The American Society for Microbiology (ASM)
Guidelines for Biosafety in Teaching and Research Laboratories

Biosafety level 1 (BSL1) guidelines for teaching and research laboratories:

Preamble: Educators need to be aware of the risks inherent in using microorganisms in the laboratory and must use best practices to minimize the risk to students and the community. The following guidelines are designed to encourage awareness of the risks, promote uniformity in best teaching practices, and protect the health and wellness of our students.

Even though organisms manipulated in a BSL1 laboratory pose a low level of risk to the community and are unlikely to cause disease in healthy adults, most of the microorganisms used in the microbiology teaching laboratory are capable of causing an infection given the appropriate circumstances. Many best practices should be adopted to minimize the risk of laboratory acquired infections and to train students in the proper handling of microorganisms. The practices set forth in these guidelines fall into six major categories: personal protection, laboratory physical space, stock cultures, standard laboratory practices, training, and documentation.

Personal Protection Requirements:

- Wear safety goggles or safety glasses when handling liquid cultures, when performing procedures that may create a splash hazard, or when spread plating.
- Wear closed-toe shoes that cover the top of the foot.
- Wear gloves when the student’s hands have fresh cuts or abrasions, when staining microbes, and when handling hazardous chemicals. Gloves are not required for standard laboratory procedures if proper hand hygiene is performed. Proper hand hygiene involves thorough hand cleansing prior to and immediately after finishing handling microorganisms and any time that microbes accidentally contact the skin. Hand cleansing is performed by washing with soap and water or rubbing with an alcohol based hand sanitizer.

Laboratory Physical Space Requirements:

- Nonporous floor, bench tops, chairs, and stools.
- Sink for hand washing.
- Eyewash station.
- Lockable door to the room.
- Follow proper pest control practices.
- Recommended: Keep personal belongings in an area separate from the work area.
- Recommended: Use a working and validated autoclave.

Stock Culture Requirements:

- Only use cultures from authorized, commercial, or reputable sources (e.g., an academic laboratory or state health department). Do not subculture unknown microbes isolated from the
environment because they may be organisms that require BSL2 practices and facilities. If unknown microbes are to be cultured in the lab, adopt BSL2 practices for that project.

- Maintain documents about stock organisms, sources, and handling of stock cultures.
- Obtain fresh stock cultures of microorganisms annually (e.g., purchased, revived from frozen stock cultures, etc.) to be certain of the source culture, minimize spontaneous mutations, and reduce contamination.

**Standard Laboratory Practices:**

- Wash hands after entering and before exiting the laboratory.
- Tie back long hair.
- Do not wear dangling jewelry.
- Disinfect bench before and after the laboratory session with a disinfectant known to kill the organisms handled.
- Use disinfectants according to manufacturer instructions.
- Do not bring food, gum, drinks (including water), or water bottles into the laboratory.
- Do not touch the face, apply cosmetics, adjust contact lenses, or bite nails.
- Do not handle personal items (cosmetics, cell phones, calculators, pens, pencils, etc.) while in the laboratory.
- Do not mouth pipette.
- Label all containers clearly.
- Keep door closed while the laboratory is in session.
- Minimize the use of sharps. Use needles and scalpels according to appropriate guidelines and precautions.
- Use proper transport vessels (test tube racks) for moving cultures in the laboratory, and store vessels containing cultures in a leak-proof container when work with them is complete.
- Use leak-proof containers for storage and transport of infectious materials.
- Arrange for proper (safe) decontamination and disposal of contaminated material (e.g., in a properly maintained and validated autoclave) or arrange for licensed waste removal in accordance with local, state, and federal guidelines.
- Do not handle broken glass with fingers; use a dustpan and broom.
- Notify instructor of all spills or injuries.
- Document all injuries according to university policy.
- Teach, practice, and enforce the proper wearing and use of gloves.
- Advise immune-compromised students (including those who are pregnant or may become pregnant) and students living with or caring for an immune-compromised individual to consult physicians to determine the appropriate level of participation in the laboratory.
- Recommended: Keep note-taking and discussion practices separate from work with hazardous or infectious material.
- Recommended: Use micro-incinerators or disposable loops rather than Bunsen burners.

**Training Practices:**

- Be aware that student assistants employed by the University are subject to OSHA, state, and/or institutional regulations. Student assistants should be trained annually.
• Conduct extensive initial training for students to cover the safety hazards of working in the lab.
• Require students and instructors to handle microorganisms safely and responsibly.
• Inform students of safety precautions relevant to each exercise before beginning the exercise.
• Emphasize to students the importance of reporting accidental spills and exposures.

Documentation:

• Require students to sign safety agreements explaining that they have been informed about safety precautions and the hazardous nature of the organisms they will handle throughout the course.
• Maintain student-signed safety agreements at the institution.
• Document all injuries and spills using the University's Incident Investigation Report.
• Make Safety Data Sheets (SDS) available at all times.
• Post emergency procedures and updated contact information in the laboratory.
• Maintain and make available (e.g., in a syllabus, in a laboratory manual, or online) to all students a list of all cultures (and their sources) used in the course.