1. Advice for Laboratory Directors, Managers, and Faculty Involved with Clinical and Teaching Microbiology Laboratories

1.1 Comprehensive biosafety guidelines for work with Risk Group 2 biohazardous agents can be found in the University of Minnesota’s [Biosafety Manual](#), the CDC/NIH’s [Biosafety in Microbiological and Biomedical Laboratories (BMBL)](#) manual, and NIH’s [Guidelines for Research Involving Recombinant DNA Molecules](#).

1.2 Course directors must apply for approval from the Institutional Biosafety Committee (IBC) for all laboratory-based courses involving recombinant DNA, microbiological agents above Risk Group 1, and biological toxins. Please contact the IBC at ibc@umn.edu if you have any questions regarding IBC approval for use of these procedures or agents in your course.

1.3 Each laboratory should develop or adopt a biosafety or course operations manual, or write a clear Standard Operating Procedure (SOP) that identifies the hazards that will or may be encountered, and that specifies practices and procedures that will be taken to minimize or eliminate the risks of exposure to these hazards for both course staff and students participating in the course (see Appendix 1: Sample SOP template).

1.4 Laboratory staff and all students working in the laboratory must be provided medical surveillance, as appropriate, and offered available immunizations for agents handled or potentially present in the laboratory.

1.5 Either non-pathogenic microorganisms or organisms attenuated in virulence should be used when possible. This practice will help reduce the risk of students and/or their family members becoming ill.

1.6 Staff and students working in the laboratory, and particularly women of childbearing age, should be provided with information regarding immune competence and encourage to self-identify with any conditions that may predispose them to infection. Contact the [Occupational Safety and Health Department](#) for more information.

1.7 A certified Biological Safety Cabinet (BSC) must be used for all work with Risk Group 2 biohazardous agents as well as highly potent toxins handled in powder or solid form that may potentially produce aerosols. If a BSC is not available, a risk assessment must be performed by the faculty member in consultation with the Biological Safety Officer (BSO) to determine if alternate containment and personal protective equipment (PPE) may be used in lieu of a BSC. The risk assessment for work on the bench would take into consideration the organism being used as well as the procedure that will be carried out in order to determine the PPE that would be required.

1.8 A [Biological Decontamination & Spill Clean-up Plan Template](#) and a [Biological Waste Disposal Template](#) must be posted in the laboratory.

1.9 Only instructors and teaching assistants are to manipulate large quantities of infectious agents (>500ml).

1.10 All students and staff using the laboratory must be trained and proficient in biosafety practices and techniques required for handling such agents safely. Students may take on-line training provided by DEHS or be taught these principles in the course of their study. The on-line blood borne pathogen training is required for all instructors and teaching assistants, except for those working solely with recombinant DNA under Section III-F of the NIH Guidelines.

1.11 Ensure that students are instructed on the location and operation of the eyewash/safety showers.

1.12 Ensure that hand washing sinks have soap and paper towels. Require students and employees to wash their hands after handling potentially hazardous material and before leaving the laboratory.

1.13 Ensure that a disinfectant is available on each work bench. It must be effective against the biohazardous agents being handled when used at an appropriate concentration and exposure time.

1.14 Do not allow lab coats to leave the laboratory, except for cleaning by the institution.
Do not allow food, drinks or personal items like car keys, cell phones, laptop computers, tablets or mp3 players to be used while working in the laboratory or placed on laboratory work surfaces.

Teaching activities that involve the release of biohazardous agents into the environment are prohibited.

2. Basic Principles for Students Working in Microbiology Laboratories

2.1 Sound experimental techniques must be used to avoid microbial contamination of:

- You and your immediate colleagues in the laboratory
- Your environment inside and outside of the laboratory
- Your experiments

2.2 Be aware that bacteria used in microbiology laboratories can make you or others who live in your household sick, especially young children and pets, even if they have never visited the laboratory.

2.3 Always wash your hands thoroughly after working with potentially hazardous materials and before leaving the laboratory.

