

JHU Civil and Systems Engineering Laboratory Manual



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1. About the Manual

This document provides laboratory safety regulations and policies for the Department of Civil and Systems Engineering at the Johns Hopkins University. It is intended for all of the students, staff, faculty, and visitors that perform experimental research and utilize facilities, equipment, and tools in the JHU CaSE laboratories. The JHU CaSE laboratories in this manual include Undergraduate Models Lab (Latrobe 13) Undergraduate Teaching Lab (Latrobe 14), Structures Lab (Latrobe 15), Thin-Walled Structures Lab (Latrobe 16), and the Soil Mechanics Lab (Latrobe 18).

This manual also presents safety training sessions for equipment and tools that the CaSE department offers. All of the students must participate in the training sessions prior to the use of equipment and tools at the first time. The safety training sessions cover, but are not limited to, drill press, band saw, grinder, soldering tools, measurement tools, power tools, etc.

The laboratory safety agreement form is attached at the end of this manual. Students should sign and date the form upon completion of safety training and then receive the signature of the Staff Lab Manager, their Research Advisor, and the Academic Lab Supervisor. Signed forms should be provided to the Civil and Systems Engineering office which will then grant keycard access to the lab.

Lab access to laboratories in Latrobe 15 and 16 is through Latrobe 5 and then through Latrobe 10/11. Latrobe 11 has appropriate Personal Protection Equipment (PPE), lockers for personal storage, and is also the office of the Staff Lab Manager.

2. The JHU CaSE Laboratories

The Department of Civil and Systems Engineering at the Johns Hopkins University houses the Undergraduate Teaching Lab, Structures Lab, Thin-Walled Structures Lab, and the Soil Mechanics Lab. Contact information for each laboratory is listed in Table 1. For questions about each lab such as research opportunities, contact the lab director.

Table 1. Contact Information for the JHU CE laboratories

Laboratory	Room	Director	Phone	Email
Undergraduate Models Lab	Latrobe 13	Prof. Ben Schafer	(410) 516-6265 (202) 321-7730	schafer@jhu.edu
Teaching Lab	Latrobe 14	Prof. Ben Schafer	(410) 516-6265 (202) 321-7730	schafer@jhu.edu
Structures Lab	Latrobe 15	Prof. Ben Schafer	(410) 516-6265 (202) 321-7730	schafer@jhu.edu
Thin-Walled Structures Lab	Latrobe 16	Prof. Ben Schafer	(410) 516-6265 (202) 321-7730	schafer@jhu.edu
Soil Mechanics Lab	Latrobe 18	Dr. Lucas de Melo	(443) 695-5330	ldemelo@jhu.edu

All JHU CaSE laboratories are located in the north side basement of Latrobe Hall. Figure 1 shows a schematic layout of the JHU CaSE laboratories in Latrobe Hall.

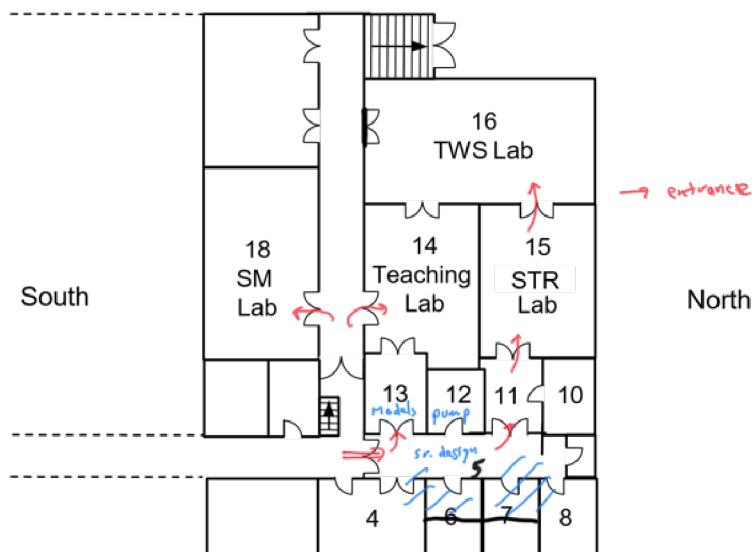


Figure 1. Layout of the JHU CaSE Laboratories in Latrobe Hall (not scaled).

Academic Laboratory Supervisor: Prof. Ben Schafer

Office: Latrobe Hall 105, Phone: (410) 516-6265, Email: schafer@jhu.edu

Staff Laboratory Manager: Kyle Coleman

Office: Latrobe Hall 5b, Phone: (617) 855-9530, Email: kcolem11@jh.edu

The laboratory supervisor oversees the educational and research activities in the JHU CaSE laboratories to ensure the safety and security. The laboratory supervisor also arranges coordination among research groups to facilitate student activities. For general questions, concerns, and requests about the JHU CaSE laboratories including regulations and policies, contact the laboratory supervisor.

The laboratory manager assists design of test setups, preparation of specimens, and installation of instrumentation. The laboratory manager also offers training sessions of equipment and tools. If you are not sure about your work in the lab, consult the laboratory manager.

