

CISE FACILITY SAFETY PLAN

Addressing topics pertaining to:


- Chemical and Biochemical Hygiene Standards
- Teaching and Research with Biological Agents
- Machine Shop Safety, Equipment and Resources
- Other CISE Laboratories, Studios and Facilities
where Hazards are Present

*for the College of Integrated Science and Engineering
James Madison University, Harrisonburg, VA 22807*




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Mark Showalter, CISE Safety Liaison



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Bob Kolvoord, Ph.D., Dean, CISE

 8/18/2020

Marcella Mullenax, Environmental Health Coordinator

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I. AUTHORSHIP AND PURPOSE

On July 1, 2012, the College of Integrated Science and Engineering (CISE) was formed. The purpose of this document is to establish procedures used, personal protective equipment required (or recommended), and work practices to be followed that will protect employees, students, and visitors to CISE facilities from health risks presented by potentially hazardous chemicals and biological agents, as well as injury from equipment if used without appropriate regard to safety. *All laboratory workers—faculty, staff, and students of CISE, as well as visitors to any CISE facility—shall be given ready access to this plan.*

The *CISE Facility Safety Plan* is the property of the College of Integrated Science and Engineering, James Madison University.

II. GOVERNMENTAL REGULATION

The CISE Facility Safety Plan was written to comply with regulations and standards set forth by the Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), Department of Transportation (DOT), National Fire Protection Association (NFPA), Centers for Disease Control and Prevention (CDC), National Institutes of Health (NIH), and applicable building codes. Specific policies and regulations can be found at the websites listed below.

<https://www.osha.gov/>

<http://www.nfpa.org/>

<http://www.epa.gov/>

<http://www.cdc.gov/>

<http://www.dot.gov/>

<http://www.nih.gov/>

III. SCOPE OF CONTENT AND APPLICATION

As recommended by *Prudent Practices for Handling Hazardous Chemicals in Laboratories: Handling and Disposal of Chemicals*, the *CISE Facility Safety Plan* contains these elements:

- employee information and training about the hazards of chemicals in the work area, including how to detect their presence or release, work practices and how to use protective equipment, and emergency response procedures;
- the circumstances under which a particular laboratory operation requires prior approval from the employer (administrator, director, manager);
- standard operating procedures for work with hazardous chemicals;
- criteria for use of control measures, such as engineering controls or personal protection equipment;
- measures to ensure proper operation of fume hoods and other protective equipment;
- provisions for additional employee protection for work with “select carcinogens” (as defined below) and for reproductive toxins or substances that have a high degree of acute toxicity;
- provisions for medical consultations and examinations for employees and,
- designation of a chemical hygiene officer.

In addition, this document contains safety information regarding laboratory equipment found commonly in chemical, biochemical, and microbiological laboratories, as well as information pertaining to laboratories containing electrical/electronics equipment, robotics, machining equipment, lasers, and materials development and processing operations.

This plan applies to all JMU CISE employees and students, as well as onsite outside contractors and visitors—all persons whose work or activities within a CISE laboratory, machine shop, design studio, or shop may expose them to physical, chemical/biochemical, and biological hazards.

IV. RESPONSIBILITIES

Dean of the College of Integrated Science and Engineering (CISE)

- ◇ Oversees and administers all aspects of the College of Integrated Science and Engineering.
- ◇ Makes all final determinations of personal protective equipment to be worn and procedures to be followed for personnel and students occupying CISE facilities based on hazard assessments of the designated areas.

CISE Safety Liaison

- ◇ Works with administrators, the Chemical Officer and other employees, as well as students, to develop and implement appropriate chemical hygiene policies and practices. Helps faculty and students develop procedures and engineering controls for work to be done in all science/engineering laboratories.
- ◇ Informs students, faculty, staff and, if appropriate, the University Environmental Health Coordinator, of safety infractions and other laboratory chemical and equipment problems.
- ◇ Recommends improvements to this safety document.
- ◇ Provides input regarding appropriate signage in labs/shops/studios.
- ◇ Schedules routine facility walk-throughs with the JMU Environmental Health Coordinator and reports findings.

Chemical Officer

- ◇ Monitors procurement, storage, use, and disposal of chemicals in CISE laboratories and shops.
- ◇ Performs a physical audit of the chemical inventory annually within CISE laboratories and shops.

CISE Academic Unit Heads

- ◇ Applies and enforces mandated safety policies in the areas under their direction.
- ◇ Executes specific duties as outlined in JMU Policy 3108, Health and Safety.
<https://www.jmu.edu/JMUpolicy/policies/3108.shtml>
- ◇ Executes specific duties as outlined in JMU Policy 3109, Bloodborne Pathogens
<http://www.jmu.edu/JMUpolicy/policies/3109.shtml>
- ◇ Works with Facility Safety Coordinators and CISE Safety Liaison to ensure appropriate signage in labs/shops/studios.

CISE Safety Committee

- ◇ Membership of the CISE Lab and Safety Committee is comprised of one member per department as well as the CISE Safety Liaison ex officio.
- ◇ Make recommendations on safety policies and procedures.
- ◇ Represent faculty at large on lab safety matters to the dean and the college safety officer.
- ◇ Review and give feedback on relevant safety documents to college dean and faculty as requested.
- ◇ Help to educate our college faculty and students on issues of workplace safety as relevant to college lab spaces.

Faculty Members/Laboratory Supervisors/Laboratory Instructors/Project Directors and Research Advisers

- ◇ Responsible for chemical hygiene and equipment safety in the particular laboratory/design studio/shop under his/her jurisdiction at a particular time. Such times include:
 - meetings of formal laboratory classes,
 - instructional sessions for lab supervisors and instructors,
 - lab exercise set-up periods, and
 - faculty-student research sessions.
- ◇ Ensure that people within the laboratory under their direct supervision know and follow the chemical, biological, and equipment safety rules; that personal protective equipment is available and is in working order; and that appropriate training has been provided.
- ◇ Retains documentation of safety training
- ◇ Determine the required levels of protective apparel and equipment for personnel occupying a laboratory at any time, and enforce the use of protective apparel and equipment based on recognized hazards.
- ◇ Ensures that the facilities for, and proper training needed for, the use of hazardous equipment and materials being used in the laboratory, are adequate.
- ◇ Maintain appropriate safety training records of students or employees in course or research activities under his/her direction.

Facility Safety Coordinator

- ◇ Maintains an up to date chemical inventory and online SDS system by KHA for the location.
- ◇ In consultation with the Academic Unit Head, ensures that all external signs for the facility are appropriate.
- ◇ Acts as a primary contact in the event of an incident or unsafe condition.
- ◇ Maintains a working knowledge of activities and hazards that occur in the facility.
- ◇ Ensures the Facility Specific Safety Policy is posted in the facility.

Laboratory/Machine Shop/Design Studio—Shop Workers and Students

- ◇ Are responsible for planning and conducting all operations in accordance with this safety document, as directed by those persons in charge of the laboratory.
- ◇ Develop good personal chemical hygiene and equipment safety habits as stated in this manual and in applicable science/engineering laboratory safety documents.

JMU Risk Management

- ◇ Recommends hazard mitigation and elimination strategies based on regulatory requirements, consensus standard guidance, and prudent practices.

