



# Moving Science Labs Online

## During University Closure

Hands on labs are an essential component to science lab courses. While the official laboratory on campus is preferred there are some creative solutions to provide the essentials of lab components for students while they remain off campus. Virtual labs, high quality simulations, and modified kitchen labs are available to replace the full laboratory experience. They often allow for extended experimentation with repetition that is not feasible in the actual lab.

Primary to making decisions on how to handle laboratory work while the University operates online, are the preferences of your department. Please discuss approaches to solutions as a departmental team to ensure consistency of experience for all students. Many of the higher quality solutions come at cost to the department and to students so that will need to be addressed if chosen.

**Here are some top suggestions as you consider your options.**

- Check for resources provided by your textbook publisher. Publishers often have online resources for simulations and virtual labs that correspond to topics in your textbook.
- Prioritize lab activities by importance and ability to perform in alternative format. Reorder the remainder of the semester's units of Study to cover topics that may require less laboratory work or that amend themselves well to alternative virtual or kitchen labs.
- If a lab would work well for demonstration, utilize that if possible. Ideally demonstrations are videoed and then shared with students. You can utilize the interactive video learning app in Isidore to add questions of your students in key places of the video demonstration.
- Avoid labs that could cause any unnecessary bodily endangerment.
- Provide sample experimental data that would have been generated during the lab for your students to analyze. You might then ask your students to develop a lab report or paper based on these results similar to if they had obtained the experimental data themselves.
- Consider utilizing a seminal scientific article where a scientific approach that would be used in the missed lab was a core component. Ask students to identify advantages or limitations and to consider new applications related to course content.
- Communicate with your lab assistants/managers to come up with solutions and to convey what changes will be made to accommodate these circumstances.



## Virtual Lab and Simulation Resources and Online Lab Equipment Supply

Free Virtual Resources	
<a href="#">NSTA Virtual Labs Collection</a>	Core biology virtual labs.
<a href="#">Glencoe Virtual Labs</a>	Online labs in life science, earth science, physical science,
<a href="#">Pearson Lab Bench</a>	Major Biology Topics
<a href="#">MacMillan PhET Interactive Simulations for Science and Math</a>	Math and science with college level filter.
<a href="#">OnlineLabs.in</a>	Mixture of virtual labs and links to other simulations and resources.
<a href="#">HHMI BioInteractive</a>	Virtual labs on lizard evolution, bacterial identification, cardiology, and more.
<a href="#">iBiology</a>	Open-access free videos by collaborative scientists and educators.
<a href="#">Jove</a>	Journal of Virtual Experiments
Virtual Resources at Cost	
<a href="#">Hands-On Labs</a>	700+ peer reviewed lessons across nine science disciplines. Lab kits for order.
<a href="#">Hayden-McNeil Lab Simulations</a>	Simulated lab environment with biology and chemistry experiences.
<a href="#">Labster</a>	Biology, Chemistry, Engineering, Medicine and Physics labs. Many are made in conjunction with Google DayDream to create a VR experience.
<a href="#">PraxiLabs</a>	3D simulations, some free access.
Lab Kits and Supply Stores	
<a href="#">Carolina Biological Supply</a>	Mixture of supplies for school and home use.
<a href="#">Flinn Scientific</a>	Supplies and kits.
<a href="#">Quality Science Labs, LLC</a>	College level labs include advanced biology and chemistry.