Manufacturer:	Manufacturer	**Model:**	Model Number	**Serial Number:**	Serial Number
Type:	Type	**Max. Power:**	Maximum Power	**Class**	Class
Laser Location:	Location				
Emergency Contact	Full name (extension or phone number)			**Last Update:**	Last date reviewed and posted

INSTRUCTIONS

The following document is an example of an SOP: you can populate this example for your laser if you do not wish to create your own. Remember that an SOP simply documents steps taken every day to perform a task (and does not have to be fancy). It should be accurate, easy to access, and contain locations for additional information, if needed.

Replace or remove text in grey italics (if replaced, change font colour to black). The grey text explains the rationale or content for populating the SOP. Delete this introduction as well.

I have organized this guideline to start with the daily, normal operating procedures followed by emergency procedures since these two lists are most common. This organization allows for these two pages to be copied and attached to the lasers, if necessary, to provide laboratory personnel a handy guide.

Ensure the latest procedures are always posted by using the Last Updated field above to verify versions.

This Standard Operating Procedure (SOP) was developed as a standard for safe practices while utilizing the laser system. This SOP shall address specific safety considerations during normal operations, emergencies, beam alignment (servicing) and any non-beam hazards that might exist. This SOP does not take the place of specific laser safety training associated with this laser system, nor the Laser Safety Training offered by the Office of Risk Management.

Periodic reviews of these procedures shall be made with the effective date noted in the header. Ask staff if they recommend changes as part of the review process.

Laser System Characteristics

Wavelength:	*Enter ranges (nm); visible or invisible?*	**Beam Diameter:**	*Enter 1/e at laser aperture*
Pulse width:	*Enter operating value, if applicable*	**Rep. Rate:**	*Maximum if pulsed, else CW*

Required Goggle OD:	*List ODs for all wavelengths (ex: 532 nm: 5+; 800 nm: 7+) – model number, if applicable*
Storage Location:	*Indicate where these goggles can be found*
Additional PPE	

Operation of this system is restricted to authorized and trained users as indicated on the reverse side of the University of Ottawa Laser Emitting Device Permit. This permit is located write out posted permit locations here.

Start-Up Procedure

Standard start-up sequence of the laser, usually from the manufacturer with additional comments that may pertain to the specific implementation of the system in the lab and/or in conjunction with the experimental protocol. If you keep a lab book that tracks the daily operation of the laser, and the procedure is written permanently there, you can indicate that here.

1.

Shutdown Procedure

Standard shut down sequence of the laser, usually from the manufacturer with additional comments that may pertain to the specific implementation of the system in the lab and/or in conjunction with the experimental protocol. If you keep a lab book that tracks the daily operation of the laser, and the procedure is written permanently there, you can indicate that here.

1.

Manufacturer:	Manufacturer	**Model:**	Model Number	**Serial Number:**	Serial Number
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Location of Important Documents

Laser Manual:	**Safety Data Sheets:**
Accident Forms:	**Training Documentation:**

Laser Emergency Shut Down Procedure

The purpose of the emergency procedure is to determine if the laser can be safely contained or safely shutdown without damaging the equipment in an emergency situation. The procedure could be a single step, such as engaging an emergency stop button. If a lengthy shutdown procedure is required, a procedure is needed, or protocol documented, to ensure that the beam is safely contained and will not present a further hazard during the emergency or to emergency response personnel that may need to access the laboratory.

All efforts should be made to set up a single step safe shutdown of the system so that laser operators can rapidly exit the area while ensuring that the laser hazard is minimized or non-existent.

1.

Emergency Procedures

List all emergency procedures specific to the laboratory (ex: laser shut down, spills, etc.) Include procedures for evacuations, location of posted emergency procedures, location of safety equipment, safety showers, eyewash stations, extinguishers, etc.).

Other Emergency Procedures

Replace this title with the specific procedure listed below and repeat this process for all procedures detailed in this SOP.

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Laser Goggle Calculation

Show how the necessary goggle OD was calculated, including any resources needed to verify the calculation. A well-worked out example for this laser can serve as a training exercise for your students.

MPE:	*Enter value from ANSI*	**Exposure Time:**	*Enter time in seconds*

Laser Training Protocol

For new users of the system, list the steps an authorized and fully trained individual must communicate and demonstrate to fully inform the new user of all protocols and hazards associated with this system. Include interim training as well. If this list is the same across many systems, consider removing it from this document and putting into its own document title Laser Training Procedures and simply indicate below where this "training manual" can be found.

