

ELECTRICAL SAFETY **IN THE LABORATORY**

COURSE OUTLINE

- **Electricity is literally everywhere in our laboratories.**
 - Without it most of our operations would come to a standstill.
 - So we need to know how to work with it safely.
- **Accidents and equipment malfunctions can cause problems such as:**
 - Electric shock.
 - Ignition of flammable vapors.
 - Explosions.
- **Performing equipment maintenance or making adjustments without proper precautions can result in serious injuries.**
 - We need to know how electricity works inside and out.
- **The force carried by electrical current is measured in "volts."**
 - Most equipment runs on 120 volts.
 - Heavy duty equipment may require 220 volts.
- **"Current" is the flow of electricity.**
 - The "intensity" of the current is measured in "amperes" (amps).
- **The amount of current that an electrical circuit can carry safely will vary.**
 - It depends on the thickness of the wire.
 - Most laboratory electrical lines can safely carry 20 amps.
- **It is the flow of current (amperage), not the voltage, which causes shocks.**
 - Only .06 amps (the amount of electricity needed to light a Christmas tree bulb) can cause a fatal heart attack.
- **Electricity flows when a "circuit" is completed.**
 - A circuit is a loop of uninterrupted electricity going from a power source to equipment and back again.
 - On/off switches regulate this "loop".

- **The flow of electricity in a circuit can also be broken by a fuse or circuit-breaker.**
 - These are activated if wires are carrying more electricity than they can safely handle.
- **"Stray" electricity is always being pulled toward the ground.**
 - This is one of the major causes of shock.
- **"Grounding" provides a safeguard against this situation.**
 - A ground wire will direct "leaking" electricity back through the circuit, not to the person using the equipment.
 - Ground wires are easily visible in three-prong plugs.
- **To be effective, a ground wire must be plugged into an outlet that is also grounded.**
 - These outlets should be tested annually.
- **For added safety, outlets can be fitted with "Ground Fault Circuit Interrupters" (GFCIs).**
 - GFCIs protect you from "current leakage."
 - They sense stray electricity by measuring the continuity of the current.
 - If any deviation exists, a GFCI will quickly shut off the flow of electricity.
- **Following safe work practices is also critical to working around electricity.**
 - Electricity can always be dangerous.
- **There are three very common electrical hazards.**
 - Fires.
 - Shocks.
 - Burns.
- **Many electrical problems involve faulty wiring. So you should:**
 - Check insulation on all equipment wiring before plugging in (look for cracks, etc.).
 - Have faulty wires replaced immediately.
 - Don't overload circuits (this will cause wiring to heat up).
 - Don't use electrical tape to try and "fix" wiring problems.
- **Limit use of extension cords (they can develop cracks, etc.).**
 - Some accreditation groups, such as JCAHO and CAP prohibit their use.

- **Always use caution when selecting electrical equipment.**
 - Whenever possible use double-insulated tools.
 - Ground stray electricity.
 - Check electrical connections for sparking.
- **Be sure to get faulty equipment repaired.**
 - Advise your supervisor about any problems.
 - Don't try to make electrical repairs yourself.
- **If you need to adjust an instrument or piece of equipment, or perform routine maintenance, disconnect all the power sources first.**
 - You should also practice "lock-out/tag-out" techniques.
 - Consult your supervisor if you have questions.
- **In areas where flammable materials are used, equipment selection is doubly important.**
 - Motor-driven equipment should have non-sparking motors and switches.
 - Never bring "home appliances" into these areas (most have switches that spark).
 - Check the equipment that is used by maintenance crews (such as vacuum cleaners, power tools, etc.), as well.
- **You should also prevent water and other liquids from contacting electrical equipment, since it:**
 - Can damage sensitive electrical circuits.
 - May cause shock.
- **Guard against any contact with "energized" parts.**
 - Prevent exposure to limit accidents.
- **If an accident does occur, it is important to be prepared.**
 - Never touch a person who is in contact with a live wire.
 - Cut off electrical current at a switch or circuit breaker.
 - Contact emergency medical personnel immediately.
- **Because of the heat generated by electricity, accidents often result in fires.**
 - Always know where fire extinguishers are located in your work area.
 - Remember, electrical fires require Type C extinguishers.
 - If a fire is too much to handle, evacuate the area and contact the fire department.

- **A working knowledge of first aid can also be helpful in case of electrical accidents.**
 - Cover minor burns with loose, dry sterile dressing.
 - Then get medical attention.
- **With more serious electrical accidents, victims may need CPR or treatment for shock. You should:**
 - Learn how to administer CPR.
 - Take other first aid training, if it is available.

*** * * SUMMARY * * ***

- **Electricity is a valuable asset. We need to use it correctly and safely.**
- **Follow proper work practices.**
- **Report unsafe conditions.**
- **Don't attempt repairs unless you are qualified.**
- **Be prepared in case of an emergency.**
- **Electricity makes our labs more efficient. It is up to us to make sure we work with it safely!**