V. EMPLOYEE/STUDENT INFORMATION AND TRAINING

Sources of Information: Each laboratory instructor/supervisor or research adviser is responsible for ensuring that this information is communicated to his/her employees and students under his/her direction:

1. The *location and availability* of this safety document.
2. Sources of safety information about chemicals used in his/her laboratory or facility and how to minimize exposure including but not limited to working in a fume hood and using PPE. The OSHA Permissible Exposure Limits (PEL) are available at the following links.
<https://www.osha.gov/dsg/annotated-pels/tablez-1.html>
<https://www.osha.gov/dsg/annotated-pels/tablez-2.html>
<https://www.osha.gov/dsg/annotated-pels/tablez-3.html>
3. JMU uses an online SDS system provided by KHA. Vendor specific Safety Data Sheets (SDS) should be entered into the online SDS system for all chemicals in his/her laboratory.
4. Potentially hazardous apparatus/equipment and how to use it properly based on safety information provided by the manufacturer.
5. Information pertaining to biological agents (both their laboratory use and their disposal) that are deemed hazardous or potentially hazardous, e.g., safety documents provided by the instructor/supervisor or research supervisor, CISE Safety Liaison, or offered in government documents.
<http://www.cdc.gov/>

Acceptable Work Practices:

For each laboratory, a ‘Lab/Facility-Specific Safety Policy’ sheet is to be posted on a wall or a door. Issues pertinent to that lab or facility, such as

1. the requirements for PPE (e.g., eye protection, gloves, footwear),
2. the prohibition of food, drink and chewing tobacco
3. the requirements for laboratory/design studio/shop ‘housekeeping’,
4. any unique physical, chemical, or biological hazards that require special attention and/or a more rigorous demand for chemical hygiene or safe work with biological agents,
5. any modifications of, or enhancements to, those policies stated in this safety document for that particular laboratory for a designated chemical, biological agent, piece of equipment, or instrument that poses a potential hazard contact information (emergency and names of responsible personnel, their telephone numbers and electronic mail addresses).

This information should be outlined in a single page readable format. An example Facility Specific Safety Policy is included in Appendix IX.

Personal Protection Equipment (PPE) requirements for the laboratory/studio/shop will be clearly posted at the entrance to the room. These requirements will be based on a hazard assessment of the space in consultation with the Facility Safety Coordinator, Academic Unit Head, and CISE Safety Liaison.

Emergency Response:

The James Madison University Comprehensive Safety Plan provides guidance for responding to emergency situations.

<https://www.jmu.edu/safetyplan/index.shtml>

Health/Medical Issues

For information pertaining to **acute** exposures to chemical agents, consult the SDS for that chemical. Information about **chronic** exposure can be found on the OSHA, CDC, and NIOSH websites noted under the ‘Sources of Information’ heading of this section (above).

Information pertaining to biological agents used in a CISE laboratory that pose a possible safety threat may be found on OSHA and CDC websites (below). Medical consultation, evaluation, and any treatment deemed appropriate will be available through the campus health center or from Rockingham Memorial Hospital.

<http://www.cdc.gov/biosafety/publications/bmbl5/BMBL.pdf>

Training

Each laboratory instructor/supervisor/research adviser is responsible for ensuring that anyone working in a lab receives adequate training. This training shall include

- 1) Physical and health hazards of chemicals, biological agents, and equipment located in the work area;
- 2) The measures employees and students can take to protect themselves from such hazards, including specific procedures that have been implemented to protect laboratory employees from exposure to hazardous chemicals, biological agents, and potentially dangerous equipment (e.g., appropriate work practices, personal protective equipment to be used, and emergency response procedures); and
- 3) Applicable policies and standards found in this safety document.

Information and training that shall be provided by the laboratory director/supervisor will be given

- 1) at the time of an employee’s or student’s initial assignment to a work area where hazardous chemicals, biological agents, or equipment are present, and
- 2) prior to assignments involving new exposure situations.

The frequency of refresher information and training may be determined by the laboratory supervisor/instructor or the CISE Safety Liaison.

Safety information concerning chemical, biological, or physical issues appropriate to a particular teaching or research laboratory/facility will be provided during safety training sessions held at the beginning of each semester or immediately prior to the activity to

- 1) any student/employee directed to oversee any section of CISE laboratory/design studio/shop courses,
- 2) any student/employee involved in laboratory/design studio/shop preparations
- 3) any student/employee involved in laboratory/design studio/shop related projects.

Safety information related to course activities may be provided to the students by the faculty/instructor at the beginning of the semester or immediately prior to the activity.

Records

Faculty/instructors/advisors are responsible for maintaining records for all safety training required for course or research activities in CISE studios/shops/laboratories. This training record may be either electronic or written.

Supervisors are responsible for maintaining records for all safety training required for employee (including student employees) work that occurs in CISE studios, shops, and laboratories.

The James Madison University Environmental Health Coordinator and members of the Department of Human Resources shall maintain an accurate record of any measurements taken to monitor employee exposures, and any medical consultations and examinations, including tests or written opinions required by this plan. He/she will assure that such records are kept, transferred and made available in accordance with 29 CFR 1910.20.

VI. STANDARD OPERATING PROCEDURES

GENERAL GUIDELINES

- **Responsible behavior in the laboratory is essential.** Irresponsible behavior will not be tolerated.
- **All work performed in laboratories, shops, and studios is to be work supporting a class course of instruction, a course-supported project, or a research activity sanctioned by the department/college.** Personal work or projects are not permitted because of possible liability borne by James Madison University.
- **No unauthorized activities in the laboratory/studio/shop.** Work in CISE facilities shall be associated with an approved academic mission. For laboratory activities, use only the quantities of reagents as instructed in written procedures, and no more. Consult your instructor if you have any doubts about the instructions in the laboratory manual or written procedure. Prior approval must be obtained from the supervisor/instructor whenever a new laboratory procedure, test, or experiment is carried out, or there is a change in an existing procedure, test, or experiment. Additional information concerning all chemicals—as potential hazards, safety issues when handling and disposing of them, and steps to take in case of accidental release (e.g., spill, leak)—is available by consulting the SDS for that chemical. Knowledge of this type of information must be in hand BEFORE the experiment is started.
- **Working alone in the laboratory/studio/shop is not permitted for undergraduate students.** At least one other person, who is aware that a student is working in the facility, shall be on site in case of emergency.
- **Facilities where unattended experiments or shop activities are occurring must have contact information posted outside the entrance to the laboratory/studio/shop.** In the event of an incident during an unattended activity such as an overnight experiment or automated production process, an appropriate contact must be accessible.
- **Work in the laboratory/studio/shop must be carefully ‘thought out’.** Plan ahead; do not “cookbook.” If you give no thought to what you are doing, you predispose yourself to an accident.
- **Do not eat or drink *anything*, do not smoke, and do not apply cosmetics** in the laboratory or shop. In addition, since many chemicals are absorbed through the skin, avoid direct skin contact. If you suspect skin contact with chemical substances, such as bottled reagents, wash off these substances with large quantities of water. Wash your hands thoroughly with soap and water before leaving the laboratory. In addition, do not store or handle food or beverages in laboratory areas, including refrigerators used for chemical storage.
- **Report all injuries at once.** Except for very superficial injuries, you will be required to get medical treatment for cuts, burns, or fume inhalation. The JMU [‘Laboratory Incident Report](#)

[Form](#) shall be submitted it to the CISE Safety Liaison following any injury.

