HERBERT WERTHEIM COLLEGE of ENGINEERING
Engineered for Safety

LAB SAFETY KICK-STARTER

This is a guide to assist understanding many of the basic lab safety requirements here at UF. It was developed by the College of Engineering Safety office, with feedback and guidance from EHS. It describes the specific tasks to complete to meet the safety expectations. It also describes recommended *best practices* (in italics). You can use this guide to help establish your lab safety program, prepare for EHS inspections, as well as use as a self-inspection tool. The EHS inspection checklists can be found here: http://webfiles.ehs.ufl.edu/GT/LS.pdf

Following this guide does not guarantee you will be meeting all regulations and compliance expectations, nor does it mean that you have addressed all possible hazards present in your lab. If you have any questions, comments, or suggestions please contact HWCOE Safety at safety@eng.ufl.edu

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RECORDKEEPING AND DOCUMENTATION

Engineering Laboratory Safety Guidelines	• *The lab should have on file a signed Engineering Lab Safety Guidelines document indicating understanding of the rules and completion of applicable training for each individual working in the lab. A copy of this document can be found at eng.ufl.edu/safety*
Does the lab have a copy of the UF Lab Safety Manual (LSM)?	• Must have a copy of the LSM on file/accessible to lab members http://webfiles.ehs.ufl.edu/labsafe.pdf • All lab members must be familiar with the lab safety manual and its requirements • *Document all lab members have read the most current version of the LSM or the lab specific version (if applicable)* • *Modify LSM to be relevant to your lab* • *Review and update LSM annually (show revision date)*
Has the lab performed Hazard Assessments for lab procedures when developing SOPs?	• All lab procedures should be reviewed for hazards and steps taken to remove or minimize them, or protect the employee with PPE • Document the PPE Hazard assessments with these guidelines http://www.ehs.ufl.edu/programs/lab/safety_info/hazard_assessment/ • Guidance on selecting PPE can be found here: http://www.ehs.ufl.edu/programs/lab/safety_info/ppeselect/

Is annual Chemical Hygiene Plan (CHP) & Training current?	• A **completed** lab specific CHP, reviewed and updated annually: http://www.ehs.ufl.edu/programs/lab-research/gator-tracs/latch/
	• The following needs to be done in order to have a completed CHP:
	  ○ Update personnel roster in Gator TRACS under LATCH
	  ○ Chemical inventory complete and update in Chemtracker
	  ○ Ensure all training has been completed and appears in LATCH
	  ○ A risk assessment has been completed with all activities selected and PPE modified as needed.
	  ○ All SOPs and Lab-specific training documents have been uploaded in the attachment section of the risk assessment
	  ○ The PI has approved the assessment
	  ○ All personnel have signed acknowledging that they have read and understand the hazards and risks of working in the work area.
	• *The PI has taken EHS861*
	• *The lab staff have taken EHS862*
	• *Both available thru myUFL: http://www.ehs.ufl.edu/programs/lab/chp/chp-training/*

	• *CHP is up-to-date with all current protocols and researchers use it as a safety tool* • *Safety information is incorporated into research protocols*
Are SDSs available to lab personnel?	• Input your chemical inventory into ChemTracker – ChemTracker has SDS database management http://www.ehs.ufl.edu/programs/lab/chemtracker/ • Contact EHS for access to ChemTracker system ehs.chemtracker@connect.ufl.edu

EMERGENCY INFORMATION

Are updated emergency call lists posted and legible at the lab entrance?	• All labs should have a notice board posted outside their rooms which indicate the hazards contained within and the emergency contact information. To obtain a notice board, email safety@eng.ufl.edu • The emergency contact list should be up to date and include at least two members of the laboratory.
Are hazard warning stickers posted and legible at the lab entrance?	• Stickers should indicate the hazardous materials contained within the lab. • Examples include: Flammable solvents, flammable gases , corrosive, non-flam gases, biohazard, cryogen, toxic chemicals, carcinogens, lasers, UV Light, chem storage area, high voltage • If you need new stickers email safety@eng.ufl.edu

