Laser Use Registration *Application* (L.U.R.)

Instructions:
- Please complete a separate LUR application for each laser >5 mW (Class 3b or Class 4 laser).
- Forward the completed application to the Laser Safety Officer (Linda Vadura) c/o of the COSE Dean's Office.
- Do not operate your new laser until the Non-Ionizing Radiation Committee (NIRC) has reviewed and approved your application.

Part I Registration Details

A. Contact Information

Name of Responsible Person(s):

*(Principal Investigator/Lab Supervisor)-**Primary***

Name of Responsible Person(s):

Secondary Contact (if any)

Dept:

Telephone:

Email:

B. Background Information

Laser will be in which building?

Thornton Hall Hensill Hall Science Bldg

Room #

What is the primary use of the laser?

Teaching Research

Briefly describe how the laser will be used:

C. Laser Information

Type of Laser

Make & Model

Serial No.

Laser Classification

☐ Class IIIb 5mW-500 mW (< 125mJ pulsed)

☐ Class IV > 500 mW

Beam Diameter at Aperture mm

Beam Divergence mrad

Wavelength(s)

nm

nm

nm

Continuous Wave

Maximum Operating Power W

Average Operating Power W

OR

Pulsed Wave

Pulse Duration nsec

Maximum Pulse Frequency Hz

Pulse Energy Hz

Average Pulse Frequency Hz

Please check all items that apply to your operation:

- ☐ Invisible Beam
- ☐ High Voltage (660V)
- ☐ Laser Modification
- ☐ Exposed Beam Path
- ☐ Beam Focusing Optics
- ☐ Laser Cutting/Welding
- ☐ Frequency-doubling Crystal
- ☐ Cryogenic Liquids
- ☐ Compressed Gases
- ☐ Tunable Laser
- ☐ Dye Laser
- ☐ SFSU Fabricated Laser

For Office Use Only

Received by LSO on _____ Date

Approved by NIRC on _____ Date

Part II –Hazard Assessment and Safe Practices

A. Security and Access Controls

Goal: Preventing unauthorized or accidental access to the laser system.

1. Describe the engineering or administrative controls you will have in place to prevent skin or eye contact with the laser beam(s) during adjustment or maintenance.

2. How will you prevent unauthorized users from entering the control area? How will you protect visitors, custodians or other "civilians" when the laser is operating?

GOAL: Preventing the laser beam from making contact with a person's eye, skin or clothing

1. Describe your interlocks or other engineering controls. If none, explain your alternative method.

B. Personal Protective Equipment

When will you require laser users to wear eye protection?			What wavelength(s) are you protecting against?	What is the expected duration of exposure?
While using the laser?	☐ NO	☐ YES	785	
During alignment?	☐ NO	☐ YES		
During maintenance?	☐ NO	☐ YES		

Brand and Model of Eyewear

Rated wavelengths:

If no eye protection will be required, please explain.

Part III –Diagram of Laser/Laser System Setup

Show location of beam stops, interlocks, shielding, mirrors and other relevant details or attach drawing.

Part IV Administrative

A. Safe Operating Procedures (SOP)

1. Please attach a written procedure for each of the following tasks:

- ☑ Alignment
- ☑ Maintenance or Adjustment (include lockout instructions)
- ☑ Laser startup/shutdown
- ☐ Other: _____ (Optional)

Once you have assessed the hazards in your operation, you must go on to the next step: writing operating procedures that all laser users under your supervision must follow. Review the General Laser Operating Guidelines in the Laser Safety Manual

When writing your procedures, please take into consideration the hazard assessment and protective measures and common laser lab hazards reviewed in this section. For more guidance, the General Laser Operating Guidelines, in the Laser Safety Manual, offer a good description of the basics involved in using lasers.

