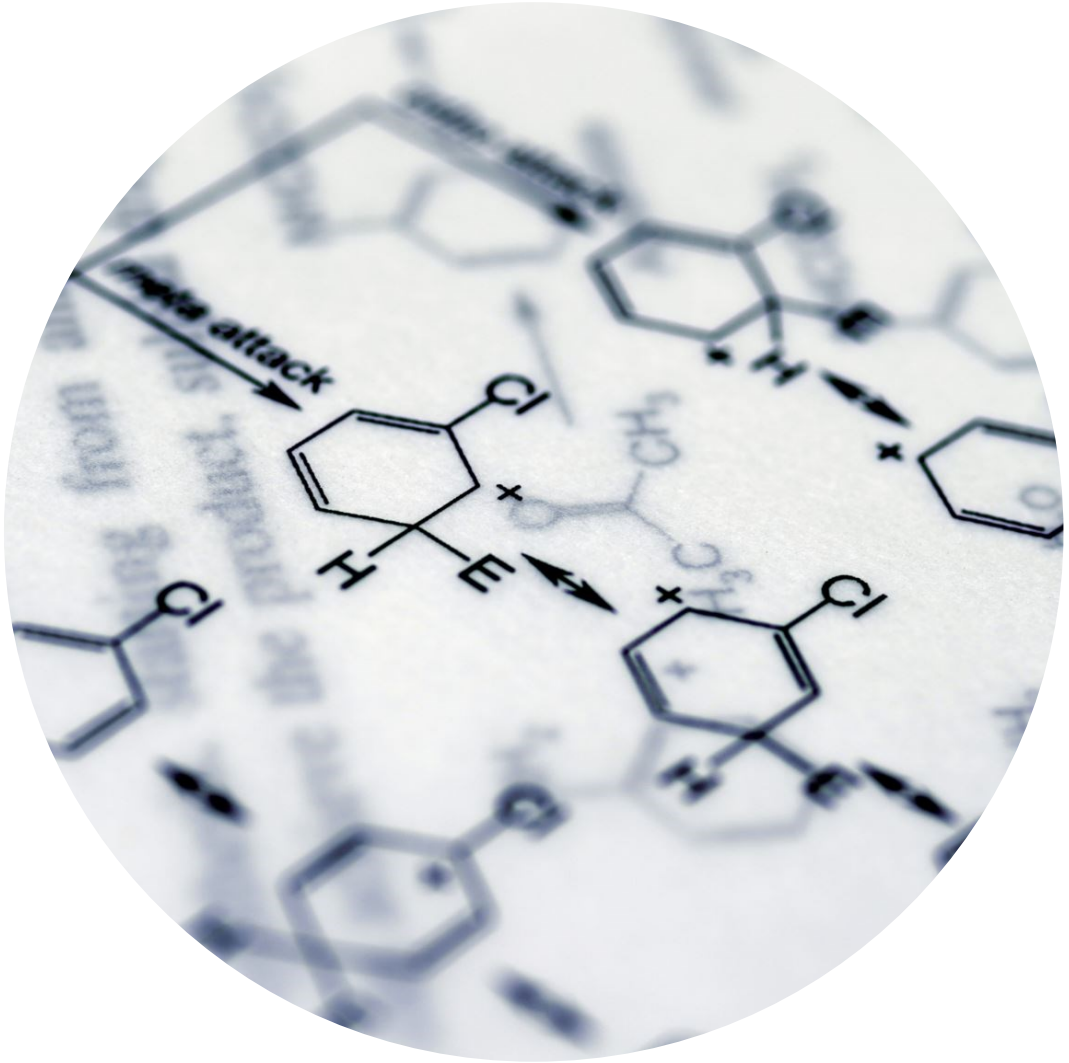
Research Planning

Part 3: Safety



Safety and Experimental Design

- Safety considerations vary widely depending on
  - Type of research
  - Type of equipment
  - Type of lab
- Common classes of hazards
  - Chemical
  - Nuclear
  - Biological
  - Mechanical & Electrical
  - Other?
- Usually not explicitly mentioned in proposals
  - Considered part of standard, good laboratory practice
  - **Exceptions: Unusual *degree* or *nature* of safety issues**