Are personnel trained in emergency procedures for the labs?	• Everyone should be trained on the following emergency procedures:
	  ○ Fire
	  ○ Chemical Spill
	  ○ Chemical exposure
	  ○ Gas Leak
	  ○ Chemical specific response as needed (HF, biologicals, etc…)
	• If the lab has any toxic gasses they must have a documented emergency plan for any detected leak
	• *Conduct annual drill related to emergency response, making it lab specific*

Are accidents and/or exposures reported and documented?	• Ensure all incidents are reported and investigated, use the form at http://webfiles.ehs.ufl.edu/IIIRpt.pdf

	• You may report incidents online at eng.ufl.edu/safety or email safety@eng.ufl.edu • *Conduct internal investigation to identify preventative actions* • *Implement preventative actions and train all effected staff*
Is there a fire extinguisher within 50 ft of the lab?	• EHS does inspections of these units • Lab must ensure it is not blocked • Ensure extinguishing agent is compatible with research materials • Every laboratory worker should know the location and operation of the extinguisher • *Visually inspect monthly and document in your lab self-inspection – report any issues to EHS* • To request fire extinguisher training, contact HWCOE Safety
Is there a safety shower within 10 second travel distance?	• PPD does inspections of these units • Lab must ensure it is not blocked • Ensure shower permanently connected to a source of potable water • *Visually inspect monthly to ensure it's not blocked.* • *Call PPD Work management if your safety shower does not display a sticker showing it's been tested within the last year.* • Every laboratory worker should know the location and operation of the safety shower
Is there a plumbed eye wash unit within 10 second travel distance	• PPD does inspections of these units • Ensure eye wash station permanently connected to a source of potable water • All the eyewash stations must be identified by signs http://webfiles.ehs.ufl.edu/labsafe.pdf • *Test/operate the eye wash weekly* • Every laboratory worker should know the location and operation of the eye wash
Is there a stocked first aid kit?	• A list of required items for the kit can be found at http://www.ehs.ufl.edu/programs/lab/ • A first kit aid must be located in a Cleary visible place in each laboratory • *Inspect the first aid kit contents monthly to replenish supplies as necessary.*
Is safety equipment accessible and unobstructed?	• Maintain all safety related equipment in operable condition and not blocked (eye washes, showers, first aid kits, calcium gluconate, etc…) • The access to the eyewash must be clear all times • The access to the safety shower must be clear all times • Additional first aid items may be required depending on the chemicals used in the lab

PERSONAL PROTECTIVE EQUIPMENT

Is PPE available, stored, clean and dry and in good repair?	• PPE must be in good condition and available for employees to use
Is hearing protection available for high noise areas?	• Have hearing protection available for high noise areas. • Have UF Industrial Hygiene group perform noise monitoring to determine if hearing protection is required and if other aspects of the Hearing Conservation Program are required. Email: safety@eng.ufl.edu to request monitoring
Are dust/mist respirator wearers informed of proper use?	• Wearers of respirators (including N95 "dust masks") must complete necessary paperwork: ○ http://www.ehs.ufl.edu/programs/ih/respirator/ • A review of the process which respirators are being worn should be completed to determine if the hazard can be eliminated or reduced before resorting to respirator use.
Are respirator wearers trained, fit tested and registered w/ EHS?	• Tight fitting respirator wearers must be trained, fit tested and registered with EHS. ○ http://www.ehs.ufl.edu/programs/ih/respirator/ • A review of the process which respirators are being worn should be completed to determine if the hazard can be eliminated or reduced before resorting to respirator use.

GENERAL SAFETY

Are walkways and work surfaces uncluttered?	The walkways and work surfaces should be clear.
Is broken glass separated from regular trash and labeled appropriately?	• Clean Lab ware Disposal Policy: http://www.ehs.ufl.edu/programs/chemrad_waste/labware/
Are food and beverages kept out of working areas?	• Food and beverages are not permitted in the lab working area, or stored in lab refrigerators/freezers • Food used in research must be identified as "Lab Use only, Not for Human Consumption." http://www.ehs.ufl.edu/programs/lab/lssurvey/checklist/
Are food and beverages kept out of lab refrigerators/freezers?	Email Amy for stickers: safety@eng.ufl.edu
Are the refrigerators labeled?	• Every refrigerator must be clearly labeled to indicate whether it is suitable for storage of flammables, biological or radiological materials Household refrigerators must be labeled "Danger-Do not store flammable liquids" or similar
Are sprinkler heads given 18" of clearance	No Stacking materials closer than 18 inches below the sprinkler.

