**Robot Control Laboratory**

**Lab Safety MANUAL**

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| Jon Scaggs, COEN Safety Liaison date |

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| Scope | This document is intended to provide safety information on the safety equipment, activities and hazards specific to the space(s) used by this lab.  This document is intended to be used in research labs in conjunction with the **COEN General Lab Safety Manual** and other lab safety training  <https://studylib.net/doc/6628757/coen-general-research-lab-safety-manual-12-2-2015.>  It is mandatory that all individuals who perform work in the lab be fully aware of this document’s existence, understand its contents, and satisfy the testing requirements associated with it. This burden of knowledge and training is the shared responsibility of the PI, lab supervisor and individual lab workers. |
| Shared Lab Spaces | Shared lab spaces require additional cooperation by lab owners to ensure a safe environment for all.  A lab-specific safety manual should be written for any space that is:   * shared by multiple PIs working independently   OR   * shared by co-PIs that do not share the same research team   This may require having multiple lab-specific safety manuals as needed based on the lab spaces used. |

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| Lab Safety Checklist | Below is a checklist of important safety-related information for your lab space(s). **Familiarize yourself with this information. See Appendix A** Laboratory Evacuation **more information.**    **Lab Location: MEC**  Room 103  Building Address: 1020 S Manitou Ave  Important Safety-Related Locations:  Secondary Contact Info: Lab entrances  Lab Safety Notebook: On the cubicle nearest the MEC 103 exit.  Nearest Fire Extinguisher: MEC 104  Nearest Fire Blanket: MEC 104  Nearest Eyewash/Safety Shower: No need  Nearest Chemical Spill Kit: No need  Nearest AED: Call Camus Security at (208)-426-6911 for Location.  Nearest Phone: Building opposite MEC, Engineering Innovation Studio  Safe Assembly Area For Evacuation: Right outside the MEC building, facing MCMR.  Meet 1st Responders: On University Dr. in front of building. | |
| 1. **Emergency Response** | | |
| * 1. **Calling 9-1-1** | | * **If possible, get out of immediate danger.** * **In the event of a fire, or if you feel the building’s occupants are in danger:**   1. **Evacuate the building immediately!** Refer to Laboratory Evacuation at the end of this document for additional evacuation information.   2. Once you are out of danger, contact University Dispatch so that they may sound the fire alarm if building evacuation is needed. * **To report any medical emergency or fire, call 9-1-1 from any phone.** * For other emergencies, contact University Dispatch at 426-6911.   When calling 9-1-1:   * Stay on the line with the dispatcher. * Provide the address of the building involved and your exact location when calling from a cell phone. The building address is located on the Emergency Contact sign on the door of your lab. * Provide a thorough description of the incident to ensure that proper resources are dispatched. * Do not hang up until the dispatcher tells you to do so. * Follow up the 9-1-1 call with a call to University Dispatch at 426-6911. |
| Boise State Emergency Response Guide | | The [***Boise State Emergency Response Guide***](http://coenintranet.boisestate.edu/Safety/COENEmergencyResponse/tabid/75/Default.aspx) has been designed to provide overall guidance for various emergency incidents which could occur at Boise State University. The online guide can be accessed from the university website at:  <http://emergencymanagement.boisestate.edu/emergency_procedures>  This guide provides emergency content on the topics below.   * [General Instructions for all Emergency Situations](http://emergencymanagement.boisestate.edu/about/emergency_procedures/general-instructions/) * [Active Shooter](http://emergencymanagement.boisestate.edu/about/emergency-procedures-2/active-shooter/) * [Bomb Threats](http://emergencymanagement.boisestate.edu/about/emergency_procedures/bomb-threat/) * [Building Evacuation](http://emergencymanagement.boisestate.edu/about/emergency_procedures/building-evacuation/) * [Fire and Smoke](http://emergencymanagement.boisestate.edu/about/emergency-procedures-2/fire-and-smoke/) * [Flooding](http://emergencymanagement.boisestate.edu/about/emergency_procedures/flood/ \t Flood Response Actions) * [Hazardous Materials](http://emergencymanagement.boisestate.edu/emergency_procedures/hazardous-materials/) [Medical Emergencies](http://emergencymanagement.boisestate.edu/about/emergency_procedures/medical-emergencies/) * [Natural Gas Leaks and Pipeline Breaks](http://emergencymanagement.boisestate.edu/emergency_procedures/natural-gas-leaks-and-pipeline-breaks/) * [Power Shortages and Outages](http://emergencymanagement.boisestate.edu/emergency_procedures/power-shortages-and-outage/) * [Report a Crime](http://emergencymanagement.boisestate.edu/report-a-crime/) * [Report Sexual Assault](http://emergencymanagement.boisestate.edu/emergency_procedures/‎http:/emergencymanagement.boisestate.edu/about/emergency_procedures/report-sexual-assault/) * [Report Unsafe Conditions/Incidents](http://emergencymanagement.boisestate.edu/about/emergency_procedures/report-unsafe-conditionsincidents/) * [Work-Related Injury or Illnesses](http://emergencymanagement.boisestate.edu/work-related-injury-or-illness/) |
| Secondary Contacts | | After calling 9-1-1 in an emergency situation, or if you have a non-emergency situation, it is important that you inform secondary contacts of the laboratory situation as soon as possible.  Secondary contact information is provided on the Emergency Response signage and is posted on the entrance of the lab and by your lab phone. |