2.4 Leave food, drinks or personal items like car keys, cell phones, laptop computers, tablets or mp3 players outside of the laboratory. These items may become contaminated if you bring them into the laboratory or touch them while working in the laboratory.

2.5 You must wear closed-toe shoes and long pants/skirts in the laboratory in order to protect yourself from accidental spills. Clothing must not drag on the ground.

2.6 Long hair must be tied back at all times when working in the laboratory. Scarves and other loose clothing must be secured under the lab coat.

2.7 Lab coats or other protective garments should be worn over personal clothing when working in all microbiology laboratories; these garments are required when working with Risk Group 2 agents in a Biosafety Level 2 laboratory.

2.8 Remove your protective garment before leaving the laboratory area (e.g. going to the cafeteria, library, or administrative offices). Dispose of protective garment appropriately or deposit it for laundering. Lab coats should be taken out of the laboratory only when they are to be laundered by the institution.

2.9 Gloves must be worn to protect hands from exposure to hazardous materials, which include recombinant DNA, toxic substances, unknown microbial agents, primary isolates and known pathogens.

2.10 Eye and face protection (goggles, mask, face shield or other splatter guard) must be used for anticipated splashes or sprays of infectious or other hazardous materials when these materials are handled outside of the BSC or containment device.

2.11 Mouth pipetting is prohibited.

2.12 Perform all procedures to minimize the creation of splashes and aerosols, even when using a biological safety cabinet.

2.13 Centrifuges should have sealed rotor heads or centrifuge safety cups. If these are not available, the user must wait 10 minutes so that any aerosols may settle before opening the lid of the centrifuge. Rotors and/or sealed containers should be opened in a biological safety cabinet, if one is available. See BioBasics Fact Sheet: Centrifuge Safety.

2.14 Sharps usage must be carefully managed. Needles must not be bent, sheared, broken, recapped, removed from disposable syringes, or otherwise manipulated by hand before disposal. Used disposable needles must be disposed of in an appropriately labeled, leak and puncture resistant container for custodian pick-up.

2.15 Broken glassware must not be handled directly but must be removed using a brush and dustpan, tongs or forceps. Potentially contaminated must be disposed of in an approved sharps container and disposed
of as described in the laboratory’s *Biological Waste Disposal Template*. Contaminated clean-up equipment must be decontaminated per the *Biological Decontamination & Spill Clean-up Plan Template*. Uncontaminated broken glassware may be removed to a dedicated box.

2.16 Clean and disinfect your bench top with an appropriate disinfectant at the recommended concentration and exposure time before and after each laboratory period and after any spill or splash of potentially infectious material.

2.17 Decontaminate all cultures, stocks, and other potentially infectious materials (biohazardous waste) before disposal using an effective method according to the laboratory’s *Biological Waste Disposal Template*. Do not pour waste bacterial cultures into sinks. These should be left in the original containers for disinfection with an appropriate disinfectant or for sterilization by autoclaving prior to disposal.

2.18 Spills involving infectious materials must be contained, decontaminated, and cleaned up by the instructor or laboratory teaching staff.

2.19 Gas burners and incinerators must be turned off when not in use.

2.20 You are not permitted to perform any experimental manipulations unless the faculty member or your teaching assistant is present in the laboratory. You may have access to the laboratory only during your assigned time.

2.21 Report all incidents to the teaching staff immediately (e.g. spills, injuries, equipment failure, etc.)

2.22 Familiarize yourself with the location and operation of eye wash/safety shower.

2.23 Do not work directly on top of your laboratory notebook. The area for culturing and working with biohazardous agents should be as separate as possible from the area for taking notes.

3. **Material Safety Data Sheets (MSDS) and Minnesota Employee Right to Know (MERTKA)**

3.1 As a student, you have a right to know any information about the safety and risks of exposure for any chemical or biological agent used or accessible in the laboratory. Material Safety Data Sheets (MSDS) are available for your review if you have a concern. If you have any questions, feel free to contact the instructor.

Appendix 1: *Sample Microbiology Teaching Lab Standard Operating Procedure Template*