

# Houghton College Department of Physics

## Student Safety Contract

### General Guidelines

1. Conduct yourself in a responsible manner at all times in the laboratory. **Horseplay, practical jokes, and pranks are dangerous and prohibited.**
2. Follow all written and verbal instructions carefully. If you do not understand a direction, a part of a procedure, or how a piece of apparatus is to be used, ask the instructor before proceeding.
3. When first entering a physics lab, do not touch any equipment, chemicals, or other materials in the laboratory area unless you are instructed to do so.
4. Do not eat food, drink beverages, or chew gum in the laboratory. Do not use laboratory containers for food or beverages.
5. Perform only those experiments authorized by the instructor. Unauthorized experiments are prohibited.
6. Be prepared for your work in the laboratory. Read all procedures thoroughly before entering the laboratory.
7. **Observe good housekeeping practices.** Work areas should be kept clean and tidy at all times. Bring only your laboratory instructions, worksheets, and/or reports to the work area. Other materials (books, purses, backpacks, etc.) should be stored elsewhere.
8. Keep aisles clear. Push your chair under the desk when not in use.
9. Know the locations and operating procedures of all safety equipment including the first aid kit and fire extinguisher. Know where the fire alarm and the exits are located.
10. Be alert and proceed with caution at all times in the laboratory. Notify the instructor immediately of any unsafe conditions you observe.
11. Labels and equipment instructions must be read carefully before use.
12. Experiments must be personally monitored at all times.
13. When using knives and other sharp instruments, always carry with tips and points pointing down and away. Always cut away from your body. Never try to catch falling sharp instruments. Grasp sharp instruments only by the handles.

### Clothing

14. Any time chemicals, heat, or glassware are used, students will wear laboratory goggles. There will be no exceptions to this rule!
15. Contact lenses should not be worn in the laboratory unless you have permission from your instructor.
16. Dress properly during a laboratory activity. Long hair, dangling jewelry, and loose or baggy clothing are a hazard in the laboratory. No sandals allowed.

### Accidents and Injuries

17. Report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to the instructor immediately, no matter how trivial it may appear.
18. When mercury thermometers are broken, mercury must not be touched. Notify the instructor immediately.
19. Never handle broken glass with your bare hands. Use a brush and dustpan to clean up broken glass. Place broken or waste glassware in the designated glass disposal container.

### Chemicals

20. All "laboratory chemicals" are to be considered dangerous. Do not touch, taste, or smell any laboratory chemicals unless specifically instructed to do so. The proper technique for smelling chemical fumes will be demonstrated to you.
21. Check the label on chemical bottles twice before removing any of the contents. Take only as much chemical as you need.
22. Never return unused chemicals to their original containers.
23. Never remove chemicals or other materials from the laboratory area.

### Heating Substances

24. Exercise extreme caution when using an exposed flame. Take care that hair, clothing and hands are a safe distance from the flame at all times. Do not put any substance into the flame unless specifically instructed to do so. Never reach over an exposed flame. Light gas (or alcohol) burners only as instructed by the teacher.
25. Never leave a lit burner unattended. Never leave anything that is being heated unattended. Always turn the burner or hot plate off when not in use.

26. You will be instructed in the proper method of heating and boiling liquids.
27. Heated metals and glass remain very hot for a long time. They should be set aside to cool and picked up with caution. Use tongs or heat-protective gloves if necessary.
28. Never look into a container that is being heated.
29. Do not place hot apparatus directly on the laboratory desk. Always use an insulating pad. Allow plenty of time for hot apparatus to cool before touching it.

### **Equipment**

30. When removing an electrical plug from its socket, grasp the plug, not the electrical cord. Hands must be completely dry before touching an electrical switch, plug, or outlet.
31. Examine glassware before each use. Never use chipped or cracked glassware. Never use dirty glassware.
32. Report damaged electrical equipment immediately. Look for things such as frayed cords, exposed wires, and loose connections. Do not use damaged electrical equipment.
33. Do not immerse hot glassware in cold water; it may shatter.
34. Be cautious near any glass or plastic vacuum vessel, it could implode. Use a shrapnel shield if large volumes are evacuated.

### **High Voltage**

35. Do not work on high voltage or high power circuits without first informing your instructor.
36. Perform as many tests as possible with power off and equipment unplugged. Before working on unpowered circuits, discharge any capacitors and ensure that there is no residual charge with a voltmeter.
37. Keep one hand in your pocket when near a powered high voltage system and wear rubber bottom shoes or sneakers.
38. Do not wear jewelry or other articles that could accidentally contact circuitry.
39. Conditions for a serious (potentially lethal) shock across a critical path (e.g., across the heart) are:
  - a. More than 30V RMS, 42.4V peak, or 60V DC at a total impedance of less than 5000  $\Omega$ .
  - b. 10 to 75 mA
  - c. More than 10J delivered.
40. Conditions for a (likely) lethal shock across the heart are:
  - a. More than 375V at a total impedance of less than 5000  $\Omega$ .
  - b. More than 75 mA
  - c. More than 50J delivered

### **Lasers**

41. NEVER LOOK DIRECTLY INTO ANY LASER BEAM, regardless of power, even when wearing protective eyewear.
42. Keep ambient light levels as high as operations will permit.
43. Never direct a laser at another person.
44. Before turning on the laser, always be sure that it is pointed away from yourself and others.
45. Keep the laser beam away from eye level, and keep your eyes away from the level of the beam.
46. When possible, block off laser beams so they cannot extend beyond the limits of the individual laboratory station.
47. Follow the same rules for direct reflections of laser light from reflective surfaces. Remove all unnecessary shiny reflecting surfaces from the work area. Remove jewelry.
48. Protective eyewear may be needed for higher-power lasers. Do not turn on a laser unless you are sure whether eye protection is needed. See instructor for additional safety rule before turning on a laser that requires the use of eye protection.
49. When using invisible (ultraviolet < 400 nm or infrared > 700 nm) laser light at any power, protective eyewear must always be worn by everyone in the room.

### **Radiation**

50. The basic principle is **ALARA**, which stands for keeping radiation exposure “As Low As Reasonably Achievable.”
  - a. Distance
  - b. Shielding
  - c. Time
51. To minimize exposure when handling a radioactive source, keep it at an arm’s length when possible.
52. No eating, drinking, or applying cosmetics while handling the sources.
53. Do not hold sources unless necessary

54. Wash your hands after working with radioactive sources.
55. Pick up solid sealed sources holding their sides. Be careful not to pierce the plastic with a fingernail or other sharp object.
56. Place solid sealed sources face down (label side up), and at arm's length from you when not in immediate use. (Keep it approximately that same distance from ANY living organism.)
57. Do not put any sources in your pockets.
  
58. Be aware of radiation warning signage in your work environment.
59. Students should not be in an area when a radiation machine is energized without specific instructions and appropriate training.
60. Students working on certain projects which the radiation safety officer determines have additional hazards will be required to have radiation safety training before starting work.
61. If you are unsure whether something is safe, immediately leave the area and notify the radiation safety officer.

**Agreement:**

I, \_\_\_\_\_ (student's name) have read and agree to follow all of the safety rules set forth in this contract. I realize that I must obey these rules to insure my own safety, and that of my fellow students and instructors. I will cooperate to the fullest extent with my instructor and fellow students to maintain a safe lab environment. I will also closely follow the oral and written instructions provided by the instructor. I am aware that any violation of this safety contract that results in unsafe conduct in the laboratory or misbehavior on my part, may result in being removed from the laboratory, detention, receiving a failing grade, and/or dismissal from the course.

Student Signature

Date