Exceptional Cases

- Some examples of types of research projects where safety should be explicitly discussed in a proposal
  - Any project where the funding agency asks for it explicitly
  - *Nuclear or radioactive materials*
  - *Biohazards*
    - Viruses, bacteria, infectious agents
  - *Unusually hazardous chemicals*
    - Examples: methylmercury compounds, chemical warfare agents, high explosives
- Whether explicitly dealt with in the proposal or not, **safety MUST be considered when planning and executing a research project!**

Identifying Potential Hazards

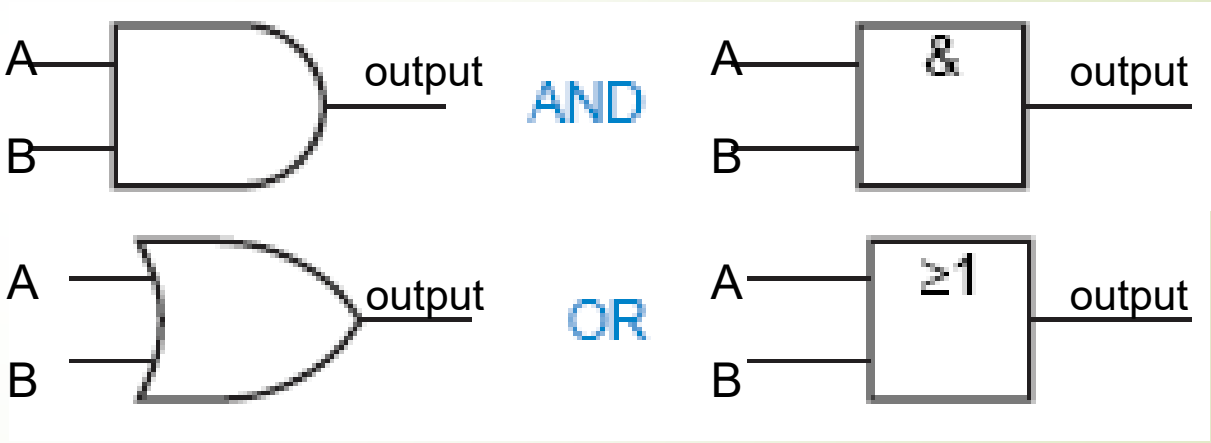
- What are the potential hazards associated with implementing the design?

- For each potential problem:
  - *Identify any potential hazard*
  - *Think of consequences if that problem occurred*
  - *Identify preventive measures*
  - *Identify contingency plans*

- *Potential Problem Analysis*
  - Can be helpful in this process

Identifying Potential Hazards

- ***Fault-Tree Analysis***
  - Widely used for more complex systems
  - Helpful for:
    - Identifying potential hazards
    - Determining likelihood of a problem occurring
    - Visualizing safety measures in place
    - Identifying problems that could have multiple causes
    - Identifying a potential "chain of events" that could create a problem



Safety Measures

- What personal protective equipment (PPE) will be needed?
  - Gloves, face shields, aprons, respirators, etc.
- What safeguards should be put in place on equipment?
  - *Sensors* (fire alarms, toxic gases, motion detectors, etc.)
  - *Fail-safes* (fuses, compliance voltage/current in circuit design, relief valves, etc.)
  - *Security* (Locks, video cameras, etc.) – esp. unattended experiments
  - Many others
- What procedures should be in place increase safety?
  - *Safety training*
  - *Mechanisms for disseminating info about hazards*
  - *Handling and disposal of hazardous materials*

Safety Response

- If an incident occurs, what is the appropriate response?
  - *Who do you tell?*
  - *How to contact emergency personnel?*
  - *Which supervisors need to be notified?*
  - *What is the safety response?*
  - *What are appropriate measures for clean-up?*
  - *What are mechanisms for evaluation?*

- Every organization has plans in place for this (or should)
- See "Safety Documents" link on the page: https://www.latech.edu/administration/administration-facilities/environmental-health-safety/

Safety

- When working in the lab, safety should be your **first priority**
- **Take responsibility for your own safety!**

The End