



## **SAFE USE OF LASERS POLICY**

<b>Date</b>	<b>Purpose of Issue / Description of Change</b>	<b>Equality Impact Assessment Completed</b>
26 <sup>th</sup> May 2005	Initial Issue	
15 <sup>th</sup> July 2022	Reviewed and approved by the Health, Safety and Emergency Management Task Group	26 <sup>th</sup> February 2019, reviewed June 2022

<b>Policy Officer</b>	<b>Senior Responsible Officer</b>	<b>Approved By</b>	<b>Date</b>
Head of Health, Safety & Campus Wellbeing	University Secretary	Health & Safety Committee	26 <sup>th</sup> May 2005

This Policy will be reviewed in 2025

## 1. INTRODUCTION

A laser is a man-made, high intensity optical radiation light source which produces an intense, coherent monochromatic, narrow beam of light.

A typical laser beam might only spread out by 1 m when shone onto a surface 1 km away. As light also travels in straight lines, this makes lasers useful for guiding, for example a 'pointer' to highlight something in a presentation. Laser beams are also used to read information, for example CDs and DVDs, some are also capable of heating materials, making them useful in surgery and for cutting metals and other industrial materials.

All lasers are potentially hazardous. Laser serves as an almost ideal point source of intense light the most common injuries are to the eye. In addition, some lasers, because of their thermal properties can cause tissue damage as well as creating the potential for fire, explosion and noxious or hazardous fumes and vapours if used for welding or cutting.

## 2. POLICY STATEMENT AND SCOPE

It is the policy of Bangor University, so far as is reasonably practicable, but in accordance with the relevant statutory requirements and good practice, to ensure the health and safety of staff, students, and visitors to the University.

This Policy states the requirements placed on the University and its Colleges and Professional Services with regards to the safe use of lasers.

### The Policy applies to:

- The University and its Colleges and Professional Services.
- All lasers.
- All staff, students, contractors, and visitors who could encounter and / or operate lasers whilst working, studying, or visiting the University.

### The Policy does not apply to:

- The use of other potentially hazardous light sources as defined by the Artificial Optical Radiation Regulations.

## 3. RELATED POLICIES AND LEGISLATION

In addition, to those general duties in law, the University and its constituent Colleges and Services, have a specific obligation under the Control of Artificial Optical Radiation at Work Regulations (AOR) to ensure no person is harmed because of laser operations.

[REFER TO 'SAFE USE OF ARTIFICIAL OPTICAL RADIATION LIGHT SOURCES POLICY' FOR ALL OTHER LIGHT SOURCES<sup>1</sup>](#)

## 4. DEFINITIONS / TERMINOLOGY

For the purpose of this Policy the following terms and definitions apply:

- Artificial Optical Radiation (AOR): Includes light emitted from all artificial sources ie light in all its forms such as ultraviolet, infrared and laser beams, but excluding sunlight.

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<sup>1</sup> See Safe Use of Artificial Optical Radiation Light Sources Policy for other light sources

- Laser: Is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. The term "laser" is an acronym for "light amplification by stimulated emission of radiation".
- Laser Safety Officer (LSO): Member of staff appointed to undertake the duties outlined in Section 10.
- Project Supervisor: Those staff working with lasers and those in a supervisory role with responsibility for others operating the laser.

## **5. DUTIES OF THE UNIVERSITY**

The University will:

- Through this Policy and supplementary documents establish a management system that complies with legislation and controls associated with the safe use of lasers.
- Appoint a suitable qualified and / or experienced Laser Safety Officer (LSO) who will advise the University on all safety matters concerned with the use of lasers and carry out duties as detailed in Section 10 below.
- Delegate, in line with the University's health and safety management system, the duty to implement this Policy to Deans of College and Directors of Professional Services.

## **6. THE UNIVERSITY RADIATION H&S SUB COMMITTEE**

The Radiation H&S Sub Committee is responsible for reviewing and overseeing the implementation of this Policy and will consider and act upon reports received from Health and Safety, Campus Services, the LSO, and individual Colleges / Services where necessary.