- **Avoid deliberately and directly breathing fumes of any kind.**
 - To test the smell of a vapor, with your instructor's permission, collect some of the vapor in a cupped hand.
 - Work in a chemical fume hood if there is the possibility that noxious or poisonous vapors may be produced.
 - Soldering must be performed using appropriate fume extraction equipment.
- **Employees and students are prohibited from donating JMU chemicals.** University policy 1506 Property Use (University) expressly “prohibits using, borrowing, or removing university property for personal or private purposes” which would also apply to chemicals purchased with university funds. In addition, employees and students are prohibited from accepting donated chemicals. Doing so is an inherently risky practice that creates safety and compliance issues (i.e. labeling, storage, availability of SDS) and exposes the university to significant liability and disposal costs.
- **Confine long hair and loose clothing** in the lab/studio/shop, since either can catch fire, become entangled in moving equipment, or be chemically or biologically contaminated.
- **Keep your work area neat at all times.** Clutter not only will slow your work, but it leads to accidents. Store all project materials and tools appropriately. In laboratories, clean your workspace, including wiping the surface and putting away all chemicals/biochemicals/biologicals and equipment, at the end of the laboratory preparation, course laboratory period or student project session. Clean spills and broken glass immediately.
- **Do not block access to emergency equipment or exits.**
- **The space 18” below sprinkler heads must be kept clear at all times.** Items placed too close to the sprinkler heads can prevent adequate water coverage in the event of a fire.
- **All working surfaces and floors shall be cleaned regularly.** The use of hoses, electrical cables, and internet/computer cables are not to be used in a manner that will create a tripping hazard. Sweep or mop floors immediately after activities that may result in slip or trip hazards.
- **Extension cords can only be used with the Facility Safety Coordinator approval.** The cord must not create a tripping hazard. Extension cords are only for temporary electrical service.
- **In the event of a fire, follow the standard JMU Fire Emergency Procedures which are posted in each facility.**
 - Activate the nearest fire alarm pull station, and if possible, call 568-6911 to report the location and cause of the fire if you know them.
 - EVERYONE MUST LEAVE IMMEDIATELY when a fire alarm is activated, even if there are no obvious signs of an emergency!

- Do NOT use the elevator.
- Remain calm and assist others in safely getting out.
- Confine the fire by closing all doors and windows if possible.
- Extinguish the fire if you have been trained, it is safe to do so, and you have a clear means of egress.
- Evacuate the building to a safe location away from the structure.
- Take any personal belongings you may need with you, e.g., wallets, purses, keys, cell phones.
- If circumstances permit, secure your area by closing doors and locking them.
- Follow directions given by emergency personnel and respond to location designated by your building coordinator outside the structure to await further instructions and so that everyone can be easily accounted for before leaving the area.
- Do not re-enter until authorized to do so by public safety officials.

LAB APPAREL (PERSONAL PROTECTIVE EQUIPMENT)

- **Wear approved eye protection**—that which meets the requirements of ANSI Z87.1—at *all times* in all CISE laboratories/studios/shops when there is a possibility of injury to the eyes because of ongoing chemical/biological laboratory procedures or engineering laboratory/machine shop operations (e.g., from chemical exposure, boiling water, projectiles).
 - Eye protection shall protect against flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, biological hazards, and potentially injurious light radiation.
- **Footwear that completely covers the feet is required when hazards are present** because of the possibility of chemical spills, broken glassware on floors in chemical/biological laboratories, and other physical hazards that may be present in instrument/manufacturing/engineering laboratories and shops.
- **A lab apron or coat must be worn**
 - when wearing easily combustible clothing, such as synthetic and light fabrics,
 - when working in certain biological laboratories (e.g., Biosafety Level 2).
- **Gloves shall be worn when working with chemicals.** These gloves shall be made of a material known to be resistant to permeation by that chemical. Inspect gloves before each use to assure structural integrity. If gloves are not disposable (e.g., thin latex or nitrile), wash them before removal and replace them as needed. Gloves must be removed before exiting the laboratory or working in another area of the laboratory where gloves are not used.
- **Specialized personal protective equipment may be required based on a hazard assessment.** Personal protective equipment must be appropriate to minimize the exposure hazard presented by the situation.
- **Specific policies for the use of proper personal protective equipment shall be posted in the lab/shop/studio.**

GENERAL CHEMICAL/BIOCHEMICAL LABORATORY GUIDELINES

- All students/employees shall receive a **safety orientation** to a new laboratory environment. The orientation must include the location of nearby fire extinguishers, fire blankets, safety showers and fire alarms. In addition, how to use the online Safety Data Sheets (SDSs) system and how to find information about a particular chemical of interest shall be noted. If microbiological agents are to be used in the laboratory, information pertaining to ‘Standard Microbiological Practices’, as well as specific requirements for pathogens, mammalian viruses and certain types of cultured cells (all to be restricted to use in a Biosafety Level 2 facility) shall be provided.

All laboratory workers and students shall know

- how to learn about the hazards of a chemical as stated in the SDS and other appropriate references pertaining to that chemical,
 - the location of emergency equipment,
 - how and where to store chemicals properly when not in use, and
 - proper disposal procedures.
- **Properly label and store all chemicals and equipment.** All chemicals (including solutions and chemicals transferred from their original containers) must be labeled with their names, concentrations and hazards—if they are known. Chemicals must not be stored or used in classroom or office areas. All chemicals/biochemicals and biologicals, and their wastes, shall be placed in their proper storage area at the end of the day. Any food product that will be used for laboratory purposes must be labeled “Not for Human Consumption”.
- **Do not use mouth suction to fill pipettes** with water, chemical reagents (aqueous or organic), or biologicals. Always use a suction device that must be available in the laboratory.
- **Be careful when heating liquids;** add boiling chips or beads to avoid “bumping.” Flammable liquids must not be heated over an open flame, hot plate or uninsulated resistance heaters. A heating mantle, steam bath or hot water bath must be used.
- **Always carefully and slowly pour acids into water;** doing so allows the heat to spread through the water instead of being concentrated in a small volume.
- **Mixing strong acids with strong bases is dangerous, and must be done slowly and with caution in a fume hood.**
- **Solvents are to be handled in an exhaust hood or a well-ventilated area.** Long-term (chronic) exposures to solvents can cause damage to specific organs, such as the kidneys and the liver, and many halogenated solvents are carcinogens and/or teratogens.

- **Minimize risks associated with glassware by using proper procedures.**
 - Do not use damaged glassware. Do not use broken, chipped, starred or cracked glassware.
 - Clean all glassware after use.
 - Do not pick up broken glassware with bare hands. Use gloves or sweep up the glass fragments. Deposit broken glass in a “Broken Glass Safety Toss Box.”
 - Handle hot glassware with proper size and type of tongs or hot mitts.
- **Do not force a rubber stopper onto glass tubing or thermometers.** Lubricate the tubing and the stopper with glycerol or water. Use paper or cloth toweling to protect your hands. Grasp the glass close to the stopper.
- **In case of the chemical spill on your body or clothing,** wash the affected area with large quantities of running water. Remove clothing that has been wet by chemicals to prevent further reaction with the skin. If your eyes come into contact with an acid, alkali, abrasive or otherwise irritating substance, wash your eyes with flowing water from an eyewash station for at least 15 minutes. Seek medical attention immediately.
- **In case of accidental ingestion of a chemical,** seek medical attention immediately.
- **Dispose of excess reagents as instructed,** typically by collecting them in appropriately labeled waste containers.
- **Vacuum and pressurizing equipment and materials:**
 - Use a safety shield whenever an implosion might occur when working with vacuum equipment.
 - Use steam or heating mantles to heat vacuum distillation flasks.
 - Relieve vacuum in all parts of system before opening apparatus. Relieve vacuum slowly. Avoid sudden pressure changes that could cause breakage or spattering of contents. Do not relieve vacuum on heated apparatus until apparatus has cooled.
 - Use a safety shield whenever an explosion might occur when working with pressurizing equipment.
 - Do not apply pressure to standard glassware.
 - Vent pressure in all parts of the system before opening.
- **The use of hydrofluoric acid (HF) is restricted to the Clean Room suite.** Before any individual may use HF in this facility, he or she must receive training in the safe use of this chemical from his/her research advisor or the Clean Room laboratory manager. Moreover, a student may not work with HF alone; there must be a second person in the lab who is also trained in the safe use of this acid. Guidelines for using HF are clearly posted in the Clean Room suite.