3. Emergency Contacts

Below is a list of emergency phone numbers.

Contacts	Phone Number
Medical Emergency	911
Fire	911
Ambulance Service	410-516-7777
Sexual Assault Center	410-828-6390
Security Office	410-516-7777
First Aid	410-516-7777
Student Health and Wellness Center	410-516-8270
Safety Office	410-516-8798

4. Safety Regulations

Safety is a primary concern in all of the engineering laboratories. While working in the labs, students must be always cautious of any work and surrounding environment. Follow the safety regulations below to prevent injuries and accidents.

Attire and Protections

- **Basic PPE:** All people in CaSE labs must have eye protection, covered shoes, long pants, and hair tied back (if long). Loose clothing, open-toed shoes such as sandals and heels are explicitly not allowed. These conditions cover all people in the lab: students, faculty, staff and visitors. Anyone not following these regulations will be immediately asked to leave the lab and may have lab privileges revoked.
- **Hand Protection:** Students must wear safety gloves during work that may have any hazard to hands (e.g., lifting heavy or sharp metal pieces). Pairs of gloves can be found at the entrance to the labs and additional task specific gloves may also be in the cabinet at each lab.
- **Head Protection:** Hard hats must be worn in rooms 15 and 16 at all times. Hard hats can be found at the entrance to the labs.
- **Respiratory Protection:** Many activities in the lab can cause dust, smoke or fumes that can be harmful to the lungs and airways. This PPE is easy to ignore, but very dangerous for your health. It is important that the proper type of mask is worn for the appropriate hazard (dust, VOC's, silica, etc). Do you need a mask? Did you select the right kind? Please ask the lab manager. Some masks can be found in the cabinet at each lab.
- **Ear Protection:** For any loud activities in the lab, use ear protection to protect your hearing. When in doubt, use ear protection. Ear plugs can be found in the cabinet at each lab.

Other Regulations

- **Common Sense:** Use common sense to ensure safety of the work in the labs. If you are not sure about the safety of your work or if you are uncomfortable with a task, speak with the lab manager. It is important to always move slow and think through consequence in the lab. There is always a safe way to do things, nothing should be risky.
- **Awareness:** If you observe a potentially dangerous act in the labs, report it to the laboratory supervisor or the laboratory manager. It is also your responsibility to help reduce risks of injuries and accidents in the JHU CaSE laboratories.
- **Electric Power:** Several types of power supply including high voltage and AC/DC power supplies are used for equipment and tools in the JHU CaSE labs. Read specifications of the devices prior to connecting power supplies. Use only the specified power supply. Ask the laboratory manager if you have questions.
- **Hydraulic Power:** Hydraulic systems used for actuators and loading frames are under high pressure. Before starting hydraulic pumps, always check that valves are closed and connections are clean. If leakage is found, stop the pump immediately and notify the laboratory manager.
- **Ventilation:** Do not turn off ventilation fans to keep the air in the labs clean. If extra ventilation is needed (e.g., in case of indoor painting), consult the laboratory manager and arrange the schedule to perform the required work.
- **Lifting and Moving Heavy Items:** When lifting and moving of heavy items are required, extra caution must be taken. Do not move heavy items alone, and the lab manager should always be present. Moving heavy items is one of the leading causes of injury in a research lab.

- **Working with 3D Printers:** Working with resin-based and other 3D printers introduces specific hazards that a student should be aware of. High heat in some cases, toxic resins that must be treated with care in others. Students using the 3D printers must, at a minimum, review the safety information appropriate to their device, for example (https://support.formlabs.com/s/article/Safety-form2?language=en_US) is provided by Formlabs. Please discuss any questions you have with your research supervisor and/or the lab manager.
- **Working with Furnaces:** Care must be taken when working with high temperature furnaces. Appropriate gloves are necessary – always assume the furnace and any nearby materials are hot. The Materials Science department provides basic safety information that you should review. (<https://engineering.jhu.edu/labs/wp-content/uploads/sites/76/2016/04/Furnace-Use-and-Safety.pdf>)

5. Laboratory Policies

To maintain the efficiency of the labs and facilitate coordination of educational and research activities, the JHU CaSE labs enforce policy described below.

General Policy

- **No Food and Drink:** Students are not allowed to eat and drink in the labs.
- **Buddy System:** Whenever possible follow the buddy system and work in teams of 2 or more in the lab. However, all people working in the labs should make sure at least one other person knows they are in the lab at that time. A video system is in place for the laboratory manager to monitor lab usage, but this does not replace a second person with accurate knowledge of your expected time in/out of the lab.
- **Security:** Laboratory doors must be closed at all times for security reasons. If you are the last person to leave the lab, please check if all of the doors are locked.
- **Housekeeping:** Keep the labs neat and clean. Students must clean up equipment, tools and used space, including drill press and band saw. Never leave the mess you made during your work. The last step of any job is to return tools and make the space workable again, this is particularly important given the small space available in the lab.
- **Tools:** Students are allowed to use power and hand tools owned by the department. Here are the locations for common tools.
 - **Power Tools (electric screw drivers, etc.):** Latrobe 10, ask the laboratory manager
 - **Hand Tools (wrenches, etc.):** Latrobe 16
 - **Protection Items (safety glasses, etc.):** Latrobe 10
 - **Spare Materials:** Latrobe 11, ask the laboratory manager

Students must return tools to the original place by the end of the day. It is your responsibility to maintain the departmental tools. To check out equipment and tools, see the below.