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| Lab Operations and Hazards | | | | |
| 5.1 Description ofLab Operation | | The operations and activities of this lab include the following:  MEC 103:   * Controller development for robot control. | | |
| 5.2 Hazards **Summary** | | The hazards of the lab’s operation(s) include the following:  MEC 103:   * Electrical * Mechanical   More information on these hazards can be found below. | | |
| 5.3 ChemicalHazards | | No chemical hazards are present in MEC 103.  For safety information and training contact Jon Scagg’s (email: [jonathanscaggs@boisestate.edu](../../../../C:/Users/Natasha/Desktop/Safety%20Adviser/D.Estrada_Lab%20Safety%20Mannuals/jonathanscaggs@boisestate.edu), phone number: (208) 426-3943). | | |
| 5.4 BiologicalHazards | | No biological hazards are present in MEC 103.  Information on managing biohazard spills and handling biohazard waste can be found on the appropriate link under “Biological Safety” at: <http://boisestate.edu/operations/ehss/safety-programs/biological-safety/> | | |
| 5.5 CompressedGas | | No compressed gas hazards are present in MEC 103. | | |
| 5.6 ElectricalHazards | | Typical residential electrical hazards may be encountered while working within MEC 103. Simple precautions can be taken to reduce the risk:  • Before operating new equipment read and follow all equipment operating instruction for proper use.  • Do not take apart laboratory instruments or attempt electrical repairs unless you are a qualified technician assigned to perform electrical work by your supervisor. Fixed wiring may only be repaired or modified by Facilities personnel or an approved outside repair service vendor.  • Wet hands, salt solutions, and some anti-static devices may enhance electrical contact with body. Use extra caution and ground fault circuit when working around electricity.  • The accidental or unexpected starting of electrical equipment can cause severe injury or death.  • Improper use of extension cords is hazardous. Do not use extension cords or power strips ("power taps") as a substitute for permanent wiring. Never daisy chain extension cords or power strips to get power where it is needed. Inspect all electrical and extension cords for wear and tear.  Basic information on working with electrical devices can be found in the **COEN General Lab Safety Manual**  <https://studylib.net/doc/6628757/coen-general-research-lab-safety-manual-12-2-2015>.  For safety information and training contact Jon Scaggs (email: <mailto:jonathanscaggs@boisestate.edu>, phone number: 208 426-3943). | | |
| 5.7 MechanicalHazards | | Many laboratory instruments as well as the robots housed in MEC 103 have moving parts. Generally these machines have safeguards or interlocks to prevent machinery-related injuries, however, caution must always be exercised around moving parts. If working with such equipment, follow these safety guidelines:  • Avoid wearing loose clothing or necklaces that could be drawn into compressed gases  • Do not disable interlocks on doors, access panels, etc.  • Do not brake moving parts by hand; wait for motion to stop on its own.  • Be aware of assemblies that vibrate and could “walk” into other objects or fall off a counter.  • Safety glasses must always be worn around any power tool operation.  • Use caution with automatic or computer-controlled machines that could start unexpectedly. | | |
| 5.8 FlammableLiquid Hazards | | No flammable liquid hazards are present in MEC 103.  For safety information and training contact Jon Scaggs (email: <mailto:jonathanscaggs@boisestate.edu>, phone number: 208 426-3943). | | |
| 5.9VacuumHazards | | No vacuum hazards are present in MEC 103. | | |
| 5.10 ThermalEnergyHazards | | No thermal energy hazards are present in MEC 103. | | |
| 5.11 RadiationHazards | | No radiation hazards are present in MEC 103. | | |
| 5.12 Stop WorkPractice | | | * A worker should never perform a job if she/he believes it to be unsafe or if inadequate PPE is available or sufficient safety measures are in not place. * If a worker feels a job cannot be performed safely, she/he should see her/his supervisor immediately for resolution. * If a worker feels pressured into performing a job they believe to be unsafe, they should contact their PI and/or the COEN Safety Liaison immediately. | |
| 5.13 PersonalBehaviors | | | The Robot Control Laboratory users include faculty, research staff, post-docs, graduate and undergraduate students, as well as other users from both within and outside the university. Users must comply with University Policies and all regulations and procedures detailed in this safety manual.  Additional required behaviors include:   * Workers must be familiar with the hazards of the materials with which they are working. * No food or drink is permitted in the lab. * No unauthorized experiments. * Personnel must have pre-approval by his/her direct supervisor in order to perform work alone. * Work should not be conducted if the researcher is feeling tired or otherwise impaired. * No rough-housing is permitted in the lab. * When performing an operation, consider if nearby workers require additional protection and take appropriate measures. * Employ good housekeeping rules by maintaining a clean, uncluttered work area.   Violating the regulations or procedures detailed in this document, or endangering the safety of yourself or others, will result in the immediate denial of access to the lab. | |
