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

Biosafety level 2 (BSL2) guidelines for 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.

BSL2 is suitable for organisms that pose moderate individual risk and low community risk for infection. When good microbiological techniques are used, these organisms rarely cause serious disease, and effective treatment for laboratory-acquired infections is available. Best practices must be adopted to minimize the risk of laboratory-acquired infections and to train students in the proper handling of organisms that require BSL2 procedures. Students should always demonstrate proficiency in laboratory techniques using organisms that require BSL1 practices before being allowed to handle organisms that require BSL2 practices. 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 for normal laboratory procedures involving liquid cultures that do not generate a splash hazard (e.g., proper pipetting, spread plates, etc.). Use safety goggles and face shields or safety goggles and masks when performing procedures that may create a splash hazard. If work is performed in a biological safety cabinet, goggles and face shields/masks do not need to be worn.
- Wear closed-toe shoes that cover the top of the foot.
- Wear gloves when handling microorganisms or hazardous chemicals.
- Wear laboratory coats.

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.
- Keep the storage area for personal belongings in an area separate from the work area.
- Use a working and validated autoclave.
- Post biohazard signage
  - Wherever cultures are used and stored.
  - On the door to the room
  - On all containers that are used to transport cultures.
• Use a biological safety cabinet when using large volumes of culture or when a procedure will create aerosols.

**Stock Culture Requirements:**

• Only use cultures from authorized, commercial, or reputable sources (e.g., an academic laboratory or state health department).
• 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.
• Keep stock cultures in a secure area.

**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: 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.
- Require students to demonstrate competency at BSL1 before working in a BSL2 laboratory.
- 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 in the laboratory.
- 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 laboratory.
- Complete and obtain approval of a BSL2 Use Authorization from the Scientific Laboratory Safety Committee.
- Make available a current version of Biosafety in Microbiological and Biomedical Laboratories (BMBL) to laboratory personnel.