## **7. COLLEGES / PROFESSIONAL SERVICE RESPONSIBILITIES**

Each College and Service is required to introduce the following management arrangements to make sure lasers, used within their areas of control are operated safely:

- Identify and establish class of lasers operated within their area of control.
- Ensure an appropriate Risk Assessment, Local Rules and Safe Operating Procedures for laser operations are in place (includes teaching activities)<sup>2</sup>.
- Provide appropriate information, instruction, and training to laser operators and those affected by laser operations. For example:
  - Risks associated with laser operations.
  - Local Rules (to include this Policy and associated Information Sheet).
  - Risk Assessment / Safe Operating Procedures.
  - Responsibilities to themselves and others affected by their activities.
  - The action to take if they are exposed to a laser beam.
  - The use of Personal Protective Equipment.
  - Specific requirements if working with Class 3R, 3B or 4 lasers.

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<sup>2</sup> The aim should be to use the minimum power laser practicable for the teaching activity

- d. Ensure competent persons maintain and align laser operations and which is suitably Risk Assessed to ensure no significant risk prevails.
- e. Ensure Project Supervisors and others in a supervisory role working with lasers understand their responsibilities as detailed in Section 12 to ensure the correct and safe operation of lasers associated with their work.
- f. Ensure recorded, 3 monthly checks are undertaken of safety critical devices i.e., equipment safety interlocks.
- g. Ensure all laser Accidents & Incidents are reported to Health and Safety.

**If operating Class 3R, 3B or 4 Lasers<sup>3</sup>:**

- h. Establish and sign Class 3B / 4 'Designated Areas' as required (Section 9).
- i. Ensure all Risk Assessments, Local Rules, Safe Operating Procedures etc are approved by the LSO before work starts (includes teaching activities).
- j. Register lasers (LF1 Form, Appendix) as required with the LSO.
- k. Ensure any person before working with a Class 3B / 4 laser (Laser Workers):
  - i. Receives appropriate training from the Project Supervisor.
  - ii. Signs the 'Declaration' stating they have read the Local Rules etc.
  - iii. Is 'Registered' as a Laser Worker with the LSO (LF2 Form, Appendix).
- l. Inform the LSO of any changes in Laser Workers and / or lasers (LF3 Form, Appendix).
- m. Maintain local records e.g., Risk Assessments, Local Rules, Safe Operating Procedures, maintenance, Declarations and details of registered Laser Workers and lasers.

**8. REGISTRATION (see Appendices for Forms)**

The Project Supervisor must, before use, notify the LSO of all College / Service Class 3R, 3B, 4 lasers and other lower-Class lasers if it is planned to modify them or attach lenses which could impact on 'collimation'. This to enable the LSO to discuss relevant safety matters before the laser is brought into use. The Project Supervisor must also notify the LSO of all 'Laser Workers'.

It is essential Project Supervisors inform the LSO of changes e.g., laser disposal, amendments to Laser Workers, to ensure the LSO's Central Register of Lasers and Laser Workers is in date.

**9. SIGNAGE AND CLASS 3B / 4 LASER DESIGNATED AREAS**

Lasers must be labelled to immediately highlight the Class of laser and necessary precautions.

Work with Class 1, 2 and 3R lasers (i.e., lasers with a power output below 5 mW) do not normally require to be in a Laser Designated Area and should if possible be used for student work / lectures.

**All work** with Class 3B / 4 lasers must take place in a restricted 'Laser Designated Area' where hazards can be effectively controlled. This includes:

- i. Displaying the appropriate laser warning sign.
- ii. Signing the entrance as a 'Laser Designated Area' with the sign visible from all angles.
- iii. Restricting access to authorised persons i.e., trained, Registered Laser Workers.

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<sup>3</sup> Includes other lower-Class lasers if it is planned to modify them or attach lenses which could impact on 'collimation'

- iv. Providing appropriate fire-fighting equipment.
- v. Posting relevant Local Rules, Risk Assessments, Safe Operating Procedures in the area.

## **10. LASER SAFETY OFFICER (LSO)**

The LSO acts in an advisory capacity regarding laser safety to Health and Safety and the University. As part of this role, the LSO oversees the University's laser safety procedures to ensure compliance with this Policy and legislative requirements. This includes:

- a. Providing Project Supervisors and LPSs with appropriate training and instruction.
- b. Advising LPSs and / or Project Supervisors as required.
- c. Maintaining the Central Register of Lasers and Laser Workers (Class 3B, 4 lasers).
- d. Inspection of all new Laser Designated Areas.
- e. Periodic auditing of laser facilities and controls.

## **11. LASER PROTECTION SUPERVISOR (LPS)**

Colleges / Services operating several Class 3R, 3B, 4 lasers should, if possible, appoint a suitably experienced staff member to act as the LPS. Following training, provided by the LSO, the LPS will be responsible for assisting their Dean of College / Director of Professional Service to supervise and monitor the general day-to-day control of lasers to ensure compliance with this Policy.

