FAYETTEVILLE STATE UNIVERSITY

LASER SAFETY PROGRAM

ENVIRONMENTAL HEALTH AND SAFETY

J. Daniel Core & Andrea Cortez
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Contents

1. Purpose

The purpose of this plan is to establish clear and consistent procedures for the safe use of lasers in research and instructional laboratories at Fayetteville State University.

The recognized standard and primary guidance for laser hazards is the American National Standard for Safe Use of Lasers (ANSI Z136.1).

2. Scope

The contents of this manual apply to all University faculty, staff, students and visitors, who work directly with or around Class 3B and Class 4 lasers and laser systems at official FSU facilities.

3. Responsibilities

3.1. Laser Safety Officer (LSO)

The LSO has the authority to authorize, suspend, and specify conditions of use of all lasers at facilities and areas. The LSO shall be responsible for the following:

a) Laser safety program development and oversight.
b) Maintain registrations for Class 3B or Class 4 laser or laser systems.
c) Classify or confirm classifications of lasers or laser systems.
d) Maintain inventory for all laser classes.
e) Approve and/or perform hazard evaluations for all class 3B and 4 lasers, laser systems and laser-controlled areas.
f) Approve and/or specify control measures for all class 3B and 4 lasers, laser systems and conduct periodic reviews of the LSP
g) Develop and conduct laser safety surveys/inspection in laser-controlled areas.
h) Review standard operating procedures (SOPs), signs, and labels.
i) Review safety training and maintain program records.
j) Investigate laser incidents.
k) Conduct biannual inspections of lasers/laser systems or after maintenance/installation.

The LSO may appoint a Laser Safety Supervisor (LSS) and may delegate duties to the LSS in accordance with ANSI Z136.1.

3.2. Laser Safety Supervisor (LSS)

The LSS shall maintain the Laser Safety Program for assigned laser use areas and may call on the

LSO for assistance as needed. Duties include, however are not limited to:

a) Supervise the use of lasers under their authority.
b) Maintain an inventory for all lasers under their authority.
c) Monitor 3B and 4 lasers and laser system.
d) Immediately report any accident, eye exposure, or suspected eye exposure to the LSO.

e) Report any safety concerns to the PI or LSO.

3.3. Principal Investigator (PI)

The Principal Investigator (PI) shall be designated for each class 3B and 4 lasers. The PI shall have the responsibility and authority to ensure laser safety compliance for their personnel and equipment. The PI shall:

a) Register each Class 3B and Class 4 laser and laser systems with the LSO.
b) Maintain proper classification of all lasers and laser systems under their authority.
c) Maintain an inventory for all lasers and laser systems under their authority.
d) Identify all laser hazards and implement all appropriate hazard controls. Correct any unsafe or non-compliant conditions in the laboratory.
e) Identify all personnel who may operate, maintain, or work in close proximity to lasers and ensure training is completed at intervals specified by the LSP and maintains records of completion dates.
f) Provide appropriate safety training to laser users under their authority.
g) Ensure maintenance is conducted at proper intervals to keep lasers in safe working order.
h) Generate SOPs for Class 3B and Class 4 laser and laser systems use, alignment, and laser specific training and submit that to LSO.
i) Ensure approved SOPs are available to laser users and followed.
j) Implement approved control measures for all 3B and 4 lasers, laser systems.
k) Maintain a copy of this written program in the workplace.
l) Immediately report any accident, eye exposure, or suspected eye exposure to the LSO.
m) Report any safety concerns to the LSO.
n) Report any major changes in laser operations to LSO (i.e: changes in laser set up/layout and laser location).

3.4. Laser User (LU)

A LU is a person who works with Class 3B and Class 4 lasers and laser systems (including embedded lasers). The general responsibilities of a LU include, however are not limited to:

a) Complete all appropriate laser safety training.
b) Read, understand, and comply with lab specific laser standard operating procedures (SOPs).
c) Wear appropriate Personal Protective Equipment (PPE).
d) Immediately report any accident, eye exposure, or suspected eye exposure to the PI or LSS.
e) Report any safety concerns to the PI or LSS.

4. Laser Classification

4.1. Class 1

a) Understood to be a non-hazardous source during usage intended by manufacturer.

b) Not intended to be monitored by this LSP:
    a. No surveillance or audits; and
    b. No control measures for usage.

4.2. Class 1M

a) A Class 1 system that may become hazardous if viewed with an opticalinstrument.
b) Not intended to be monitored by this LSP:
    a. No surveillance or audits; and
    b. Control measures – ensure no optically aided viewing.

