

ASU FACT SHEET

Personal Protective Equipment Requirements for Work with Biological Materials

The Centers for Disease Control (CDC) and the National Institutes of Health (NIH) have established four levels of biosafety, based on the degree of hazard associated with a microbial agent, to describe the combination of laboratory practices and techniques, safety equipment, and facilities needed to protect against exposure. The CDC/NIH document, "[Biosafety in Microbiological and Biomedical Laboratories](#)," or BMBL, outlines four different biological safety levels that are appropriate for the operations performed in a laboratory, the documented or suspected routes of transmission of the biological agent, and the laboratory function or activity. These four biological safety levels (BSL) require successively more stringent practices and facilities as work moves from the least restrictive (BSL-1) to work with the highest hazard level (BSL-4). A brief summary of each biological safety level is provided below:

- **BSL-1:** Required for work involving well-characterized agents not known to consistently cause disease in immunocompetent adult humans, and present minimal potential hazard to laboratory personnel and the environment.
- **BSL-2:** Required for work involving agents that pose moderate hazards to personnel and the environment.
- **BSL-3:** Required for clinical, diagnostic, teaching, research and production facilities where work is performed with indigenous or exotic agents that may cause serious or potentially lethal disease through the inhalation route of exposure.
- **BSL-4:** Required for work with dangerous and exotic agents that pose a high individual risk of aerosol-transmitted laboratory infections and life-threatening disease that is frequently fatal, for which there are no vaccines or treatments, or a related agent with unknown risk of transmission.

Personal protective equipment varies depending upon the biological safety level. Please refer to the table below for specific requirements for each of the four biological safety levels.

Biological Safety - Personal Protective Equipment (PPE) Requirements*			
BSL-1	BSL-2	BSL-3	BSL-4
<ul style="list-style-type: none"> • Protective laboratory coats, gowns, or uniforms recommended to prevent contamination of personal clothing. • Protective eyewear worn when conducting procedures that have the potential to create splashes of microorganisms or other hazardous materials. • Personnel who wear contact lenses in laboratories should also wear eye protection. • Gloves must be worn to protect hands from exposure to hazardous materials. 	<ul style="list-style-type: none"> • Protective laboratory coats, gowns, smocks, or uniforms must be worn while working with hazardous materials. • 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 the microorganisms are handled outside the Biological Safety Cabinet (BSC) or physical containment device. • Personnel who wear contact lenses in laboratories should also wear eye protection. • Gloves must be worn to protect hands from exposure to hazardous materials. • Eye, face and respiratory protection should be used in rooms containing infected animals. 	<ul style="list-style-type: none"> • Protective laboratory clothing with a solid-front, such as tie-back or wrap-around gowns, scrub suits, or coveralls must be worn. • Eye and face protection (goggles, mask, face shield or other splash guard) must be used for anticipated splashes or sprays of infectious or other hazardous materials. [All procedures involving the manipulation of infectious materials must be conducted within a BSC, or other physical containment devices.] • Personnel who wear contact lenses in laboratories must also wear eye protection. • Gloves must be worn to protect hands from exposure to hazardous materials. • Eye, face, and respiratory protection must be used in rooms containing infected animals. 	<ul style="list-style-type: none"> • Not permitted at ASU. • Please refer to the CDC/NIH document, "Biosafety in Microbiological and Biomedical Laboratories" for more information.

* Safety is improved when PPE is used in combination with physical containment devices or equipment, such as Biological Safety Cabinets (BSCs).