CHEMICAL SAFETY

Has a complete chemical inventory been prepared for the lab?	• Input your chemical inventory into ChemTracker – ChemTracker has MSDS database management http://www.ehs.ufl.edu/programs/lab/chemtracker/ • Contact EHS for access to ChemTracker system ehs.chemtracker@connect.ufl.edu • *Utilize the chemical inventory to track inventory to reduce waste and repeat orders* • *Review chemical inventory for highly hazardous materials, chemicals with low PELs, reactives, etc… to develop specific procedures for working with those compounds*
Are chemical spill control materials available in the lab?	• Must have appropriate spill kit for the types and quantities of chemicals you use • Request one here: http://www.ehs.ufl.edu/programs/lab/spill_kits/ • If you are using biohazardous materials, you need a separate biospill kit • *Have a regular inspection of your spill kit materials to ensure they are replenished if any are used on a regular basis*
Are the chemical fume hoods uncluttered and airfoils and slots unobstructed?	• The use of the hood cannot obstruct the airflow – it must maintain the face velocity it was certified at. • Avoid excessive storage and blocking the baffles at the rear of the hood • More info: http://www.ehs.ufl.edu/programs/lab/fumehood/ • It is important for lab staff to understand how the chemical fume hood in the lab functions. • All laboratory personnel must be trained in proper use of fume hoods
Are all outdated and unused chemicals disposed of in a timely manner?	• Disposal of chemical wasted is managed by EH&S Hazardous Materials Management Program. • Chemical wastes are required to be held at the generating location in a defined “accumulation area” until ready for pick up • Each lab that generates waste, must have an identified waste manager who has completed in-person training annually. • All other users in lab shall be trained via the waste manager or online training. • All chemicals wastes shall be accumulated in sealed containers • Segregate chemical wasted by class: acids, bases, halogenated, non-halogenated, oxides, and reactives. • For full waste guidelines: http://www.ehs.ufl.edu/programs/chemrad_waste/forms/

Are proper storage procedures followed for all chemicals including:	
Labeling	• All chemicals containers shall be labeled with the contents and hazards. • If you do use abbreviations, you must post a list of all abbreviations used • *Use a standardized labelling/classification system – such as HMIS or NFPA*
Capping/sealing?	• All bottles/containers need to be closed immediately to avoid any degradation of the chemicals or reactions, or spills • All bottles/containers must be capped with a firm sealing cap or stopper; aluminum foil and parafilm are not sufficient • If a container needs tubes going into it, a tight fitting hole can be drilled in a cap to accept the tube
Cap/seal and container in good condition	All cap/seal and containers need to be in good conditions to avoid any degradation, venting or spill of the chemical
Liquids stored below shoulder height?	Do not store liquid chemicals above shoulder height
Are chemicals stored by compatibility:	
Liquids and dry chemicals separated	• Liquids and dry chemicals stored separated • Liquids and dry chemicals must be segregated by hazard classification and stored only with compatible substances
Acids separated by compatibility	• Organic and inorganic acids stored separately • Nitric acid stored separately from all other acids, and all other inorganic acids stored by compatibility • Hydrofluoric acid stored separately in a secondary container of a chemically compatible plastic • Secondary containers are acceptable for separation
Acids and bases separated	• Secondary containers • The storage area should be checked regularly for spills and leaks • Suitable spill clean-up material must be available
Corrosives stored away from flammables, metals, and oxidizers	Corrosives should be stored separately from flammable liquids, metals, and oxidizers
Flammables and oxidizers separated	• Oxidizing agents should be stored separately from flammable liquids, organics, dehydrating agents and reducing agents. • Oxidizing agents should be used with caution in the vicinity of flammable materials. • Strong oxidizing agents should be stored and used in glass or other inert containers. Corks and rubber stoppers should not be used