| 5.14 PersonalProtectiveEquipment (PPE) | | | No activity that would require PPE is performed in MEC 103. | |
| 5.15 EngineeringControls forHazards | | | * **Electrical hazards:** Do not daisy chain extension cords. | |
| 5.16 AdministrativeControls forHazards | | | Administrative controls play an important part of reducing hazard risk when engineering controls alone are not sufficient. Below are administrative controls that are in place for this laboratory | |
| 5.16.1 Lab Signage | The number of signs should be kept to a reasonable minimum and be clear and concise.  The following information will be posted on the each laboratory entrance from the main hall.   * Information relating to the general hazards, PPE, and rules of the lab.   If a phone is provided in the lab, the secondary contact information should also be provided adjacent to the phone. | | |  |
| 5.16.2 Training | Before performing any work in the laboratory, each worker must receive training as assigned by the PI. This training will generally consist of a combination of:   * This laboratory safety manual and its appendices * The [Boise State University Emergency Response Guide](http://coen.boisestate.edu/safety/files/2011/10/CEERG-online-version.pdf) * General online training modules as determined by lab management. * Specific training relating to tasks performed.  This training may include document-based training (such as protocols and procedures), as well as operational hands-on training. * The Boise State Chemical Hygiene Plan. * Online training modules provided by the Boise State EH&S. Any other training specified by the PI.   Note: The Principal Investigator (PI) is responsible for ensuring all workers within the lab are properly trained. All training records are to be maintained in the  5.16.4 Laboratory as described in Section . | | |  |
| 5.16.3 Certification | Certification level is determined by the type of work performed or responsibilities held in the lab:   1. A Laboratory Visitoris a person who does not work in the laboratory but is simply visiting. All visitors must be escorted by a laboratory worker. Any person in the lab who does not fall in one of the categories below can be considered a lab visitor. 2. A Support Worker is a person who supports the facility or IT needs of the laboratory. Due to the broad description of this type of worker, it is recommended that the PI or Lab Supervisor discuss the work to be done with the worker to determine what training is needed, whether the worker must be accompanied by lab personnel, etc. 3. A Laboratory Worker is a person who performs work in the laboratory, regardless of whether that work is frequent or infrequent. 4. The Laboratory Manager is the person designated by the PI(s) who oversees the day-to-day activities within the lab. 5. The Principal Investigator (PI) is the person responsible for overall laboratory activities including laboratory safety initiatives. These initiatives includes defining safety practices and training materials, assessing the training level needed for each worker, ensuring safety training records are maintained and support of periodic inspections.   Completion of the following training is required for the worker types as shown below.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | Lab  Safety Manual | BSU Emerg. Resp. Guide | Task-Specific Training, incl. CITI | Chem.  Hygiene Plan | | Lab Visitor | No | No | No | No | | Support Worker | No | No | No | No | | Laboratory Worker | Yes | Yes | As required | Familiar \* | | PI, Laboratory Supervisor | Yes | Yes | All | Familiar \* |   \*must have general understanding of the topics covered in the document and be able to readily reference it as needed. | | |  |
| 5.16.4 LaboratorySafetyNotebook(s) | The laboratory safety notebook(s) is intended to provide a variety of safety-related content that can be readily accessed by lab members and visitors to the lab.  In general, the notebook will contain:   * The lab safety manual procedures and other tanning materials * College of Engineering Emergency Response Guide * Current contact information for COEN and BSU safety personnel * Information and forms relating to lab incidents/accidents * Records of safety training for each lab worker (may be located elsewhere but must be readily accessible). * Chemical inventory and MSDSs for lab   More information on how to organize a lab safety notebook can be obtained by contacting the COEN Safety Liaison or by clicking [here](http://coen.boisestate.edu/safety/laboratory-safety/lab-safety-manual/). | | |  |
| **5.16.5 Lab Incidents,**  **Accidents and** Property Loss | In the event of an incident where a person in the lab is injured, or where property is damaged, contact the Boise State Office of Risk Management and Insurance to ensure the proper measures are taken to protect health and property. Their contact information can be found at: <http://rmi.boisestate.edu/>  Also, your lab notebook should have the proper forms and a flow chart to describe how to handle an incident for an employee. | | |  |

