STEM Basic Laboratory Safety Procedures

General Lab Safety:

PROTECT YOUR HEALTH: Never eat, drink, smoke, bite nails, chew gum, apply lip balm, or put anything in or on your eyes, nose, or mouth while in a lab. *This includes water bottles and coffee/tea; keep them out of the labs.* Chemicals and biologicals in a lab are not to be ingested in any way, nor should glassware or any other lab materials be used for food or drink.

CONTAIN YOURSELF. Tie back long hair, avoid wearing dangly sleeves, earrings, pendants, bracelets, or anything else that will interfere with your work or become contaminated or electrified. Do not engage in horseplay or roughhousing in any laboratory at any time. Put your backpack and personal items in a safe place out of the way of spills and traffic flow.

AVOID DISTRACTIONS. Laboratory work requires that you focus on what you are doing. Put away your cell phone and computer during lab unless it is serving a specific lab-related function. If you must make a call, wash up to leave the lab properly and use your phone in the lobby. Phones can become a medium for chemical or biological contamination and should be kept in a pocket or away from the workbench if being used as a timer or manual.

NO UNAUTHORIZED EXPERIMENTS. Make sure your supervisor knows what you are doing at all times; *there is no experimentation without prior discussion and authorization.*

PERSONAL PROTECTIVE EQUIPMENT (PPE) is to be used at all times when working with chemicals and biologicals, and are to be left in the lab to avoid spreading contamination.

COVER YOUR SKIN. You will be assigned a lab coat in class. ***Lab coats are to be worn at all times while you are in the lab***. In addition, clothing should cover any other exposed body parts; this includes wearing long pants and covered shoes (sandals, open mesh, and open-toed shoes are not protective) while in the lab. Remove your lab coat when you leave the lab.

PROTECT YOUR EYES. Goggles or safety glasses are to be brought to lab every day and worn whenever you are working with liquids or chemicals, or in physics when projectiles or other hazards are occurring. Contact lenses are not recommended to be used in a laboratory setting. If you decide to wear contact lenses, you should *always* wear your safety glasses in the lab. Many instructors require that you wear your safety glasses during the entire time you are in the lab regardless of your activity.

PROTECT YOUR FACE: your instructor will let you know when you should also wear a face-shield or use a chemical fume hood for protection. This often occurs when working with hazards such as pouring hazardous liquids, working with heating chemicals, or other dangers. Your safety glasses should be worn with the face shield or hood when needed.

PROTECT YOUR HANDS: WEAR GLOVES. Whenever you are working with chemicals or biologicals, it is imperative to wear protective gloves. Remove any rings, as they can tear gloves. For some chemicals, latex gloves are inadequate, as these chemicals will pass across latex and contact your skin; use nitrile or other appropriate gloves as directed. Some chemicals require two layers of gloves. If you get chemicals onto your gloves, replace them as soon as practicable. If you are working with hot materials, dry ice, or liquid nitrogen, or will be retrieving materials from a freezer, wear insulated gloves for protection. REMOVE YOUR GLOVES BEFORE LEAVING THE LAB – don't spread contamination.

KNOW WHERE SAFETY EQUIPMENT CAN BE FOUND. All labs have eyewash stations, and most have emergency drench showers. Note where the nearest ones are to your lab bench. If you splash a chemical in your eyes or on your skin, *notify your instructor* and get help removing the chemical.

To use an eyewash station, pull down the unit, hold open the affected eye(s) and flush with water for at least 10-15 minutes to remove all of the chemical; these can also be used to flush chemicals off the skin. Once you have flushed the area, seek medical attention.

Emergency showers are for large-scale splashes or body fires that require a whole-body drenching; keep in mind that they are only for appropriate emergencies: at a 20-30 gallons per minute flow rate, the cleanup is a messy one.

Chemical Spill kits are available on each floor in the prep rooms. If you have a spill, notify your instructor immediately, and they will use the kit to contain and neutralize the spill. Even if you spill a small amount of a chemical, ask your Instructor's advice in cleaning it up: some chemicals cannot simply be wiped up and must be treated as a hazard.

Fire extinguishers are available in each lab, but are only to be used by trained personnel (your Instructor, for instance). If you notice a fire, notify your instructor immediately, and be prepared to evacuate the area should it become necessary. If the fire is large or spreading at all, evacuate the area and pull the fire alarm near the stairs or elevators for help.

Never block access to emergency equipment or emergency exits with chairs, carts, boxes, packs, or any other objects. Keep aisles and walkways free of tripping hazards and obstructions. Impeding access, even temporarily, is dangerous. Exit doors should never be blocked or locked in any way.