- **Disposal:** Hazardous/industrial waste has to be properly handled base on the university rule. Do not throw screws, metal pieces, rags with hydraulic oil, etc., into trash bins. Consult the laboratory manager if you have hazardous waste.
- **Computers:** Personal computers in the labs are maintained by the director of each lab. If you need to access computers, consult the director.
- **Storage:** The JHU CaSE laboratories offers a small amount of storage space for students (to store shoes, long pants etc.). If one needs personal storage space, ask the lab manager, you will be assigned a locker. Note that the laboratory manager is not in charge of student property in the labs.

- **Communication:** It is essential to communicate with the laboratory manager and the other lab users to make the work performed smoothly. Use professional communication skills.
- **Working off Hours:** Working outside of the normal laboratory hours (8-5) is a privilege and is only granted by the laboratory supervisor and lab manager in special circumstances. Students should not assume they have after-hours access. In such cases when access is granted it is particularly important that the work not be hazardous and that the buddy system be maintained. Documentation of after hours access should include a note from the student of the work being performed with confirmation from their research advisor that the work needs to be performed outside of normal hours, followed by approval by the Laboratory Manager and Supervisor.
- **Visitors:** Students are not allowed to bring visitors to the JHU CaSE labs unless the visit is at an assigned time, known by the Laboratory Manager and/or Laboratory Supervisor – or when the Laboratory Manager and/or Laboratory Supervisor is present and has given permission. It is the student's responsibility to ensure the safety of visitors.

6. Annual Cleaning of Laboratories

The major cleaning of the labs occurs annually during the summer in July to coincide with the WSE's (Whiting School of Engineering) annual office and laboratory cleanup. At this time, WSE places dumpsters near buildings to be used for all trash items and provides the labor to remove and dump the trash. The CaSE Laboratory Manager coordinates this activity and is the liaison with WSE's Facilities Manager.

Steps to Prepare for Lab Cleaning:

1. During the spring semester, the PI of each lab will identify non-hazardous items to be removed from their lab and trashed by providing a list to the CaSE Laboratory Manager.
2. The CaSE Laboratory Manager will schedule a meeting with each PI to do a walk-thru to identify the items to be trashed.
3. Labels marked as Trash will be adhered to the items to be removed and placed in the dumpster.
4. The CaSE Laboratory Manager will contact the WSE facilities Manager to coordinate the removal of the items for the dumpster.

Note: For ad hoc cleaning during the year, contact the CaSE Laboratory Manager to coordinate any type of lab cleanup that is needed when projects start and end. The steps outlined above will also be followed for this.

7. Basic Laboratory Training and Safety Videos

The Department of Civil and Systems Engineering at JHU offers a basic training session to students who will perform experimental research. The training session is intended to provide safety instructions of equipment and tools

that students are allowed to use in the JHU CaSE laboratories. The session needs to be requested by the research advisor to the laboratory manager with the types of equipment. The laboratory manager will arrange the schedule and offer the session. The items that can be covered include:

- Screw Gun

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- Band Saw
- Drill press
- Magnetic Drill Press
- Soldering Gun
- Grinder
- Measurement Tools (e.g., Caliper, Dial Gages)

For special equipment such as hydraulic actuators and welding equipment, training and permission will be handled case by case based on the student experience and type of work. Consult the research advisor and the laboratory manager.

While Youtube is not a perfect source it is good practice to always watch videos related to any new tool or procedure you will be performing. For tools, manufacturers also often have operation videos on their websites, it only takes a minute to learn a bit from those who have come before you and to sharpen your own questions. Examples include

Hand tool safety: <https://www.youtube.com/watch?v=ZbOo1PdU0vs>

3D printer safety https://www.youtube.com/results?search_query=3d+printer+safety

Materials handling safety https://www.youtube.com/results?search_query=material+handling+safety

APPENDIX A: LAB SAFETY AGREEMENT FORM

Department of Civil and Systems Engineering at the Johns Hopkins University

I have read, understood, and will comply with regulations and policies outlined in the JHU Civil and Systems Engineering Laboratory Manual. I will take full responsibility for any action while working in the JHU CaSE Laboratories.

STUDENT:

Name (Print) Last _____
First Name (Print)

Signature _____
Date

RESEARCH ADVISOR:

Name (Print) Last _____
First Name (Print)

Signature _____
Date

LAB MANAGER:

Last Name (Print) _____
First Name (Print)

Signature _____
Date

LAB ACADEMIC SUPERVISOR:

Last Name (Print) _____
First Name (Print)

Signature _____
Date