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|  | 1. **Chemical Emergencies** | | | |
| * 1. **Chemical Contact** | | There is no danger of chemical contact in MEC 103. | |  |
|  | * 1. **Large Chemical Spill** | | Thereis no danger of large chemical spill in MEC 103. | |
|  | * 1. **Small Chemical Spill** | | Thereis no danger of small chemical spill in MEC 103. | |
|  | * 1. **Uncontained Spill Release** | | There is no danger of uncontained spill release in MEC 103. | |
|  | **6.5**  **Spill**  **Investigation**  **Report** | | There is no danger of chemical spill in MEC 103. | |

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| 1. **Chemical and Waste Management** | |
| * 1. **Chemical Labeling** | MEC 103 does not contain dangerous chemicals. |
| * 1. **Chemical Inventories** | MEC 103 does not contain dangerous chemicals. |
| * 1. **Chemical Operation Procedures** | MEC 103 does not contain dangerous chemicals. |

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| * 1. **Definition of Waste** | MEC 103 does not produce chemical waste. |
| * 1. **Hazardous Wastes** | MEC 103 does not produce hazardous waste. |

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| * 1. **Waste Pickup** | No need for waste pickup from MEC 103. |

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| * 1. **Illegal Disposal of Waste** | No material is present in MEC 103 that would be considered illegal to be disposed in a usual trash bin. |
| * 1. **Segregation of Waste** | No segregation of waste is necessary in MEC 103 as it does not contain any hazardous waste. |

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| * 1. **Hazardous Waste Containers** | No hazardous waste containers are present in MEC 103. |

