

Meeting the Challenge of Safety Training for Diverse Audiences Using Varied Laser Systems

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Background to Northwestern's Program

- More than 90 labs with registered lasers
- Over 400 class 3b and 4 lasers
- Spread out between two campuses

Diversity of Laser Systems

- Lasers run from continuous wave to femtosecond pulse
- Open beam paths to enclosed systems

Diversity of Users and Uses

- Users range from physicists to medical students
- Lasers used for many different experiments

Northwestern's Tools for Training

- Northwestern Safety Information System (NSIS)
- Learn@Northwestern

Issues Northwestern Faces with Training

- 2014 audit by Rockwell Laser Industries
 - Visited two-thirds of labs
 - Some recommended improvements could be met with more robust training

New Training

- Rolled out September of 2015
- Immediate complaints over the increased difficulty
- 19 of 50 questions had less than 60% correct
- 4 questions had less than 25%

Question	% Correct
The retina can be damaged by photochemical effects from:	21.88
Which of the following is not a requirement for alignment procedures requiring access to the beam of a class 4 laser embedded inside a class 1 laser product?	22.73
The Maximum Permissible Exposure (MPE) depends on all of the following except:	25.58
An intrabeam exposure to too much energy in a short (Q-switched) laser pulse in the near infrared will probably result in what kind of eye injury?	44.87

Northwestern's Solution

- Provide two different training courses dependent on the laser system being used
 - Open beam
 - Enclosed

Implementation

- Alter laser equipment registration process in NSIS
 - Allow the creation of laser “tables”
 - Classify tables for the training required
- Factor in tables in the laser operator registration

Please indicate all lasers that you will operate.

If the laser you are planning to operate is not listed, please contact the [Laser Safety Officer](#)

Laser Class	Manufacturer	Model#	Serial#	Laboratory Location	Campus	Will you operate this laser?
4	at	at	at	Technological Institute/-NG83	Evanston	<input type="radio"/> Yes <input checked="" type="radio"/> No
4	ta	ta	ta	Montgomery Ward Building/--Not Listed--	Chicago	<input type="radio"/> Yes <input checked="" type="radio"/> No
4	aa	aa	aa	Technological Institute/-NG83	Evanston	<input type="radio"/> Yes <input checked="" type="radio"/> No
3b	tt	tt	tt	Montgomery Ward Building/--Not Listed--	Chicago	<input type="radio"/> Yes <input checked="" type="radio"/> No

Laser Operator Registration Screen in NSIS

Potential Pitfalls

- NSIS is a nearly 10 year old program
 - Changes require time and resources from the programmers
 - Changes in one part can affect others that you are not aware of

Pitfalls

- Laser operators may also align enclosed beam systems
- Time and resources to develop two different training courses

Benefits

- Accurately assess the hazards for laser operators
- Match the training to hazards

Additional Benefits

- Improve the registration process
- Better inventory control of lasers
- Give labs a place to store SOPs and hazard analyses electronically