Is an alternative to chromic acid cleaning solution being used?	• Chromic acid and chromerge solutions need to be handled with extreme care. • If these are being used as cleaning solutions for glassware, it is recommended that they be replaced by other non-chromic acid compounds, such as “No-Chromix”
If perchloric acid is used, is it dated and disposed of annually?	• Perchloric acid must be dated when received into the lab and again when opened. It should be disposed of after one year since explosive crystals may form, or within six months of opening whichever occurs first • Heavy Perchloric acid usage should be done with extreme caution and only in a fume hood designed for its use
If peroxide forming compounds are used in the lab are they:	
Dated when received?	Must be dated when received into the lab
Dated when opened?	Must be dated when opened
Disposed of in a timely manner?	• These compounds must be picked up by EH&S within six (6) months after date of opening or one (1) year after date of receipt. • Certain organic solvents are susceptible to peroxide formation and can form potentially explosive peroxides over time

COMPRESSED GASES SAFETY

Are cryogenic materials handled with appropriate PPE?	○ Must have:
	  ○ Eye protection (Face shield)
	  ○ Cryogenic protective gloves
	  ○ Full shoes and long pants
	○ Cryogenic gases should only be used and dispensed in well – ventilated areas
	○ *Oxygen monitor recommended for small enclosed spaces where asphyxiant gases are used*
	• http://www.ehs.ufl.edu/programs/lab/cryogens/

Is there a copy of the UF compressed Gas Rules posted in the lab?	• Print and post this poster near cylinders • http://www.ehs.ufl.edu/programs/os/cgr/
Are all compressed gas cylinders adequately secured?	• Cylinders must be secured around the top 1/3rd of the cylinder by a chain or strap to a cart, wall, bench, or cabinet • Cylinder stands that clamp the base of the cylinder are permissible when the cylinder cannot be secured normally • Must use hard cart for transport • Must be capped during transport or when not in use
Are all cylinders capped or have regulators?	Use cap when cylinders are not in use or when a regulator is not attached
Are all cylinders labeled for contents?	• All cylinders shall be clearly labeled to identify the contents
Are hydrostatic tests current?	• Hydrostatic testing is the most common way to check an cylinder for leaks or flaws • Hydrostatic tests should be current (cylinders have not been stored more than 5-10 years) • The cylinders should be clearly and permanently marked on the metal of the cylinder with the date the cylinder was manufactured and the date(s) of subsequent hydrostatic tests. • If you rent cylinders, the vendor is responsible for cylinder maintenance
Are cylinders stored by compatibility?	• Oxygen or nitrous oxide shall not be stored in the same area with flammable gases unless separated by at least 20 feet or by a ½ hour rated fire resistant partition • Reactive gases should be stored separately • Cylinders stored in an area outside a building must be a minimum distance of 20 feet from flammable gases or combustible material.
Are special precautions used for storing and	• Do not store corrosive gases and toxic gases for more than 6 months

handling toxic gas cylinders?	• Is there an emergency plan in place? • Are highly toxic gases stored in gas safety cabinets vented to the outside
Are cylinders stored away from heat sources?	• Do not let the temperature of the cylinders exceed 38° C (100° F) Store full cylinders in a cool, well ventilated and protected area
Is the regulator connection leak tested after and before use?	• With a regulator under pressure (both high and low pressure side) check all connections for leaks using a gas leak detector • Use regulators specific for the type of gas contained in a cylinder; they are not interchangeable
Are cylinders transported by hand truck w/ a cap attached?	Cylinders shall be moved only on a hand truck or other cart designed for handling gas cylinders with cap attached. http://www.purchasing.ufl.edu/departments/selfmove.asp