CHEMICAL/BIOCHEMICAL/BIOLOGICAL AGENT PROCUREMENT AND STORAGE

Procurement

To minimize storage space problems and waste disposal costs, only the quantity of chemical anticipated for particular experimental plans or for ongoing laboratory courses, shall be purchased. Larger quantities of commonly used chemicals may be purchased if proper storage space and accommodations are available. The following recommendations from *Prudent Practices in the Laboratory* must be considered:

- 1) Assessing surplus chemicals prior to ordering new chemicals.
- 2) Ordering the minimum amount of chemicals necessary.
- 3) Substituting less hazardous chemicals when feasible.
- 4) Assessing whether adequate storage space exists for chemicals and any waste that will be produced prior to purchasing chemicals.

JMU uses an online SDS database. SDS's for all lab chemicals must be entered into this system. Instructions on how to enter and access SDS's are in Appendix IV.

Biological agents (such as bacterial cultures, cultured cells, virus stocks) shall be purchased (or otherwise received) in accordance with CISE Biosafety regulations presented in this document.

All chemical acquisitions (except those specified below) that are non-point-of-sale must be barcoded to enable tracking per the CISE Chemical Inventory Management Plan. Any chemicals obtained as samples or transferred from another institution must be barcoded and tracked per the CISE Chemical Inventory Management Plan.

Chemicals that will not be tracked per the CISE Chemical Inventory Management Plan include:

- Enzymes and other chemicals/biochemicals that are purchased and received in microcentrifuge tube quantities, e.g., nucleic acid modifying enzymes, such as restriction enzymes, other nucleases, phosphatases,
- Pre-cast polyacrylamide gels,
- Common household chemicals, such as cleaning supplies available from grocery or hardware stores, and
- Environmental 'field kits' for soil and water testing.

Point-of-sale chemical purchases (readily available as a consumer product) will not be tracked in the JMU chemical inventory system; however, an SDS must be entered into the online SDS system for any chemical located in a CISE facility.

Laboratory supply receiving personnel who unpack and distribute incoming chemicals shall ensure that labels on containers of hazardous chemicals are not removed or defaced.

Faculty, staff, and students must not bring chemicals or materials for processing into a CISE facility without a safety data sheet and the approval of the laboratory/shop/studio supervisor. Chemicals/biochemicals deemed particularly hazardous MUST be approved by the CISE Safety

Liaison prior to receipt of these materials in any CISE facility per Section VII of this document.

Laboratory-generated chemical substances will require special handling by the generating facility.

- 1) If the composition of a chemical produced exclusively for laboratory use is known, available hazard information will be provided to employees exposed to the substance.
- 2) If the chemical produced is a byproduct whose composition is not known, the substance shall be handled according to the safety procedures generated prior to execution of the synthesis.
- 3) Chemicals and chemical mixtures synthesized during laboratory operations must have documented and readily available synthesis procedures that include anticipated chemical products and safety guidelines for safe handling of generated materials. These guidelines must be clearly posted in the facility where the materials are stored/used.

The generation of any particularly hazardous chemical/biochemical as outlined in Section VII of this document requires CISE Safety Liaison approval **before** execution of the experimental plan.

Distribution

Chemicals and biological agents that are to be transported from the receiving area shall be put onto a cart and transported via the building freight elevators.

- Highly volatile liquids and concentrated acids must be transported in appropriate containers (provided by the manufacturer) that minimize the likelihood of bottle breakage.
- Biological agents deemed to be hazardous, purchased (or otherwise received), shall be stored in accordance with CISE Biosafety regulations presented in this document.
- Safety data sheets (SDS), *vendor-specific*, shall be entered into the online SDS system by KHA when the chemical is delivered.

Storage of CHEMICALS

- The major quantity of most chemicals must be stored in acid cabinets, flammables cabinets, or in appropriate storage areas in laboratory preparation rooms. (Only small quantities of chemicals may be transferred to secondary containers, properly labeled, and stored in the laboratories.)
- Generally, chemicals shall not be stored on bench tops, under hoods on lab floors, or atop cabinets.
- Chemicals that are highly toxic shall be kept in unbreakable secondary containers.
- Stored chemicals must be examined annually for deterioration and container integrity.
- Exposure of chemicals to heat or direct sunlight must be avoided.
- Flammable liquids shall be stored in approved flammable liquid storage cabinets. Flammable

chemicals shall not be stored near any source of ignition, spark, or open flame.

- When transferring solvents from one container to another, if the potential for sparking exists, the containers must be electrically “grounded.”
- Chemical storage areas must be established, so that storing incompatible reagents can be avoided. Inorganic acids, such as sulfuric, nitric and hydrochloric, shall be stored separately from organic acids, such as acetic.
- Refrigerators used for chemical storage must be labeled “NO FOOD STORAGE.”
- Flammable liquids must not be stored in any laboratory refrigerator unless that appliance is approved for such storage.

Storage of BIOLOGICAL AGENTS

- Biological pathogens, e.g., bacterial cultures other microbes that can cause disease, will be kept in the CISE Biosafety Level 2 facility located on the first floor of the ISAT/CS building.

POLICIES FOR REPRODUCTIVE TOXINS, HIGH ACUTE TOXICITY CHEMICALS, AND SELECT CARCINOGENS

These types of chemicals must be properly labeled with appropriate warnings and stored in well-ventilated, limited-access, areas—in unbreakable secondary containers, if possible.

All containers of these substances shall be properly labeled with identity and warning labels.

These chemicals shall be handled, only when properly attired (especially with suitable gloves to prevent skin contact), in only a “RESTRICTED ACCESS” fume hood or area of the lab posted with special warning signs. **This hood will be identified as having been tested and shown to be working properly.**

The hands, forearms, face, and neck of anyone who manipulates these chemicals must be washed thoroughly before that person leaves the laboratory if exposure is suspected.

If a major spill occurs outside the hood, the area involved first must be evacuated; then the cleanup personnel, wearing suitable protective apparel and equipment, shall begin the cleanup process. **The laboratory supervisor/instructor, as well as the CISE Safety Liaison, must be notified of all incidents of exposure or spills.** Chemical decontamination should be used whenever possible; containers of contaminated waste (including washings from contaminated flasks) must be transferred from the controlled area in secondary containers under the supervision of the laboratory supervisor/instructor or Safety Liaison. Contaminated waste shall be stored in closed, suitably labeled secondary containers. (For liquids, the containers shall be plastic bottles half-filled with vermiculite). **NO CONTAMINATED WASTE MATERIALS MAY BE PLACED IN STANDARD LABORATORY TRASH RECEPTACLES.** Contaminated clothing or shoes shall be discarded or incinerated if decontamination is not possible.

The controlled work area, including any equipment, including glassware, must be decontaminated before normal work in that area is resumed.

When a person is working with a chemical in a laboratory that is highly toxic or of unknown toxicity,

another person in the building shall be informed of the possible risk.

Breakable containers of these substances must be stored in chemically resistant trays. Work and storage surfaces are to be covered with removable, absorbent, plastic-backed paper.

Wet mopping—instead of dry sweeping—shall be done for cleanup if the toxic substance was a dry powder.

COMPRESSED GASES, LIQUEFIED GASES, AND CRYOGENIC LIQUIDS

A gas cylinder shall be labeled as to its contents. Reliance on the manufacturer's color code is not advised.

All gas lines leading from a compressed gas supply must be labeled clearly to identify the gas.

Store and transport compressed gas cylinders with the safety caps on.

Incompatible gases shall be stored separately. Gas cylinders shall be kept away from other stored chemicals.

Signs shall be posted conspicuously in areas in which flammable compressed gases are stored. For example,

ACETYLENE - FLAMMABLE GAS NO SMOKING - NO OPEN FLAMES

Cylinders shall be transported carefully, not dragged, rolled, slid, or allowed to strike each other forcefully. They must be transported on wheeled cylinder carts with retaining straps or chains.

Once in place, cylinders shall be secured firmly, individually, by means of clamp and belt or chain, to a wall or lab bench. The valve handle at the top must be accessible at all times.