FIRE SAFETY: Know your exit routes! Have your personal belongings nearby at all times. In case of evacuation, use the stairs (not elevators) to exit the building. The STEM building evacuation assembly area is the grounds between STEM and Morris Avenue. *Please report there to your instructor or supervisor so we know everyone has left the building.*

ON FIRE? STOP, DROP AND ROLL! The goal is to extinguish the flames by smothering them. Running or panicking will provide the air to increase the flames. Drop to the floor and roll the flames out, get help from a colleague to smother the flames with a lab coat or other material. Do not use a fire blanket while standing up, as this creates a funnel effect and can result in facial burns. Use an emergency drench shower if the flames are out of control. If you are burned, seek medical attention.

INJURED? Seek medical attention ASAP. The student health center is an appropriate place for care of non-life-threatening injuries. After hours, go to Overlook Medical Center, 1000 Galloping Hill Road, Union. *If you or your colleague are seriously hurt, bleeding profusely, or cannot stand or walk to help, dial 911 for emergency assistance*. On campus, 911 will go to campus dispatch; on a cell phone, identify your location (Kean University, Union, NJ) so they can put you through to appropriate local emergency personnel.

USE THE BUDDY SYSTEM. Never work alone in a laboratory, especially when working with hazardous chemicals or biologicals or with heat sources such as flames. Make sure someone is nearby to help you in case of an emergency.

SHARPS HAZARDS: sharp objects such as needles, syringes, scalpels/blades, capillary tubes, slides, etc. should be placed in BIOHAZARDOUS SHARPS. Glass items such as pipets and broken lab glass must be disposed of in a BROKEN GLASS box, which is labeled specifically for the safe disposal of such hazards. Plastic pipets and pipet tips are disposed of in labeled PIPETS buckets. Do not toss sharps in the trash, as maintenance personnel can be injured. Broken glassware should be picked up with a broom and dustbin or forceps, NOT with the hands, to avoid lacerations.

CHEMICAL SAFETY: If you are using chemicals on a regular basis, you should read the Laboratory Safety Manual general section that deal with chemicals as well as reading the Chemical Hygiene Plan. *Briefly*:

Use appropriate PPE and know your chemicals. Read the **Safety Data Sheets** (MSDS/SDS) on any chemical you question. Ask your lab instructor for directions and information. You can also obtain SDS information online at www.hazard.com/msds *SDS contain important information about the hazards of chemicals you are working with so you can be aware of potential hazards.*

Chemicals should be properly carried. If moving chemicals outside the lab, they should be carried in a secondary container which can contain the entire contents should a break or spill occur.

Chemicals should be aliquoted to useable amounts to minimize waste and cross-contamination. Use caution with containers and make sure they are chemically compatible.

Chemicals MUST be properly stored. Do not store acids near bases, or organic chemicals near combustible agents. Never store flammables in quantities greater than 500mL outside a Flammables Cabinet, and make sure they all fit into the cabinet in an upright and stable manner. Fluids should always be stored in a secondary containment system in case the original container fails. Waste bottles should be held in secondary containers, monitored, replaced when 5/6 full and appropriately labeled for disposal.

Chemicals MUST be properly labeled for storage. If you make a solution or aliquot of a chemical, be sure to label with:

Name of chemical and its carrier/solvent. Concentration (if appropriate).
Date (mm/dd/yy)
Course number/name.
Name of person who made the chemical or is using it.
If storage is overnight or longer, the CAS* number should be included.
(*Chemical Abstract Service)

Chemicals MUST be properly disposed of. Follow your instructor's directions for where to put waste chemicals. DO NOT POUR CHEMICALS DOWN THE DRAIN AND DO NOT PUT CHEMICALS IN THE TRASH. There are few chemicals which can be handled this way; your instructor will let you know if that type of disposal is appropriate.

Never heat volatile chemicals over an open flame. Use a water bath and/or hot plate.

Never start a suction hose or pipet with your mouth.

Do not "sniff" to test chemicals or inhale chemical vapors.

Do not pour gels or liquid agar or agarose down the drains.

BIOLOGICAL SAFETY: if you are working with biologicals such as bacteria or cell cultures, you should read the LSM and Blood Borne Pathogens Exposure Control Plan. *Briefly*, you must wear PPE when handling biologicals, and use care to minimize exposure to yourself and others working in the lab, If you transfer cultures or gels containing biologicals between labs, you must use a secondary containment system (e.g. lidded dish or enclosed bin) when transferring from one lab to another, and have at least one hand clean and ungloved to handle any buttons or latches in the common areas (i.e. outside the labs). Use care to avoid contaminating surfaces, and decontaminate all work surfaces with alcohol or dilute bleach when done with your work.

KEEP YOUR WORK STATION TIDY: this keeps your work area cleaner and safer, since you can more readily control possible spills, contamination, and other hazards. Dispose of debris in the proper containers and remove materials you are finished with as you work.

GET PROPERLY TRAINED ON EQUIPMENT: Many labs use specialized equipment which requires training to use properly. Be sure to be on time for class to receive instructions on equipment use. DO NOT USE ANY EQUIPMENT UNTIL YOU HAVE BEEN PROPERLY TRAINED – it can be dangerous and costly if something goes wrong. ASK if you have *any* questions or concerns or feel uncomfortable using any lab equipment.