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| 1. **Additional Resources** | |
| * 1. **COEN Safety Liaison** | The College of Engineering is staffed with a safety liaison that works closely with COEN labs and the Boise State Environmental Health and Safety team. The safety liaison can also help with chemical ordering, handling chemical waste and many other issues.   Contact information for the COEN Safety Liaison can be found below:  Jon Scaggs, Lab Safety Specialist Office: MCMR 140B  email: [jonathanscaggs@boisestate.edu](mailto:jonathanscaggs@boisestate.edu)  ph: (208) 426-3943 |
| * 1. **EH&S** | ***For chemical contact, chemicals spills or other lab emergencies, call University Dispatch at 426-6911.***  The Boise State Environmental Health and Safety (EH&S) team can provide a wealth of information regarding university policy and safety information regarding laboratory work across campus.  Two members of the EHS staff that support COEN labs heavily are:   * Suzy Arnette, Lab Safety Officer [suzyarnette@boisestate.edu](mailto:suzyarnette@boisestate.edu) ph. (208) 426-3906 * Chris Siepert, EHS Hazardous Waste Officer [christophersiepert@boisestate.edu](mailto:christophersiepert@boisestate.edu)   ph. (208) 426-3913  Additional information regarding other members of the EHS team, university policy, training, etc. is provided on their website site at:   * <https://www.boisestate.edu/coen-safety/contact-us/> |
| * 1. **COEN Safety Website** | * The COEN Safety website is hosted on the College of Engineering’s website at <http://coen.boisestate.edu/safety>. * Topics of the website include:   + Emergency response information   + Commonly used forms and documents   + Chemical management, including chemical ordering, chemical inventory and MSDS record-keeping   + Lab Safety (PPE, controls, etc.)   + Safety training, including types of training, templates, etc. |

###### Laboratory Evacuation

**When ordered to evacuate or when alarms are activated, ALWAYS LEAVE IMMEDIATELY.**

* Unless ordered otherwise by officials, designated Building Coordinators and/or alternates and assistants (identified with red armbands) shall direct and ensure, to the extent practical, that a safe personnel evacuation is conducted. Treat all alarms as warning of an actual emergency situation.
* All department heads, faculty, managers and supervisors must help direct employees, students, visitors and each other to obey evacuation instructions of emergency response personnel and/or the Building Coordinators.
* Building Coordinators and/or alternates and assistants shall notify emergency personnel immediately upon their arrival at the scene concerning the status of the evacuation, the exact location of any injured or trapped persons, those waiting in designated Areas for Evacuation Assistance, any others who may be anywhere in the building, and any other relevant information on the emergency situation.

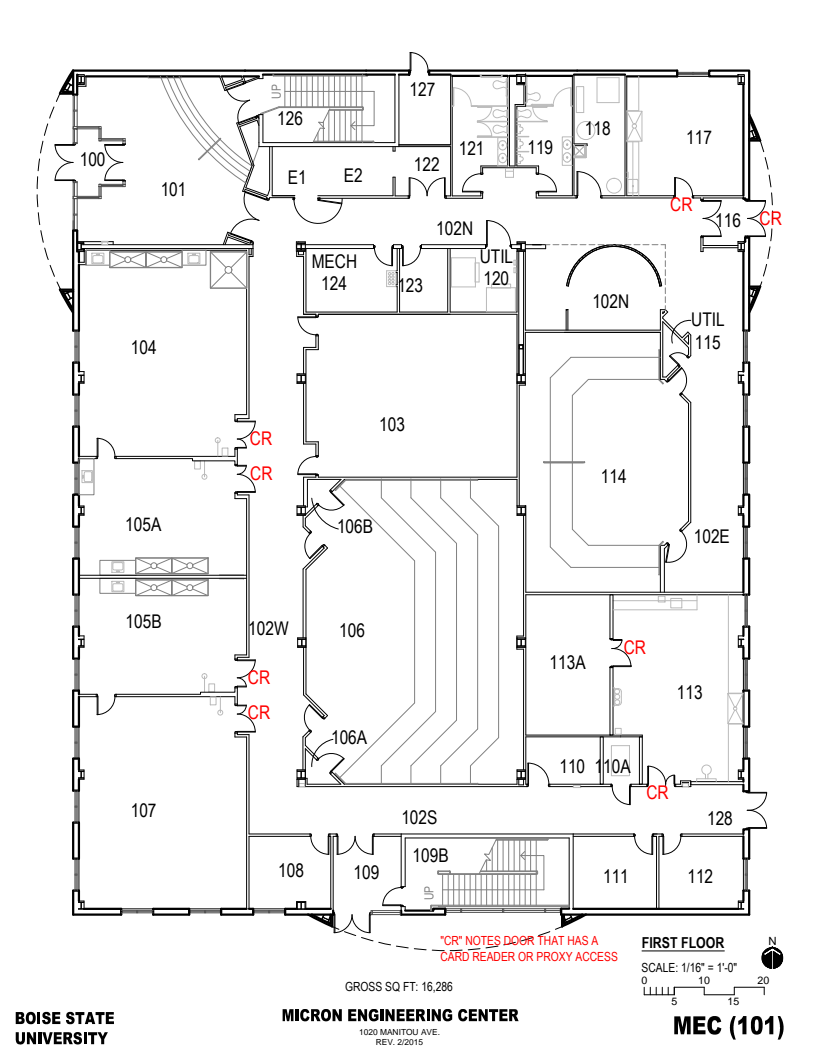
**Exit quickly and calmly using nearest emergency escape routes and marked exits and proceed to Safe Assembly Locations.  DO NOT USE ELEVATORS!**