The cylinder valve must be opened slowly and only when a proper regulator is in place. Do not lubricate, modify, or tamper with a cylinder valve.

Leak-testing must be performed when a problem with a cylinder is suspected. To check for leaks, a flammable gas leak detector or soapy water, or a 50% glycerin/water solution, may be used. If a leak at the cylinder valve handle cannot be remedied by tightening a valve gland or a packing nut, emergency action must be taken and the supplier must be notified.

Do not heat cylinders or store them near a heat source. All sources of ignition shall be kept away from cylinders of flammable gases, e.g., oxygen, hydrogen, methane, and acetylene.

Because of the special risk of eye and skin contact of personnel who work with cryogenic liquids (e.g., liquid nitrogen, helium, and argon), the following personal protective equipment is required.

- Eye protection—preferably safety glasses and a face shield—must be worn,

- Gloves must be worn, and
- The area where cryogenic liquids are used must be well-ventilated.

When a cylinder is no longer in use, the tank valve shall be closed; pressure in gas regulator, released; the regulator, removed; and the tank valve shall be capped. Empty cylinders must be strapped or chained properly until they are returned to the supplier.

CONTROL MEASURES AND SAFETY EQUIPMENT

Laboratory ventilation shall

- (1) provide a source of air for breathing and for input to local ventilation devices; and
- (2) not be relied on for protection from toxic substances released into the laboratory.

Chemical fume hoods shall

- (1) be used for work with hazardous chemicals, especially toxic chemicals that have low air concentration limits, or that have high vapor pressures;
- (2) provide an average face velocity of 80 to 120 feet per minute (fpm) hood performance;
- (3) not be used as storage areas for chemicals, apparatus or other materials; and
- (4) not be used to evaporate solvents (except small quantities of volatile materials).

Also pertaining to fume hoods:

- Work inside the hood shall be conducted at least six inches from the front edge of the hood.
- Hood sashes must be lowered at all times except when necessary to raise them to adjust apparatus inside the hood.
- The hood fan must be kept "on" whenever a chemical is inside the hood, whether or not any work is being done in the hood.
- Solid objects must not be allowed to enter the exhaust duct of the hood.
- Hoods shall be inspected annually for a face velocity evaluation. **Any hood having inadequate performance shall be tagged as out of service and repaired by Facilities Management.**

Biological Safety Cabinets

Prior to being used with microbial pathogens or for animal cell culture/virus work, these cabinets shall be tested and certified by a representative of a company that specializes in biosafety cabinet certification and decontamination. Thereafter, the cabinet shall be recertified annually.

Safety Equipment

The safety equipment for each facility is dependent upon the activities that occur within the space. Typical items found within laboratories include:

- eyewash fountain,
- safety shower,
- protective apparel compatible with the required degree of protection for substances, being handled,
- a fire extinguisher and/or a fire blanket, and
- first-aid kit.

This safety equipment must be located so that they can be reached readily from any point in the laboratory, and access to them must not be restricted or blocked in any way. In addition, a fire alarm and a telephone for emergency use shall be available nearby.

Eyewash fountains and safety showers shall be tested by the CISE personnel once a month to see that they are functioning properly. If the water flow from the two spigots of an eyewash is not symmetrical, or if water flow from safety showers or eyewash fountains are deemed not adequate, the CISE Safety Liaison shall request repair or assistance in correcting the problem.

Fire extinguishers will be inspected monthly by university personnel or designees.

GUIDELINES FOR BIOLOGICAL AGENTS

[Most of the information in this section was taken from an on-line pdf document posted by the University of Colorado, Boulder Institutional Biosafety Committee as “IBC Requirements for Laboratory Operating Practices, Physical Containment, and Training for Research Involving Biological Agents.”

<http://www.colorado.edu/ehs/pdf/Biosafety-EMS.IBC%20Lab%20Requirements%20for%20BL1%20and%20BL2%20%20Containme.pdf>

Changes were made as needed to apply to facilities on the JMU campus to which this safety document applies. *Most importantly, these ‘standards’ parallel the current NIH guidelines cited in Section II of this document.*

The James Madison University Institutional Biosafety Committee (IBC), the CISE Safety Liaison, and the University Environmental Health Coordinator, require that the following standard and special microbiological practices, physical containment or laboratory design, containment equipment, and training be implemented when using organisms containing recombinant DNA or biological agents that are known or potential biohazards. These requirements include hygienic and operational practices that are critical in providing for a safe work environment, assuring a viable research product is produced, and minimizing and/or eliminating the risk of occupational exposure to infectious and potentially infectious substances.

The Principal Investigator is responsible for having their laboratory area meet the specified

requirements for the biosafety containment level that corresponds to the biological agents in use. Failure to meet these requirements will result in a review by the IBC. The Principal Investigator will work with the IBC to correct all deficiencies in a timely manner.

Standard Practices and Training

The first principle of containment is strict adherence to good microbiological practices. Consequently, all personnel directly or indirectly involved in experiments using recombinant DNA shall receive adequate instruction. At a minimum, these instructions include training in aseptic techniques and in the biology of the organisms used in the experiments so that the potential biohazards can be understood and appreciated.

Any research group working with agents that are known or potential biohazards shall have an emergency plan that describes the procedures to be followed if an accident contaminates personnel or the environment. The Principal Investigator shall ensure that everyone in the laboratory is familiar with both the potential hazards of the work and the emergency plan. Personnel must receive annual updates or additional training when procedural or policy changes occur. If a research group is working with a known pathogen for which there is an effective vaccine, the vaccine shall be made available to all workers. Serological monitoring, when clearly appropriate, will be provided.

Physical Containment Levels

The specific guidelines for each level of containment are outlined in the CDC's *Biosafety in Microbiological and Biomedical Laboratories* (BMBL) which can be found at the link below. All activities in CISE laboratories involving biological agents must comply with the appropriate guidelines of BMBL.

<http://www.cdc.gov/biosafety/publications/bmb15/BMBL.pdf>

Biological Safety Cabinets

Biological safety cabinets referred to in this section are classified as Class I and Class II cabinets. Additional information on biological safety cabinets is published as a CDC-NIH web page:

http://www.cdc.gov/biosafety/publications/bmb15/BMBL5_appendixA.pdf

CHEMICAL AND BIOLOGICAL WASTE DISPOSAL

Chemical and biological waste must be handled in accordance with all local, state, and federal regulations. Anyone who generates or manages chemical and/or biological waste must complete the JMU Hazardous Waste Training and Quiz located at the site listed below.

<http://www.jmu.edu/labsafety/>

Hazardous chemical waste will be inventoried and stored in a designated location for off-site disposal. All waste containers shall have an easily read label that includes the composition of the waste.

Potentially hazardous biological/physical waste (e.g., Petri dishes with bacterial colonies, sharps containers) will be removed (from appropriately labeled containers located in select CISE laboratories) and appropriately packaged for disposal by JMU Housekeeping personnel specially trained in handling of these wastes.

HEALTH AND SAFETY

James Madison University has published Policy 3108 (*Health and Safety*) to provide guidelines and instructions to assist university officials in their compliance with applicable provisions of the Occupational Safety and Health Act, as well as applicable laws and regulations of other state and federal regulatory agencies.

The university will comply strictly with EPA, OSHA, waste management and other safety and health related codes, laws and standards. Safety violations must be reported to a supervisor and the university environmental health and safety officers.

The complete Policy 3108 can be found at the following location.

<https://www.jmu.edu/JMUpolicy/policies/3108.shtml>

BLOODBORNE PATHOGENS

James Madison University has published Policy 3109 (*Bloodborne Pathogens*) to establish the Bloodborne Pathogens Control Program. This policy advises all employees of the university of the practices and procedures to help prevent exposure to blood and other potentially infectious materials.

According to university Policy 3109, department heads are responsible for developing and implementing a departmental exposure control plan that includes annual training, disseminating awareness information and establishing engineering and work practice controls.