## **12. PROJECT SUPERVISORS**

Staff working with lasers and those in a supervisory role with responsibility for others operating the laser must ensure the correct and safe operation of lasers associated with the work, seeking the advice of the LSO as necessary. This includes:

- a. Ensuring lasers are suitable for the activity.
- b. Ensuring undergraduates working with lasers use the minimum power laser practicable and that appropriate controls to manage risk are in place.
- c. Ensuring suitable training is provided to laser operators.
- d. Labelling all lasers and demarcating 'Laser Designated Areas' as required.
- e. Checking personal protective equipment provided is suitable for the Class of laser.
- f. Preparing and displaying suitable Risk Assessments, Safe Operating Procedures and Local Rules for the laser and laser activities.
- g. Registering all Class 3R, 3B, 4 lasers with the LSO (LF1 Form, Appendix).
- h. Completing the Laser Survey Form (LF1 Form, Appendix) for all new set ups using Class 3R, 3B and 4 lasers and annually thereafter for Class 3B/4 lasers
- i. Informing the LSO of lower-Class lasers if planned modifications could affect 'collimation'.
- j. Registering Laser Workers with the LSO, with the Declaration signed (LF2 Form, Appendix).
- k. Monitoring arrangements to confirm lasers are used in compliance with this Policy, Risk Assessments, Local Rules etc.
- l. Informing the LSO of any changes in lasers or Laser Workers (LF3 Form, Appendix).
- m. Undertaking recorded, 3 monthly checks of safety critical devices i.e., interlocks.
- n. Ensuring Accidents and Incidents are reported and investigated accordingly.

### **13. RESPONSIBILITIES: STAFF, STUDENTS, CONTRACTORS AND VISITORS**

As with those duties placed upon the University and its Colleges / Services, staff, students, visitors, and contractors also have responsibilities in law. With regards to this Policy, they must:

- a. Observe this Policy, Risk Assessments, Local Rules, Safe Operating Procedures, and other associated guidance to ensure lasers are operated safely.
- b. Follow all management controls implemented by their College / Service.
- c. Attend training as required.
- d. Only operate lasers they have been instructed and / or trained and authorised to operate.
- e. Not interfere with or mis-use systems put in place to protect against exposure to lasers.
- f. Wear personal protective equipment as required to protect them against laser risks.
- g. Report all Accidents & Incidents and other concerns immediately to the Project Supervisor, LPS (if appointed), LSO or other appropriate person.

### **14. EQUALITY ASSURANCE**

Every effort must be made to support individuals, so they are treated equally. However, in some very rare instances, there may be a requirement to treat 'persons with a protected characteristic' differently to ensure lasers are operated safely and to safeguard the health, safety and well-being of others who could be affected. In such circumstances, adjusted control and direct supervision should be considered before restricting activities.

### **15. FURTHER INFORMATION AND PRACTICAL GUIDANCE**

The following Information Sheet is available which provides practical guidance on the action Colleges / Professional Services need to take to meet the requirements of this Standard:

- Information Sheet: Safe Use of Lasers.

### **16. REVIEW AND AUDIT PROCEDURES**

Health and Safety, Campus Services will carry out general and periodic audits to assess compliance against this Policy Standard and legislation in general.

Colleges / Professional Services must periodically review their own procedures to ensure the requirements of this Policy Standard are implemented, suitable and effective.

In addition, the University's Health and Safety Committee may from time to time review the effectiveness of the University's system for the management of lasers across Colleges and Professional Services.

**End.**



## LF1: REGISTRATION OF LASER EQUIPMENT CLASS 3R, 3B / 4

Project Supervisor to complete this Form and the *Laser Survey Form* for all Class 3R, 3B and 4 lasers and submit to the LSO for approval.