B. Administrative Checklist

- ☑ • Copy of completed Laser Safety Plan and LUR package
- ☐ • Laser system labeled with class, wavelength and hazard information
- ☐ • Appropriate warning signs (per ANSI Z136.1-2000) posted
- ☐ • Written alignment, start up and shut down procedures posted
- ☐ • List of authorized laser users for current year is posted
- ☐ • Laser users have received their basic laser safety orientation and baseline laser eye exams
- ☐ • Eye protection for wavelength(s) of laser available
- ☐ • Training documentation on file for laser users in lab-specific practices

C. Administrative Signatures and Approvals

_____ _____
Signature of Principal Investigator or Lab Manager **Date Submitted to LSO**

_____ _____
Signature of 2nd Principal Investigator or Lab Manager *(if applicable)* **Date Submitted to LSO**

For Official NIRC Use Only

- ☐ **LUR APPROVED** as submitted
- ☐ **LUR NOT APPROVED** as submitted Changes required: _____

Comments: _____

_____ _____
Signature of Laser Safety Officer **Date**

Appendix: Hazard Assessment Guide

Evaluating a work operation for operational efficiency and potential safety hazards is one of the basic responsibilities of a lab manager and, in fact, is a basic component of Cal-OSHA's required Illness and Injury Prevention Program. Performing a hazard assessment to identify work hazards is essential to creating a safe work area. Before you can minimize risks, you need to know what the risks are. The chart below summarizes hazards and protective measures common to laser operations.

1. Example of a hazard assessment

Common Laser Beam Hazards	Indirect Laser Hazards	Protective measures that minimize risk of injury
Beam crossing a pathway Invisible beams (infrared, ultraviolet) Person leaning across a beam path Contact from escaping beams ▪ *Damaged or burned clothing* ▪ *Burned or damaged skin or eyes* ▪ *Escaping beam causing combustible materials to burn – fire hazard* ▪ *Damage to walls and equipment* **Direct or reflected viewing of beam** ▪ *flash blindness* ▪ *temporary vision loss* ▪ *damaged cornea* ▪ *burned retina*	**Reflective surfaces** ▪ Jewelry ▪ Mirrors ▪ Shiny metal objects **Toxic or pressurized chemicals** ▪ Off-gassing of dyes and chemicals ▪ Hazardous chemical exposure ▪ Compressed gases ▪ Cryogenic fluids ▪ Explosion of high pressure lamps **Electrical** ▪ High voltage ▪ Electric shocks ▪ Electrical fires	▪ Securing beam stops ▪ Shielding to contain stray beams ▪ Using low power alignment lasers ▪ Restricting access ▪ Wearing eye protection ▪ Warning signs clearly posted ▪ Mapping the beam path(s) ▪ Removing jewelry ▪ Using interlocks ▪ Training ▪ Locking out during maintenance ▪ Using lowest practical power ▪ Consistently enforcing safe practices

2. Note commonly observed unsafe practices that cause <u>preventable</u> laser accidents:

- Not wearing protective eye wear during alignment
- Misaligned optics and upwardly directed beams
- Malfunctioning equipment
- Improperly handling high voltage components of the laser system
- Lack of consideration for non-beam hazards – electric shock is the main cause of serious injury and death
- Bypassing interlocks and housing on doors and laser
- Turning on the power supply accidentally – not following required lockout procedures
- Wearing the wrong eye wear for the laser being used
- Operating unfamiliar equipment – lack of training and awareness of risks
- Intentionally exposing unprotected personnel – horseplay

3. Example of an SOP for alignment with included hazard assessment

Laser users can prevent laser-related accidents. According to the LSO at Lawrence Berkeley National Laboratory, 60% of laser accidents in research settings occur during the alignment process.

Task: Alignment

Potential Hazards	Protective Measures	SAMPLE: Alignment Procedures
1. Beam hitting an eye 2. Beam hitting flammable or combustible materials 3. Injury to visitors 4. Beam escaping confines of the optics table	▪ Isolate the area during alignment ▪ Choose the correct eye wear ▪ Wear the provided eye wear ▪ Mark the back side of each beam stop ▪ Double-check beam stop locations ▪ Use the lowest practical power setting ▪ Take off jewelry ▪ Set beam paths below eye level of people working in the area ▪ Clearly mark any beam directed out of a horizontal plane ▪ Don't allow unauthorized or unnecessary people in the room during alignments	1. Put up a shielding curtain. 2. Make sure warning sign "*Keep Out. Alignment in progress*" is visible. 3. Put on the orange UVEX laser goggles. 4. Check beam stop locations and secure them. 5. Power up the system. 6. Take the He-Ne alignment laser and align the beam as required. 7. Identify and terminate each and every stray beam coming from any optical component moved. 8. Make sure beam paths are at a safe working height below the eye level of the user(s) before you leave.