At risk employees are defined as all employees who could be reasonably anticipated, as a result of performing their job duties, to have contact with blood and other potentially infectious materials.

OSHA defines an exposure incident as “a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from performance of an employee’s duties.”

The complete Policy 3109 can be found at the following location.

<http://www.jmu.edu/JMUpolicy/3109.shtml>

INSTRUMENT/EQUIPMENT SAFETY

In the introductory section pertaining to “Laboratory Equipment” in *Prudent Practices* (1995) is this statement: “Proper use of laboratory equipment is required to work safely with hazardous chemicals. Maintenance and regular inspection of laboratory equipment are an essential part of this activity. Many of the accidents that occur in the laboratory can be attributed to improper use or maintenance of

laboratory equipment.”

Requirements and recommendations concerning safety with equipment commonly located in CISE laboratories appear below. *(These safety issues apply to all CISE equipment/apparatus including, but not limited to, those listed.)*

Water-cooled equipment (e.g., distillation apparatus):

The major problem with cooling water is localized flooding due to the disconnection of tubing supplying water to the condenser. Tubing connections shall be checked frequently, and the entire apparatus shall be operated when the laboratory is occupied.

Electrically-powered equipment (including fluid and vacuum pumps, lasers, power supplies, both electrophoresis and electrochemical apparatus, stirrers, hot plates, water baths, heating mantles, microwave ovens and ultrasonicators):

The major hazard is electrical, as a shock hazard and as a source for flammable or explosive vapors. All electrical equipment must be installed and maintained according to the provisions of the National Electric Code (NEC) of the National Fire Protection Association (NFPA).

All repair and calibration work must be carried out by properly trained and qualified personnel.

Before modification, installation, or even minor repairs of electrical equipment are carried out, the devices must be deenergized, and all capacitors, discharged safely.

Receptacles that provide electric power for operations in hoods shall be located outside the hood, a step which prevent the production of electric sparks inside the hood. In addition, cords shall not dangle outside the hood in such a way that they accidentally can be pulled out of their receptacles or tripped over.

General precautions for working with electrical equipment:

- 1) All equipment must be insulated properly. During equipment use, if frayed or damaged cords are found, they must be replaced before further use of the equipment is permitted. The complete electrical isolation of electrical equipment and power supplies must be ensured to prevent the possibility of accidental contact with electrical circuits.
- 2) Electrical equipment, e.g., heat guns or hot plates, which may generate sparks must be isolated from volatile solvents.
- 3) To minimize the possibility of electrical shock, adequate grounding will be provided for all electrical equipment.
- 4) Pieces of equipment must be unplugged prior to adjusting, modifying, or repairing them.
- 5) Personnel contact with energized electrical circuits must be avoided. Electrical equipment shall be serviced by only qualified individuals, and only after power has been disrupted and capacitors are discharged. Before electrical equipment is reconnected to power after servicing, it must be tested to ensure proper grounding.

- 6) If a circuit breaker “trips,” steps must be taken to assure that the overload or short-circuit which caused the failure is corrected.
- 7) Ground-fault circuit interrupters must be in place where required, particularly if an electrical device is hand-held during a lab operation.

Electrical equipment used in CISE laboratories requiring special precautions:

Ultrasonicators

- Direct contact of the body with liquids or solids subjected to high-intensity ultrasound shall be avoided.

Centrifuges

- Centrifuges must be properly installed and must be operated by only trained personnel.
- The load must be balanced each time the centrifuge is used, and the lid must be closed while the rotor is moving.
- All centrifuges must have a door interlock to prevent opening or starting the unit with the door open.

Electrical Instruments and Appliances (e.g., circuit testing equipment, electrophoresis power supplies, microscopes, ovens, water baths, hot plates and stirring devices, top-loading and analytical balances, microwave ovens, pH and specific ion meters, vacuum pumps, refrigerators and freezers):

- For all equipment, a chassis ground must be in place.
- Special precautions shall be taken to avoid the possibility that water or other chemicals could be spilled onto these instruments.
- Only qualified individuals shall make repairs.

Machine Tools (e.g., drills, saws, mills, lathes, grinders):

- Those persons using electrically powered equipment and tools, used in machine shops must use caution to avoid damaging power cords.
- Using this equipment in the presence of potentially hazardous chemicals, e.g., flammable solvents, must be avoided.

Electromagnetic Radiation Hazards (e.g., UV sources, lasers, microwave sources)

- Overexposure to UV light, direct or reflected, must be minimized. Lamp sources shall be sealed or enclosed whenever possible, and appropriate eye protection and/or face shields must be worn. Long-sleeved clothing and gloves shall be worn to protect arms and hands.
- Lasers: Users of class III A and B, and class IV, lasers must wear appropriate eye protection and clothing to prevent damage to eyes and skin when direct laser beam exposure is remotely possible. **(NOTE: When laser demonstration/laboratory exercises are in process in a CISE laboratory, if the laser beam is split by means of a diffraction grating so that several low-energy beams can be projected onto a surface, safety glasses may be set aside to facilitate the laboratory activity. However, precautions must be taken so that it is ensured that operators of laser equipment, as well as observers, do not look directly into the beam with unprotected eyes, and that the laser points only at the intended projection wall or screen.)**

Area where a laser is in operation must be posted accordingly.

Anyone who is not the authorized operator of a laser system, or who is not authorized to be present by the operator, shall not enter a posted laser-controlled laboratory if the laser is in use.

Microwave sources must be operated only with appropriate microwave generator shielding in place. Avoid metal in microwave ovens, since arcing may occur, causing the ignition of any solvents present. Since superheating of liquids can occur, capping of vials and other containers can result in explosion from pressure buildup within the vial. Use only selected plastic containers.

Compressed Gas Diffusers/Air Guns must have their pressure regulated to below 30 psig. This may be accomplished by the use of regulators or OSHA approved diffusers with safety tips installed that reduce the gas to approximately 30 psig. Use of these compressed gas diffusers requires that the flow be directed away from the operator and never at another person

Machine Tools require JMU approved training specific to the tool being used as well as an understanding of the hazards involved with the task being executed. Work pieces must always be secured with a vise, clamp, or other means to minimize projectile hazards.

Cranes located in EnGeo 0001 and EnGeo 0002 may be used by only the Facility Safety Coordinator who has received appropriate training by JMU Risk Management.

VII. FACULTY/STUDENT PROJECTS REQUIRING APPROVAL

Any projects that would involve large amounts of chemicals/biochemicals MUST be approved by the CISE Safety Liaison (who will consult and inform the University Environmental Health Coordinator) prior to receipt of these chemical agents in any CISE facility. Any project that requires more than 5 gallons or 40 pounds of a particular chemical MUST be approved by the CISE Safety Liaison.

The approval of the CISE Safety Liaison (who will consult and inform the University Environmental Health Coordinator) is required PRIOR to introducing any of the following into a CISE facility:

- Ionizing radiation sources,
- Highly toxic chemicals including but not limited to cyanide salts, dimethyl mercury, arsenic, butyl lithiums,
- Highly corrosive and toxic solutions including Hydrofluoric acid and aqua regia,
- Highly energetic materials and explosives,
- Controlled substances,
- Any class of chemical that has not previously been utilized in the facility (i.e. flammable solids, organic peroxides), and
- Animals. This is consistent with [JMU Policy 1330, Animals on University Property](#).