4.3. Class 2

a) A laser with power less than or equal to 1 milliwatt.
b) A laser within the visual spectrum (400 nanometers – 700 nanometers).
c) Not intended to be monitored by this LSP:
    a. No surveillance or audits; and
    b. Control measures – understood that the natural aversion response is sufficient to protect the eyes from damage.

4.4. Class 2M

a) A Class 2 system that may become hazardous if viewed with an optical instrument.
b) Not intended to be monitored by this LSP:
    a. No surveillance or audits; and
    b. Control measures – ensure no optically aided viewing.

4.5. Class 3R

a) A laser with power less than 5 milliwatts.
b) May be dangerous from both direct viewing and specular reflections if natural aversion responses are not functioning properly.
c) Not intended to be monitored by this LSP:
    1. No surveillance or audits; and
    2. Control measures – ensure no optically aided viewing, avoid direct viewing of the beam or its specular reflection, and avoid unattended operation where the beam is directed into a location where it can be directly viewed by the public or personnel uninformed about the hazards.

4.6. Class 3B

a) A laser with power less than or equal to 0.5 watts.
b) May be dangerous from both direct viewing and specular reflections.
c) Not a fire hazard.
d) Intended to be monitored by this LSP:
    a. Minimum of an annual survey for compliance to the LSP; and

b. Control measures – See section V: Laser Hazard Control Measures for more detailed information regarding specific control measures.

4.7. Class 4

a) A laser with power that exceeds a Class 3B.
b) Hazardous to both eyes and skin when beam makes direct contact or from specular reflection; may pose a hazard from diffuse reflection.
c) May be a fire hazard.
d) Intended to be monitored by this LSP:
    i. Minimum of an annual survey for compliance to the LSP; and
    ii. Control measures

5. Training & Inspection Forms

The following forms are to be completed and submitted to Laser Safety Officer before use of lasers or laser systems in compliant with ANSI Z136.1.

5.1. Laser Safety Training

Laser Safety Training

Fayetteville State University
1200 Murchison Rd, Fayetteville, North Carolina

Trainee Name: _____
Laser System ID: _____
Trainer Name: _____
Email / Phone: _____
Department: _____
Building/Room #: _____

Training Component	Completed (Y/N)	Date	Initials
1. Laser Fundamentals (Wavelengths, Classifications)			
2. Bioeffects of Laser Exposure (Eyes & Skin)			
3. Beam & Non-Beam Hazards (Electrical, Chemical)			
4. Control Measures (Engineering & Administrative)			
5. Personal Protective Equipment (PPE) Requirements			
6. Alignment Procedures and Safe Practices			
7. Emergency Procedures (Exposure, Fire, etc.)			
8. Signage, Labeling, and Entry Controls			
9. Laser Classification and MPE Concepts			
10. Operating Procedures and SOP Familiarization			
11. Responsibilities of Laser Operator & LSO			
12. Regulatory & ANSI Z136.1 Overview			
13. Hands-on Training/Walkthrough			
14. Assessment/Quiz Score (if applicable)			

ANSI Z136.1 Compliant — Class 3B and Class 4 Lasers

Trainee Signature: _____
Trainer's Signature: _____ **Date:** ___ / ___ / _____

5.2. Laser Safety Inspection Form

Laser Safety Inspection Checklist
Fayetteville State University
1200 Murchison Rd, Fayetteville, North Carolina

Department: _____ **Building:** _____
Lab Number: _____ **Inspector:** _____
Inspection Date: ___ / ___ / _____ **Re-inspection Date:** ___ / ___ / _____

Rating:
✓ = Compliant ✗ = Non-Compliant **N/A** = Not Applicable

Inspection Area	(✓/✗/N/A)	Notes
Laser classification label is present & legible		
Laser warning signage posted at entrances		
Entryway controls installed (key, interlock)		
Beam is terminated within controlled area		
Laser path is enclosed where possible		
Appropriate PPE available (laser eyewear rated for wavelength & OD)		
Eyewear is inspected and in good condition		
Area is free of reflective surfaces		
SOP available and followed		
Emergency shutdown clearly marked and accessible		
Warning lights/indicators operational		
Alignment procedures use low-power mode		
Beam stop/attenuator used when not in use		
Non-beam hazards controlled (electrical, fumes)		
Fire extinguisher accessible and inspected		
Laser secured from unauthorized use		
Personnel trained and documented		
Regular audits or inspections conducted		

For Class 3B and Class 4 Laser Systems – ANSI Z136.1 Compliant

Additional Comments:

_____

_____

Inspector's Signature: _____ **Date:** ___ / ___ / _____

Corrective Actions Required? ☐ **Yes** ☐ **No**
Follow-up Assignee: _____ **Due Date:** ___ / ___ / _____