* Do not attempt to use elevators during an emergency.  Elevators are called to the first floor when the fire alarm system is activated.  Use only stairways in an evacuation.
* Use clear, safe escape routes and exits and proceed to the nearest outside Safe Assembly Location shown on this building’s posted evacuation map, or to a location ordered by emergency response personnel.  Do not return to an evacuated building until directed by University officials.
* If possible, take your coat and keys but do not take time to go to lockers or offices for personal possessions.
* Where applicable and, if possible and safe, turn off laboratory gases, exhaust fans, and close doors/windows as you exit.

**Assist persons requiring evacuation assistance to get to designated Areas for Evacuation Assistance.  Be alert for trapped, injured, or other persons requiring assistance.**

* Transporting of individuals requiring evacuation assistance up or down stairwells shall be avoided until emergency response personnel have arrived.  Unless imminent life-threatening conditions exist, relocation of these individuals shall be limited to the designated Areas for Evacuation Assistance.
* Notify emergency personnel immediately upon their arrival of the exact location of any injured or trapped persons, those waiting in designated Areas for Evacuation Assistance, and any others who may be anywhere in the building.

**MEC 103 Evacuation Routs**

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**Additional Resources**

**Environmental Health, Safety and Sustainability Website**

* The [Environmental Health, Safety and Sustainability website](http://vpfa.boisestate.edu/EHS/) provides a wealth of information regarding university policy and safety information for laboratory work on campus. The EHSS website can be found at[: https://www.boisestate.edu/operations/ehss/](../../../../C:/Users/Natasha/Desktop/Safety%20Adviser/D.Estrada_Lab%20Safety%20Mannuals/:%20https:/www.boisestate.edu/operations/ehss/)
* The EHSS website contains:
  + Contact information to assist you in finding the right person to address your needs
  + Links to safety training offerings (both online and in person)
  + Various EHSS forms and signage
  + Hazard-specific (e.g., biological, chemical, laser, radiation) pages

**COEN Safety Website**

* The [COEN Safety website](http://coen.boisestate.edu/safety/) provides contact information for the COEN safety liaison and BSU EHSS personnel as well as information regarding COEN safety policies and procedures. The COEN Safety website contains information regarding:
  + Emergency response plans (both BSU and COEN)
  + Commonly used forms and documents
  + Chemical management, including chemical ordering, storage, inventory, SDS record keeping, and waste disposal
  + Laboratory safety and hazard mitigation
  + Safety training, including types of training, templates, etc.
  + Calendar of safety-related events

**COEN General Lab Safety Manual**

* The COEN General Lab Safety Manual provides an overview of COEN safety policies and procedures. A copy can be found at the following link.

<https://studylib.net/doc/6628757/coen-general-research-lab-safety-manual-12-2-2015>

* Topics covered in the COEN General Lab Safety Manual include:
  + Emergency Response Guide
  + General Lab Practices
  + Hazard & Risk Mitigation
    - Engineering & Administrative Controls
    - Personal Protective Equipment (PPE)
  + Chemical Emergencies
  + Waste Management