical Hazards

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|[ ]  Are you planning to utilize **radioactive materials, lasers, and/or X-Ray producing Machines**? (If no, skip this section.) |
|  |[ ]  Are you approved to use radioactive material?  |
|  |  | * + - An approved Radiation Use Authorization (RUA) is required to order, purchase, or possess radioisotopes. RUA’s must be renewed annually.
		- An [RUA application](https://appsafety.appstate.edu/safety/biological-safety/radiation-safety/forms) must be submitted to the Radiation Safety Officer (RSO); Gregory Bell, 828-262-4008, bellgl@appstate.edu
		- Radiation Safety Training must be completed prior to approval.
 |
|  |[ ]  Is appropriate PPE utilized? |
|  |[ ]  Is shielding equipment available and utilized? |
|  |[ ]  Is appropriate environmental monitoring conducted? |
|  |[ ]  Are you aware of how to dispose of radioactive material and/or equipment? |
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| [ ]  | Are you planning to utilize **compressed gases**? (If no, skip this section.) |
|  |[ ]  Have you and your staff completed compressed gas training (general, lab specific)? |
|  |[ ]  Is the area you plan to utilize and/or store the compressed gasses well ventilated? Is there a chemical fume hood available? A chemical fume hood should be used whenever possible.  |
|  |[ ]  Is appropriate PPE available? |
|  |[ ]  Is all equipment (valves, tubing, etc.) rated for the pressure utilized and cylinder content. |
|  |[ ]  Are the gas cylinders properly stored? |
|  |  | * Storage area should be:
	+ Well ventilated with appropriate signage.
	+ Free of heavy traffic, excessive heat, and potential sparks.
* Cylinders should be:
	+ Separated by hazard class.
	+ Secured individually to the wall or bench with a chain/strap positioned between the shoulder and midpoint; or placed in a storage rack.
 |
|  |[ ]  Have you coordinated with vendor to collect empty or unused cylinders? |
|  |[ ]  Are all cylinders properly labeled? Cylinders should be labeled “empty” promptly once it is spent; empty and full containers should be kept separate if possible.  |
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|[ ]  Are you planning to utilize **sharps**? (If no, skip this section.) |
|  |[ ]  Have you and your staff completed sharps training (general, lab specific)? |
|  |[ ]  Are all sharps appropriated discarded? Sharps should be discarded immediately into a sharps containers; needles should never be removed, bent, sheared, or recapped. |
|  |[ ]  Are sharps containers available in the lab? |
|  |[ ]  Do you know the proper disposal procedure for full sharps containers? |
|  |[ ]  Are you planning to utilize with biological material? BSL-2? If used with BSL-2 material, sharps must be safety engineered (retractable, guarded) to prevent accidental sticks as dictated by OSHA regulations. |
|  |[ ]  Are you planning to use with hazardous chemicals? If so, the sharps container should be handled as chemical waste by covering the biohazard label with a hazardous waste label. |
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|[ ]  Are you planning to use **cryogens or dry ice**? **Open flames, heating devices**? (If no, skip this section.) |
|  |[ ]  Have you and your staff completed appropriate training (hazard specific, lab specific)? |
|  |[ ]  Are equipment and materials utilized in a proper manner (e.g., heating device or open flames are not utilized near flammable or combustible materials, dry ice is used in a well-ventilated space)? |
|  |[ ]  Are Bunsen burners (open flames) or hot plates ever left unattended?  |
|  |[ ]  Is a chemical fume hood or direct exhaust available to vent the potential release of toxic vapors/fumes from certain heated materials?  |
|  |[ ]  Are all heating devices equipped with temperature controls and automatic shutoffs to prevent overheating? |
|  |[ ]  Is appropriate PPE available for both high heat and extremely cold materials? |
|  |[ ]  Are hot or cold material properly discarded? Extremely hot or cold materials should never be discarded into the sink. |
|  |[ ]  Are hot or cold materials properly stored? Cryogens, dry ice, and high heat materials should be stored in a manner that allows proper venting.  |
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|[ ]  Have you reviewed the [Lockout/Tagout requirements](https://appsafety.appstate.edu/safety/workplace-safety/lockout-tagout-procedures) when servicing equipment possessing **hazardous energy** (electricity, pneumatic/hydraulic, gas/steam)? Have you developed group specific procedures?  |
|  |[ ]  Have you reviewed the lockout/tagout procedures – general and group specific – with your staff? As these procedures ensures all equipment is stopped, isolated from all potentially hazardous energy sources, and locked out before employees perform any servicing or maintenance activities where the unexpected start-up or release of stored energy could cause injury, all personnel must be aware and adhere to all established procedures. |
|  |[ ]  Have all personnel received appropriate **Hazardous Energy Training**? The required training will be dependent upon on the role and responsibility of each individual. |
|  |[ ]  Does all personnel know which equipment needs to be serviced employing lockout and tagout procedures and who is authorized to perform such maintenance? |
|  |[ ]  Are you aware of the appropriate methods of dissipating or restraining energy for all the equipment in your area(s)? And have equipment specific procedures been developed?  |
|  |[ ]  Is all staff aware of the lockout/tagout notification requirements? Affected individuals should be notified of any equipment under lockout and tagout and when the affected equipment has been cleared. |