VIII. APPENDIX I – Forms

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James Madison University
Laboratory Incident Report

Date: _____ Time: _____ Location: _____		
Date of report: _____		
Incident Type – injury, fire, near miss, etc. _____		
Name of person involved - print: _____		Sign: _____
Address room, apartment : _____		
building, street _____		
Telephone: _____	Cell: _____	E-mail: _____
Name of person reporting - print: _____		Sign: _____
Telephone: _____	Cell: _____	E-mail: _____
Name of witnesses - print: _____		Sign: _____
Telephone: _____	Cell: _____	E-mail: _____
Name of witnesses - print: _____		Sign: _____
Telephone: _____	Cell: _____	E-mail: _____

Incident

Description of Incident: _____

Corrective Actions Taken: _____

Additional Corrective Actions Planned: _____

Forward copies 131 West Grace Street, MSC 6703, Harrisonburg, Virginia, 22807
to: office of Risk (540) 568-7812, FAX: (540) 568-2878, Mooremg@jmu.edu, <http://www.jmu.edu/riskmtmt/>
Management

IX. APPENDIX II – CISE FACILITIES WITH HAZARDS

		Number of Signs	Acutely Toxic	Environmental Hazard	Explosive	Health Hazard	Moderate Hazard	Corrosive	Gas Under Pressure	Flammable	Oxidizing	No Food or Drink	Closed Shoes Required	Safety Glasses Required	Chemical PPE Required	Biohazard	X-Ray	Radioactive Materials	Radiation Area
College of Integrated Sciences and Engineering – Shared Facilities																			
EnGeo 0001	CISE Projects High Bay	1						X	X	X		X	X	X	X				
EnGeo 0002	Advanced Thermal Fluids Lab	1								X		X	X	X					
EnGeo 0111	Machine Shop	2					X			X		X	X	X	X				
EnGeo 2032	Center for Materials Science	1	X	X		X	X	X	X	X	X	X	X	X	X				
EnGeo 2034	Center for Materials Science	1	X	X		X	X	X	X	X	X	X	X	X	X				
EnGeo 2036	Center for Materials Science	1	X	X		X	X	X	X	X	X	X	X	X	X				
JMU Alternative Fuels Lab (South Main Street)		1							X	X		X	X	X					
Tech Drive		1				X	X	X		X		X	X	X					
Department of Engineering																			
EnGeo 0008	Small Capstone Studio	1										X	X	X					
EnGeo 0009	Engineering Analysis	1										X	X	X					
EnGeo 0014	Engineering Analysis	1	X	X		X	X	X			X	X	X	X	X				
EnGeo 0107	Fabrication Shop	2							X	X		X	X	X					
EnGeo 0116	Small Capstone Studio	1										X	X	X					
EnGeo 0122	Engineering Supplies	1																	
EnGeo 0208	Bit Shop	2					X	X		X		X	X	X	X				
EnGeo 1003	Sophomore Design Studio	2										X	X	X					
EnGeo 1027	Product Innovation	1	X	X		X	X	X		X		X	X	X	X				
EnGeo 1029	Infrastructure Innovation	1	X	X		X	X	X		X	X	X	X	X	X				
EnGeo 1030	Engineering Innovation																		
EnGeo 1032	Process Innovation	1							X			X	X	X	X				

CISE SAFETY PLAN – AY 2020-21

School of Integrated Sciences		Number of Signs	Acutely Toxic	Environmental Hazard	Explosive	Health Hazard	Moderate Hazard	Corrosive	Gas Under Pressure	Flammable	Oxidizing	No Food or Drink	Closed Shoes Required	Safety Glasses Required	Chemical PPE Required	Biohazard	X-Ray	Radioactive Materials	Radiation Area
ISAT/CS 130	Biomanufacturing Laboratories	1						X		X	X	X	X			X			
ISAT/CS 134	Biomanufacturing Laboratories	2						X	X	X	X	X	X			X			
ISAT/CS 138	Biomanufacturing Laboratories	1						X		X	X	X	X			X			
ISAT/CS 131	Infrared Development & Thermal Solutions Laboratory	1							X			X	X	X					
ISAT/CS 146	Production Systems Laboratory	4										X	X	X					
ISAT/CS 149	Production Systems Collaboratory	1																	
ISAT/CS 151	Production Systems Testing and Fabrication	2					X			X		X	X	X	X				
ISAT/CS 230	Environmental Preparation Laboratory	1	X	X		X	X	X			X	X	X	X	X				
ISAT/CS 234	Environmental Teaching Laboratory	2								X		X	X	X	X				
ISAT/CS 240	Geographic Science Teaching Laboratory	2										X	X	X	X				
ISAT/CS 238	Environmental Laboratory	2		X		X	X	X	X	X	X	X	X	X	X		X		
ISAT/CS 330	Biotechnology Preparation Room	1		X		X	X	X			X	X	X	X	X	X			
ISAT/CS 331	Cell Culture Laboratory	1								X		X	X		X				
ISAT/CS 334	Biotechnology Laboratory	4										X	X	X	X	X			
ISAT/CS 340	Biotechnology Laboratory	4								X		X	X	X	X	X			
ISAT/CS 346	Physical Science & Energy Laboratory	4										X	X	X					
ISAT/CS 351	Laser and Optics Laboratory	1										X	X	X					
ISAT/CS B09	SIS Storage	2							X			X	X	X	X				
EnGeo 1031	ISAT/Center for Materials Science Materials Characterization Lab	1	X	X		X	X	X	X	X	X	X	X	X	X				
EnGeo 2140	Electronics Shop	2										X	X	X					
EnGeo 2037	ISAT Projects Laboratory	2					X					X	X	X					

X. APPENDIX III – SAMPLE DOOR HAZARD SIGN AND SAFETY POLICIES

ISAT/CS 151

Production Systems Testing and Fabrication



Name (Title)	Campus Phone	Other/Cell Phone
Mark Showalter (Lab Coordinator and CISE Safety Liaison)	540-568-2767	
Matthew Hunsberger (Building Coordinator)	540-568-4660	
Linda Thomas (Academic Unit Head)	540-568-6963	
JMU Campus Emergency	540-568-6911	8-6911 (from campus phone)

EnGeo 0107 Safety Policy

This document outlines the policies specific to EnGeo 0107. These policies supplement those outlined in the CISE Safety Plan.

Any person working in this lab is to have completed the Basic Tools Safety Quiz on the Engineering Commons and the Basic Tools Training administered by JMU faculty and staff.

In case of emergency evacuation, immediately exit the lab through the nearest door and leave the building at the posted exit. Move away from the building and meet at the posted evacuation meeting location.

If you have questions or concerns please contact the Head of the Department of Engineering, Dr. Kurt Paterson, or the Lab Supervisor, John Wild, or the CISE Safety Liaison.

Lab Facility Hazards & Concerns

- Fire – Welding & Grinding
- Mechanical – Hand Tools, Portable Power Tools, & Machine Tools

Safety Policy Overview

- **Do not work alone.** At least one other person should be present to call for assistance.
- **Report all injuries.** Medical treatment is to be received for injuries.
- **Use safety glasses with side protection** at all times in the shop.
- **Confine long hair and loose clothing.**
- **Use fully-closed shoes** to protect against falling objects and cut hazards.
- **Do not eat, drink, or chew gum** in the shop.
- **Keep the work area neat and organized** for efficient work and to avoid accidents.
- **Review the Safety Data Sheet for raw materials prior to work.** Some materials may generate dust or gases upon work that result in significant hazards.

Lab/Facility Safety Policy Outline

- **Act responsibly.** Accidents due to horseplay, inattention, or carelessness can harm people and property.
- **Do not use equipment for which you are untrained.** Training documentation is required for the use of each power tool and machine.
- **Know the location of fire extinguishers.** Do not block access to the fire extinguishers.
- **Know the location and how to use the eyewash stations.** Do not block access to the eyewash stations.
- **Keep exits and aisles clear.**

Lab/Facility Contacts

Campus Police:	(emergency)	x6911/ 568-6911 (off-campus)
Campus Police:	(non-emergency)	x86913/ 568-6913 (off-campus)
Facility Supervisor:	Mr. John Wild	x85201 / wildjw@jmu.edu
CISE Safety Liaison:	Mark Showalter	x82767/ showalmh@jmu.edu
Head of Engineering:	Dr. Kurt Paterson	x88110 / paterskg@jmu.edu

ISAT146/151 Safety Policy

This document outlines the policies specific to this lab. In case of emergency evacuation, immediately exit the lab through the nearest door and leave the building at the posted exit. Move away from the building.