<b>School / Service</b>			
<b>Laser Make</b>			
<b>Model</b>		<b>Type</b>	
<b>Serial No</b>		<b>Class</b>	
<b>Power</b>		<b>Wavelength</b>	
<b>Building</b>		<b>Room</b>	

<b>Proposer (Project Supervisor (or other) responsible for laser system)</b>	
<b>Name</b>	

<b>Laser a new acquisition? YES - complete A, NO – complete B (delete as appropriate)</b>				
<b>A</b>	Anticipated date of first use:			
	Outline work to be undertake and persons involved (UG, PG, PhD, Staff etc):			
	<b>FOR CLASS 3R, 3B, 4 LASERS:</b>			
	Laser Survey attached (see over)	<b>YES</b>	<b>NO</b>	If NO explain:
<b>B</b>	Risk Assessment attached	<b>YES</b>	<b>NO</b>	If NO explain:
	Detail changes in use / status of the laser			

### AUTHORISATION

<b>Project Supervisor</b>			
<b>Name</b>			
<b>Signature</b>		<b>Date</b>	

<b>Laser Safety Officer</b>			
<b>Name</b>			
<b>Signature</b>		<b>Date</b>	



## LF1: LASER SURVEY FORM - CLASS 3R, 3B / 4

Project Supervisor to submit this Form with the *Registration of Laser Equipment Form* for all set ups involving Class 3R, 3B and 4 lasers **before** the laser is put into use for the first time and **annually** thereafter for all Class 3B / 4 lasers.

<b>School</b>		<b>Location</b>	
<b>Make</b>		<b>Model</b>	
<b>Type</b>		<b>Serial No</b>	
<b>Wavelength</b>		<b>Max Power &amp; Class</b>	
<b>Experiment Summary</b>			

<b>Precautions</b>		<b>Class 1 / 1M</b>	<b>Class 1C</b>	<b>Class 2/2M</b>	<b>Class 3R</b>	<b>Class 3B</b>	<b>Class 4</b>
<b>Physical/Engineering Controls</b>	Door signage (standard warning symbol and including highest class of laser in use)						
	Emission Indicator						
	Remote Interlock						
	Key Control						
	Beam Shutter						
	Beam Stop						
	Beam Level (avoiding eye level if user seated or standing nearby)						
<b>Administrative Controls</b>	Beam Enclosure (interlocked enclosure, shielding, covers, flight tubes etc)						
	Open Beam Working – justified in Risk Assessment if not prevented via engineering controls						
	Laser Labels (on equipment, close if device small)						
	Eye Protection (available, correct for lasers, stored correctly, undamaged, labelled)						
	Protection Clothing (eg for skin)						
	Paperwork (Risk Assessments, SOPs, MPE Calcs., High Risk Tasks covered (eg alignment)						
Laser Users Registered & Trained (recorded)							

<b>Additional Controls</b> (engineering / administrative)	
<b>Recommended Actions</b>	
<b>Completed by</b>	<b>Signature</b>





## LF2: LASER WORKER REGISTRATION FORM - CLASS 3B / 4

The Project Supervisor must return this Form **before** work with lasers commences to the Laser Safety Officer (LSO), so workers can be added to the Laser Worker Register. Laser Workers must sign the 'Declaration'. Authorization relates only to the laser installation listed.

<b>Laser Worker</b>	<i>Title</i>	<i>Forename</i>		<i>Surname</i>		
<b>School / Service</b>						
<b>Location of Laser</b>						
<b>Laser Type &amp; Class</b>						
<b>Commencing Date</b>				<b>Expiry Date</b>		
<b>Staff / Student Category</b>	Academic Staff	<input type="checkbox"/>	Research Staff	<input type="checkbox"/>	Technical Staff	<input type="checkbox"/>
	Postgraduate	<input type="checkbox"/>	Other	<input type="checkbox"/>	Specify	

### LASER WORKER DECLARATION *(MUST be signed before any work with laser commences)*

**Tick**

	The Project Supervisor has discussed specific safety issues and instructions, including training and supervisory requirements related to my laser work
	I have read and understood the Risk Assessments, Safe Operating Procedures and Local Rules that are relevant to the laser(s) I will be working with
	I understand the control measures that must be implemented, including any eye and skin protection
	I understand access restrictions in Designated Laser Areas and the operation of the laboratory door interlocks and any equipment-related interlocks (e.g. on laser compartments)
	I know the location and capabilities of laser safety equipment (beam stops, moveable shielding, laser eye protection, gloves, etc.) in the laboratory
	I understand the procedure to follow if I suffer, or suspect I have suffered, a laser-related eye injury

Laser Worker		
<b>Name</b>	<b>Signature</b>	<b>Date</b>

Project Supervisor		
<i>I will ensure suitable and sufficient arrangements are in place to ensure the health and safety of the Laser Worker. This includes Risk Assessments, Local Rules, Safe Operating Procedures, training and supervision.</i>		
<b>Name</b>	<b>Signature</b>	<b>Date</b>

Laser Safety Officer		
<b>Name</b>	<b>Signature</b>	<b>Date</b>