ELECTRICAL SAFETY

Is access to circuit breaker panel unobstructed and breakers labeled?	• Electrical panels must be kept free of obstructions with at least 3 feet of clearance provided in front of the panel • All panels and breakers must be labeled to indicate the circuit's specific function.
Are openings sealed on the breaker panels, receptacle boxes, etc?	• Openings on breaker panel, receptacle boxes, etc. are sealed • All face plates on light switches and power outlets must be in place; signal wires do not require covered boxes
Are Ground fault circuit interrupters (GFCI) used in wet areas?	Ground Fault Circuit Interrupters (GFCI) are used near sinks and wet areas
Are extension cords used only for temporary use with portable equipment?	• Extension cords are intended only for temporary use with portable equipment. • Permanent use of extension cords is prohibited • Extension cords must be put away between uses, leaving extension cords in place between uses counts as long term usage
Is the lab free of shop made cords and receptacle boxes?	• Shop-made cords with receptacle boxes may not be used • Receptacle boxes with knock out plugs must be firmly mounted; any receptacle boxes on the end of a flexible cord should be the bell type box with screw in plugs and a cable grip strain relief
Are flexible cords protected from damage and in good condition?	• Flexible cords and cables are attached to appliances and should not be confused with extension cords that supplement the regular supply cords • Generally flexible cords that are designed into machinery are not a problem as long as they are in good condition. • Flexible cords are not to be run through any pinch points, over sharp edges, or walked on • Flexible cords that must go across a walk way must be covered with a tread protector that prevents damage to the cord

FLAMMABLE SAFETY

If flammable liquids are stored in refrigerators, is it fire-rated?	• It is unsafe to store flammable liquids in domestic refrigerators or freezers. Explosions, injuries, and costly laboratory fires have resulted from this dangerous practice • Purchase the correct storage units for flammable materials
Are large drums of flammable liquids grounded and bonded during liquid transfer?	• Transferring a liquid from one metal container to another may result in static electrical sparks. To prevent the buildup of static electricity and prevent sparks from causing a fire, it is important to bond metal dispensing and receiving containers together before pouring. Bonding is done by making an electrical connection from one metal container to the other • One of the two containers must be grounded • The following link shows an example of the correct way to handle the drums: http://www.ccohs.ca/oshanswers/prevention/flammable_static.html
Are flammable liquids > 10 gallons (combined vol) stored in flammable cabinets?	• Flammable liquids in amounts exceeding 10 gallons must be stored in flammable storage cabinets or safety containers • Flammables cabinets must close fully for them to qualify as flammable storage
Are sprinkler heads given 18” of clearance	• No Stacking materials closer than 18 inches below the sprinkler • Sprinkler heads must not be blocked
Are flammable cabinets sealed?	Flammables cabinets must have their vents closed.

BIOMEDICAL SAFETY

If you work with any of the following: Risk Group 2 or above pathogens, recombinant/synthetic nucleic acids, State or federally regulated materials, acute toxins (LD50 of ≤ 100 µg/kg), human primary cell lines, cancer cell lines, cell lines transformed with viruses, or cell lines tumorigenic in humans you must register with the office of Biosafety. http://www.ehs.ufl.edu/programs/bio/bioman/	
Is this research registered with EH&S?	• Institutional Biosafety Committee: http://www.ehs.ufl.edu/programs/bio/forms/
If BSL2 or higher, is a Biosafety cabinet certified annually?	• Precision Air certifies BSC on campus: • ***Any engineering control should be tested annually to ensure it is working properly***
If animals are housed in the lab for over 24 hours, is lab approved by IACUC?	• http://www.iacuc.org/
Is biological waste decontaminated appropriately?	• Biological Waste Management and Disposal. http://www.ehs.ufl.edu/programs/bio/waste/
Is autoclave tested every 40 hours for biomedical/biohazardous waste inactivation or every 6 months for all other uses?	• Autoclave Guidelines. http://www.ehs.ufl.edu/programs/bio/autoclave/
Does the lab have a Biosafety manual (if applicable)?	• Must have a copy of the BSM on File/ accessible to lab members. http://webfiles.ehs.ufl.edu/BioMan.pdf (currently under revision; not available)
If human body fluids, tissues, specimens or primary cell lines are handled:	
Are all affected personnel in the Bloodborne pathogen program?	• BBP Exposure Information. http://www.ehs.ufl.edu/programs/bio/bbp/
Is there an exposure control plan & SOP?	• A completed exposure control plan & SOP.

	http://webfiles.ehs.ufl.edu/BBP_ECP.pdf & http://webfiles.ehs.ufl.edu/BBPSOPS.pdf

