

THE UNIVERSITY OF
MEMPHIS®

Laser Safety Program

Notice to Users

This Laser Safety Program was approved by The University of Memphis Radiation Safety Committee on December 17, 2014. It represents official University policy with regard to laser safety.

Copies of this program and the American National Standard for Safe Use of Lasers, Z136.1, are available for viewing during regular business hours in the Environmental Health and Safety Office, 216 Browning Hall, Memphis, Tennessee.

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Laser Safety Program

This Laser Safety Program is designed to ensure the safe use of lasers by University personnel. All University personnel, including faculty, staff, and students, are expected to implement these prudent practices, precautions, and operating techniques for lasers as a means of promoting a safe and healthful environment for the University community.

Compliance Requirements

American National Standard for Safe Use of Lasers, Z136.1-2014, is hereby incorporated by reference into the requirements of this program. University personnel who design, construct, use, possess, or maintain lasers and laser systems shall comply with ANSI Z136.1-2014.

Responsibilities

The President of The University of Memphis has ultimate responsibility for laser safety within the University and, with other administrators, chairs, and directors, provides continuing support for the University's Laser Safety Program.

Laser Safety Officer

The University Laser Safety Officer (LSO) is appointed by the Vice President for Research and is responsible for monitoring laser use and safety. The LSO is authorized to conduct unannounced inspections and may require termination of any activity determined to create imminent danger to personnel or facilities. Departments possessing Class 3B and 4 lasers should have a departmental LSO, appointed by the department chair, who will work closely with the University LSO and departmental personnel.

Environmental Health & Safety Office

Environmental Health and Safety (EH&S) maintains inventories of lasers, makes available training materials on laser safety, provides consultation, and issues and maintains this Laser Safety Program.

Department Chairs and Directors

Department chairs and directors are responsible for general oversight of the laser safety efforts within their respective areas, including:

- Ensuring that a copy of ANSI Z136.1-2014 is available to department personnel
- Ensuring that risks are evaluated and appropriate protective measures implemented
- Ensuring that standard operating procedures (SOPs) are prepared and implemented
- Ensuring that all Class 3B and 4 lasers are registered with EH&S
- Implementing an information and training program for all individuals reasonably anticipated to be exposed to laser hazards
- Maintaining records, including but not limited to training records and hazard assessments
- Ensuring that appropriate medical surveillance is implemented
- Coordinating laser and laser system purchases with the LSO
- Appointing a departmental LSO

Faculty and Supervisors

These individuals have overall direct responsibility for laser safety in their work areas, including:

- Assessing risks associated with laser use in their work areas and determining appropriate requirements for protective apparel and equipment
- Implementing and enforcing the safety requirements outlined in this program
- Developing, maintaining, and implementing SOPs for the laser(s) used in the work area
- Providing laser operators with training in operating, administrative, and alignment procedures
- Ensuring that all lasers in the work area are properly classified and labeled
- Ensuring that the proper signs are posted at work area entrances
- Registering all Class 3B and 4 lasers with EH&S
- Ensuring that appropriate personal protective equipment is available and used
- Providing regular safety and housekeeping inspections, including inspection of emergency equipment
- Ensuring that facilities and equipment are adequate and functioning properly
- Ensuring prior approval of hazardous operations
- Initiating and following up on actions to eliminate hazards and/or unsafe conditions within their work areas
- Coordinating design, construction, modification, and installation of all Class 3B and Class 4 lasers and laser systems with the LSO
- Reporting accidents and near misses to EH&S

Non-supervisory Personnel

These individuals shall be responsible for the following:

- Following laboratory SOPs
- Seeking prior approval from their supervisors for any departure from the SOPs
- Notifying their supervisor in the event of an exposure incident
- Attending laser safety training
- Planning and conducting operations in accordance with this Laser Safety Program
- Complying with all rules, regulations, and University policies pursuant to occupational safety and health standards
- Wearing prescribed personal protective equipment
- Reporting unsafe conditions and practices to their supervisor
- Stopping work activities if an imminent danger exists, any change in the scope of work occurs that could significantly impact worker health and safety and/or the environment, significant new hazards are identified, existing hazards cannot be controlled, and/or work conditions change so as to potentially impact worker health and safety or the environment

Laser Classification

Lasers and laser systems are classified based on their capacity for injuring personnel. Lasers manufactured after August 1, 1976, are classified and labeled by the manufacturer. Lasers and laser systems that are constructed or modified in the laboratory shall be classified by the Principal Investigator. Classes of lasers include the following:

- **Class 1** lasers and laser systems do not emit accessible levels of radiation capable of causing eye injury under normal operating conditions. Class 1 lasers are exempt from most

control measures and from registration with EH&S. (A more hazardous laser that is not accessible during normal operating conditions may be embedded in a Class 1 product.)