If you have questions or concerns please contact the Lab Manager, Academic Unit head, or CISE Safety Liaison.

Lab/Facility Hazards & Concerns

- **Electrical: 120V 60Hz.**
- **Fire: Furnace; Plastic Injection Molder; Possible electrical shorts.**
- **Chemical: Batteries; Lubricants; Cutting Fluid/Coolant; Occasionally Instructional Lab Materials.**

CISE Safety Policy Overview

- **Do not work alone.** At least one other person should be present to call for assistance.
- **Report all Injuries and Damage.** Medical treatment is to be received for cuts, burns, and fume inhalation.
- **Use safety goggles at all times** in all labs and in any area where chemicals are stored or handled, unless instructor is present and says otherwise.
- **Confine long hair and loose clothing.**
- **Use closed-toe shoes** to protect against broken glass, chemical spills, and dropped objects.
- **Do not eat, drink, chew gum,** smoke or apply cosmetics in the lab.
- **Wash hands** after handling chemicals.
- **Keep your work area neat** and organized for efficient work and to avoid accidents.

Lab/Facility Safety Policy Outline

- Responsible behavior in the laboratory prevents injury. Throughout the semester, we will work with electrical equipment, physical instruments, and occasionally with chemical materials. Accidents due to horseplay, inattention, or carelessness can harm people and property.
- Ask Questions. Read instructions before class, so that you have time to think of questions. Follow both oral and written laboratory instructions carefully. Discuss procedures with classmates before you execute them. Ask questions frequently, even if you think that you understand.
- **Do not Force Equipment**, especially glass! Ask the instructor for help. Components should assemble easily.
- Electrical: **Do not pull electrical cords.** They can fray.

Lab/Facility Contacts

- | | | |
|-----------------------|------------------|---|
| - Campus Police: | (emergency) | x6911 / 442-6911 (<i>off-campus</i>) |
| - Campus Police: | (non-emergency) | x86913 / 568-6913 (<i>off-campus</i>) |
| - Academic Unit Head: | Dr. Linda Thomas | x86963 / thoma7lm@jmu.edu |

XI. APPENDIX IV – The Online SDS System

JMU uses an online SDS system by KHA. The system can be accessed through jmu.kha.com.

To Add an SDS to the System: email a PDF of the vender specific SDS to caneczjr@jmu.edu or riskmanagement@jmu.edu with your request that the SDS be added for a specific room.

To Access an SDS: follow the instructions in the info graphic on the following pages for SDS access and use of the mobile app including offline backup



FIND SDS FAST

CHOOSE ACCESS:

COMPUTER

VISIT: jmu.kha.com



SELECT AN SDS BY CLICKING THE .PDF ICON OR PRODUCT NAME

MSDS ID	Queue	PDF	Product Name	Manufacturer	Revision
100249	Add		09100 Plastic Tank Repair Kit (Epoxy)	Permatex, Inc.	2004-02-10
100221	Add		09101 Fuel Tank Repair Kit (Epoxy)	Permatex, Inc.	2001-04-18
100022	Add		1112 COOL-TEC 2 (Cooling System Inhibitor)	PENRAY COMPANY	1996-11-07
100030	Add		1132 New-Stabil Fuel Conditioner, Stabilizer	GOLD EAGLE COMPANY	2003-07-17
100070	Add		1200A Belt Dressing & Conditioner 12oz AE	Permatex, Inc.	2004-01-30

VIEW ENTIRE SDS OR AT-A-GLANCE



MOBILE DEVICE



From the App Store / Google Play search for the "SDS Mobile" app (icon pictured left for reference). Download and log in:

Username:

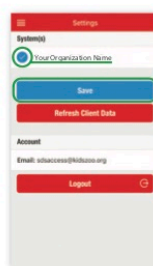
jmu@sdsmobile.app

Password:

jmusds2019



2

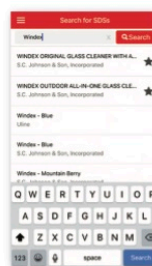


• Navigate to "Settings"

• Tap the checkmark next to your organization name

• Click save

3



Search for and review SDS prior to using a chemical

NOTE:

SDS noted with a star are understood to be in your chemical inventory.

Non-starred items can be referenced from KHA's larger SDS database.



SDS MOBILE APP ACCESS AND OFFLINE BACKUP

1



From the Apple App Store / Google Play search for the "SDS Mobile" app (icon pictured left for reference). Download and log in:

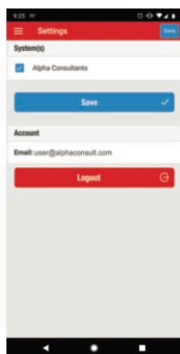
Username:

jmu@sdsmobile.app

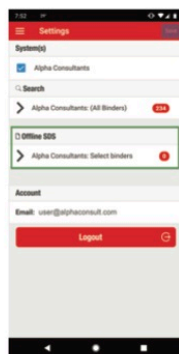
Password:

jmusds2019

2



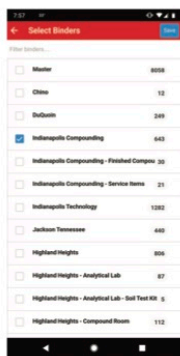
- Navigate to 'Settings'
- Tap the checkmark next to your organization name
- Click 'Save'



After you save your settings

- Click on Offline SDS

3



- Select the binder(s) for offline backup
- Click 'Save'
- Remain connected to wifi while your SDS download for offline access



- Access your Offline SDS binder(s) by clicking on 'Offline SDS' from the Dashboard menu

XII. APPENDIX V – CITED WEBSITES

Centers for Disease Control and Prevention

<http://www.cdc.gov/>

CDC Biological Safety Cabinet Information

http://www.cdc.gov/biosafety/publications/bmb15/BMBL5_appendixA.pdf

CDC Biosafety in Microbiological and Biomedical Laboratories

<http://www.cdc.gov/biosafety/publications/bmb15/BMBL.pdf>

Environmental Protection Agency (EPA)

<http://www.epa.gov/>

JMU Animals on University Property Policy

<https://www.jmu.edu/JMUpolicy/policies/1330.shtml>

JMU Bloodborne Pathogens Policy

<http://www.jmu.edu/JMUpolicy/3109.shtml>

JMU Comprehensive Safety Plan

<http://www.jmu.edu/pubsafety/safetyplan.shtml>

JMU Hazardous Waste Training & Quiz

<http://www.jmu.edu/labsafety/>

JMU Student Accident Investigation Report (Incident Report)

<http://www.jmu.edu/riskmgmt/>

National Fire Protection Association (NFPA),

<http://www.nfpa.org/>

National Institutes of Health (NIH)

<http://www.nih.gov/>

Occupational Safety and Health Administration (OSHA)

<https://www.osha.gov/>

OSHA Permissible Exposure Limits (PEL)

<https://www.osha.gov/dsg/annotated-pels/tablez-1.html>

<https://www.osha.gov/dsg/annotated-pels/tablez-2.html>

<https://www.osha.gov/dsg/annotated-pels/tablez-3.html>

CISE SAFETY PLAN – AY 2020-21

University of Colorado Boulder Biosafety Operating Practices

<http://www.colorado.edu/ehs/pdf/Biosafety-EMS.IBC%20Lab%20Requirements%20for%20BL1%20and%20BL2%20%20Containme.pdf>

U.S. Department of Transportation (DOT)

<http://www.dot.gov/>