CLEAN UP AFTER YOURSELF. You wouldn't want to come to a lab bench covered in unknown chemicals and biologicals, so don't do it to someone else. Put away all equipment, close what is open, wipe down your work station or change the cover as needed, and *properly dispose of wastes*. See the waste disposal chart to determine how particular items should be disposed of, or ask for guidance. Help clean up the common areas, as well. Thank you.

WASH YOUR HANDS. Wash them coming into the lab to keep the lab clean of contaminants, and wash them again after taking off gloves to keep contaminants from leaving the lab. While hand sterilizing agents have their place, the lab isn't one of them; washing hands removes materials you don't want to have accompany you elsewhere. Use warm running water and soap, and be sure to clean all hand surfaces thoroughly.

ELECTRICAL HAZARDS. Do not handle electrical devices or plugs with wet hands or while standing in water. Do not use any device which has frayed cords or exposed wiring. Notify your instructor if any of the equipment seems faulty. Do not use cell phone chargers in lab outlets.

REPRODUCTIVE HAZARDS: Reproductive hazards are substances or agents that may affect the reproductive health of women or men or the ability of couples to have healthy children. Efforts have been made to eliminate the use of known reproductive hazards in our labs. However, the vast majority of laboratory chemicals have never been tested by the manufacturer or by any governmental agency. As a result, their effect on a developing fetus is unknown; students must assume that each chemical used in this lab presents a hazard to an unborn child.

If you are pregnant, become pregnant or are planning to become pregnant during the semester, you are strongly encouraged to speak privately with your instructor, who will be able to provide written health and safety information about each chemical that will be used in the class (MSDS). You are asked to review and discuss this information with your healthcare provider.

After you have reviewed the information, you can choose to:
1. Continue your enrollment in the lab - You will be asked to sign a waiver and will be expected to follow a strict set of health and safety procedures while in the lab.
2. Withdraw from the lab - Your instructor will assist you in creating a plan to complete the course at a later date.

USE OF SPECIAL EQUIPMENT & MATERIALS

BIOLOGICAL SAFETY CABINETS: Use Biological Safety Cabinets for reducing contamination of biological materials and for containing biological materials within an area. BSCs allow easier chemical decontamination of surfaces and many use disinfecting UV lights when not in use to further reduce contamination. Do not use while UV lights are on. Keep your upper body and head out of the cabinet while in use. Use appropriate PPE (lab coat & gloves, at minimum). Make sure the BSC you use has passed inspection.

CHEMICAL (FUME) HOODS: Use chemical hoods whenever a volatile or hazardous chemical is involved. Keep the hood front sash at a level which allows work but minimizes exposure to splashes, spills, and possible explosions; the red marker should be highest level for the sash during under-hood work. Do not use lightweight materials such as paper or paper toweling in a hood where it can get sucked into the airstream. Keep your head and upper body out of the hood when using chemicals. Keep materials in the hood at least 6 inches from the front panel to ensure vapors do not enter the classroom. Do not store large quantities of materials under fume hoods, especially hoods where work is being performed. Do not block airflow - keep materials at least 6 inches from back of hood. Promptly wipe up any spills. Close the hood to storage level when done.

CENTRIFUGES: Centrifuges spin at a high rate of speed and, if not balanced, can cause a catastrophic failure, damaging equipment and harming individuals. You **must** be properly trained to use one. Do not run without a balanced load and work away from the machine while it is in motion. Be sure to wipe up any spills immediately, to avoid spread, solidification and/or corrosion of the machine/containers. Any corrosive, hazardous, or biological materials should only be centrifuged when appropriate secondary containment systems and lids are in place.

LAB SAFETY AGREEMENT

I have read and understand the basic NJCSTM Laboratory Safety Procedures, have received a safety orientation (either online or in person), and will read the appropriate sections of the NJCSTM Laboratory Safety Manual in order to better understand the general safety procedures and fire safety practices here in the STEM building at Kean University.

I understand that any research I do in NJCSTM is subject to rules contained within the NJCSTM Laboratory Safety Manual as well as within the lab in which I work.

I understand that there are to be NO UNAUTHORIZED EXPERIMENTS in any lab at any time, and that the supervising professor or staff member must be fully aware of any experiment I am doing and has approved of all my procedures. I will contact a professor or staff member if I have any questions on procedures, and will not work alone in a laboratory when performing work with hazardous biologicals or chemicals.

I will contact the NJCSTM Safety Officer, Nan Perigo, in case of any questions regarding procedures or other concerns. (nperigo@kean.edu, 908-737-7227, or visit room 118)

I agree to abide by the STEM safety procedures, outlined above and in the Student Safety Packet, to keep myself and my colleagues safe in the laboratories in which I work.

Print Name *Signature*

Date *Course/Section, Name of Lab Supervisor/Instructor*

This form is to be completed and signed, then given to the STEM Safety Officer to be put on file in the STEM Safety Office. The information packet attached should be retained for reference.