CONTROLLED SUBSTANCES

Does lab use DEA Controlled substances?	• Pharmaceutical Products and DEA Controlled Substances. http://www.ehs.ufl.edu/programs/lab/controlled/
Does PI have the proper permit?	• DEA Registration https://www.deadiversion.usdoj.gov/webforms/jsp/regapps/common/newAppLogin.jsp
Is recordkeeping in order	• All of the following recordkeeping forms must be maintained and be readily available for inspection http://webfiles.ehs.ufl.edu/deause.pdf http://webfiles.ehs.ufl.edu/UF_DEA_Drug_Record_C-II.pdf
Are these substances stored in a secure location?	Must be secure and controlled access to drugs.
Is proper disposal method being used?	• There are many chemical and/or pharmaceutical compounds used in research or in the treatment of diseases that are also considered hazardous wastes when disposed off http://www.ehs.ufl.edu/programs/chemrad_waste/pharm/

RADIATION SAFETY

Are you using radiation or lasers?	Contact Radiation Control http://www.ehs.ufl.edu/programs/rad/ to Register lasers (3b and above) http://www.ehs.ufl.edu/programs/rad/laser/ Xray users need to be badged: http://www.ehs.ufl.edu/programs/rad/rssc/rssc-training-schedules/ Training – Use/machines Radiation Control Committee – use material machines Lasers trained	• If you are considering using radioactive materials and would like to have a better understanding how this will impact your labs operations, COE has put together a guide "radiation application and use summary" – email safety@eng.ufl.edu for a copy.

WASTE MANAGEMENT

Are lab personnel trained in hazardous waste management?	• Annual training is required for all employees who generate or manage hazardous waste on UF's main campus or in satellite areas. http://www.ehs.ufl.edu/programs/chemrad_waste/ • Individuals designated as the hazardous waste manager for the lab must take the in-person training annually
Are hazardous waste containers properly labeled with yellow EH&S labels?	• All hazardous waste containers must be labeled correctly • Waste hazards must be identified on the label (toxic, flammable, corrosive, reactive) • The Hazardous Waste label must be placed on the container BEFORE any waste is put into the container. • Abbreviations and formulas are not permitted. http://webfiles.ehs.ufl.edu/ChemWasteMgtGuide.pdf
Are hazardous wastes properly sealed (except when adding waste)?	• A container holding hazardous waste must ALWAYS be closed during storage, except when it is necessary to add or remove waste. • If a waste container is used to collect waste from a continuous process (i.e., drainage from a process collected with tubing inserted into a bottle), the container must still be sealed using rubber stoppers with tubing inserts or other appropriate means.
Does the lab have a designated and identified Waste accumulation area?	• The PI must designate a Lab Waste Manager to ensure that the waste is being handled correctly on a day-to-day basis. • The PI must also ensure that everyone in the lab has read and is familiar with the Hazardous Waste Satellite Accumulation Area Requirements sheet and the Hazardous Waste Management Guide. • Waste is accumulated only in areas classified as "satellite accumulation areas." • A Hazardous Waste Satellite Accumulation Area Requirements sheet can be found here: http://webfiles.ehs.ufl.edu/ChemWasteMgtGuide.pdf Appendix D • Satellite Accumulation Areas **must be audited and documented monthly** (by lab staff) http://webfiles.ehs.ufl.edu/monthly_waste.pdf

OTHER SAFETY ISSUES

Are needles and syringes disposed of in red “Sharps” boxes?	• Biomedical Waste Disposal Guidelines: http://webfiles.ehs.ufl.edu/biomed_waste_disposal_guide.pdf
Are pipetting tools available to lab personnel?	• Mouth pipetting is not allowed; ensure proper pipetting tools are available. Tips to reduce, reuse and recycle pipette tip boxes in labs • http://www.biotech.ufl.edu/reduce-reuse-recycle-pipette-tip-boxes/
Are belt driven vacuum pumps, or other sources of pinch points in the lab guarded?	All vacuum pumps that utilize a belt driven motor must have belt guards. Pumps should, if possible, be placed in a secondary container to contain oil leaks/spills.
Is equipment in good working condition, no frayed wiring or damaged casing?	Check to see that the equipment is in good condition and working properly