1. Ensure trainee has completed a new user registration form and perform in-lab training;
2. Have the trainee document, in short form and in their own words, their training in the specific fields on the form;
3. Verify that the new user has attended or will attend the 3 hour Principles of Laser Safety course provided by the Office of Risk Management (ORM) at the University of Ottawa. This requirement can be fulfilled by reviewing the permit for this system, seeing a copy of the trainee's certificate provided by ORM upon successful completion of the course, or in writing by the Laser Compliance Specialist that the training was completed;
4. Sign and have the form sent to ORM;
5. Provide these SOPs to the user and indicate all areas where they can be accessed, including written and electronic formats;
6. Communicate who is currently authorized to use the system, the lab designate and/or the principal investigator on the permit, and who to contact in case of an emergency including where the contact information can be located;
7. Demonstrate all emergency protocols associated with the laser system and all the safety features;
8. Demonstrate … *(activities specifically related to the safe operation of the laser: PPE, alignment, start-up, shut down, operation of the laser, experimental protocols);*

Other training protocols that you may wish to include in your list (edit the content to be specific to your system/lab):

1. Intrabeam viewing is prohibited. *Indicate what viewing methods are used to align the beam (fluorescent paper, IR cameras, CCDs, etc.);*
2. Use low power alignment lasers where possible (especially for high power lasers that do not have a low setting and invisible lasers), or the lowest power settings (and how to set the laser to low power);
3. Align laser beams to new experiments with two beam blocks between mirrors to control reflections.

Laser Beam Alignment

These steps should indicate how to align this laser to an experiment. For example, using a different low power laser, or how to set the current laser to a lower power and indicate that power setting here. If the laser is set up for one particular experiment, for example to a microscope, these steps may be about verifying that the laser is well-aligned. For general setups, you may have cameras, specific beam viewing cards, or apertures that need to be verified before proceeding.

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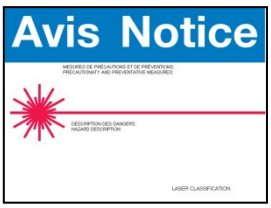
Laser beam alignment is a laser repair/internal optimization activity. Usually this procedure changes the wavelength conditions listed on the Danger sign of the laboratory door because other embedded lasers are exposed. If the conditions in the laboratory change, a Notice sign is required indicating those changes and that only authorized personnel are allowed to enter the lab: it is unlikely that sufficient PPE for everyone in the lab under these conditions are available, so this sign indicates restricted access.

Safety interlocks shall not be permanently disabled without the consent of the Laser Safety Officer.

Laser Maintenance

These steps should be followed, including by external service providers.

Required Goggle OD:	*List ODs for all wavelengths (ex: 532 nm: 5+; 800 nm: 7+)*
Storage Location:	*Indicate where these goggles can be found*



1. Post the Notice sign over the Danger sign. An example of a Notice sign is shown in the figure. Place the goggle requirements on the sign as well as the conditions of the exposed laser beam. Indicate Laser Repair In Progress
2. *Write your procedures here*
3. *Write your procedures here*
4. *Write your procedures here*
5. *Write your procedures here*
6. Remove interlock defeats, replace all enclosures and safety devices;
7. Verify normal laser operation;
8. Remove ANSI Notice sign after returning the laser to service.

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Non-Beam Hazards

If there are non-beam hazards of notable concern: laser dyes, gas cylinders, flammable solvents, tripping hazards, LGACs, UV Lamps, computers/laptops, fibre splicing; list procedures or protocols that need to be addressed. Each NBH procedure should have a different heading and address: securing cylinders, spill cleaning and MSDSs for solvents and dyes, PPE for these materials other than that for the laser itself; clean-up/containment procedures for solvents, dyes and fibres, etc. Some notable examples are given in the table below.

The corresponding standard operating procedures for non-beam hazards associated with this laser system, including required protective equipment and emergency procedures, are listed below.

Laser Dyes:	*SOP Title and Location*
Cryogenics:	*SOP Title and Location*
Compressed Gases	*SOP Title and Location*
Flammable Solvents:	*SOP Title and Location*

Only properly trained personnel shall work on high voltage systems (Electricians should be trained in CPR as a safety precaution). The "buddy" system should always be used when working on electrical systems. Note the placement of fire extinguishers and assure the laboratory staff knows how to use extinguishers and the fire alarm system.

Remember that poor housekeeping can create physical hazards. Remove any light reflective objects from the laser table (pliers and tools, pens and rulers, etc.). Keep flammable objects out of the beam path (paper, fabrics, solvents, etc.).