- **Class 1M** lasers and laser systems do not emit levels of radiation capable of causing eye injury unless the beam is viewed with an optical instrument, such as an eye-loupe or a telescope. These lasers are exempt from most control measures other than preventing potentially hazardous optically aided viewing; they are exempt from registration with EH&S.
- **Class 2** lasers and laser systems are visible light lasers that are incapable of causing eye injury unless intentionally viewed directly for an extended period. The normal aversion response to bright light (blinking) protects the eye from a momentary exposure. These lasers are exempt from registration with EH&S.
- **Class 2M** lasers and laser systems do not emit levels of radiation capable of causing eye injury unless the beam is viewed with an optical aid, such as an eye-loupe or a telescope. These lasers are exempt from most control measures, and they are also exempt from registration with EH&S.
- **Class 3R** lasers and laser systems, while generally not posing a serious eye hazard unless viewed through optical instruments, may present an eye hazard from direct or specular viewing if the eye is focused and unmoving. Registration with EH&S is not required.
- **Class 3B** lasers and laser systems pose immediate eye and skin hazards from exposure to the direct beam; specular reflections may pose an eye hazard. These lasers do not normally pose risk of fire, diffuse reflection injury, or laser generated air contaminants. Registration with EH&S is required.
- **Class 4** lasers and laser systems pose a serious eye hazard from viewing the direct beam, specular reflections, and diffuse reflections. Class 4 lasers and laser systems also pose skin hazards, fire hazards, and may produce laser generated air contaminants. Registration with EH&S is required.

Information and Training

It is the responsibility of each department chair or director to, where applicable, implement an information and training program to assure that all individuals at risk are trained at the time of initial assignment to the laser work area, prior to assignments involving new exposure situations, and at regular intervals as determined by the work area supervisor. Training should be a continuing activity rather than an annual event.

All personnel designing, constructing, maintaining, operating, or in the immediate vicinity of a Class 3B or Class 4 laser or laser system shall receive appropriate training. Personnel determined to be at risk from Classes 1M, 2, 2M, or 3R lasers or laser systems should receive appropriate awareness-level training. All training shall include discussion of hazards associated with the class and kind of laser to which personnel will be exposed, measures personnel can take to protect themselves and others from these hazards, signs and symptoms associated with exposure to laser radiation and associated hazards, and location and availability of reference material on laser safety.

Training shall be documented by the person providing the training, with records maintained by the department of the trained personnel or, if the trainer was from a different department, by the trainer's department. All personnel serving as LSOs shall receive formal training appropriate for the level of hazards being overseen.

Exposure Incidents and Medical Services

Timely medical attention shall be sought in the event of an obvious or suspected injury from exposure to laser radiation. Employees with eye injuries resulting from exposure to laser radiation in the retinal hazard region shall be examined by an ophthalmologist. Medical surveillance should be considered for employees known to be at risk due to exposure to laser radiation from Class 3B or Class 4 lasers and laser systems.

Employees injured on the job must utilize one of the medical providers authorized by the State of Tennessee under its Workers' Compensation program. Employees should contact the Benefits Section of Human Resources for additional information. Laboratory supervisors are encouraged to post information on the location of nearest approved medical services providers for quick reference. Student Health Services does not treat employees injured on the job. All laser-related illnesses and injuries shall be reported to EH&S for investigation.

Laser Hazard Evaluation

A laser hazard evaluation shall be performed to identify all hazards associated with a laser or laser system and to determine the necessary control measures. The LSO can provide assistance in performing the hazard evaluation. A hazard evaluation must take into account the following aspects:

- The laser or laser system's capability of injuring personnel
- The environment in which the laser is used
- The personnel who may use or be exposed to the laser radiation

These aspects shall include evaluation of potential electrical hazards, laser-generated air contaminants, collateral and plasma radiation, fire hazards, explosion hazards, compressed gas hazards, laser dyes and solvents, and noise.

Hazard Mitigation

See American National Standard Z136.1-2014 for guidance or contact the LSO.

On-line Appendices

[Laser warning sign examples](#)