Try to do experiments live - with students on camera giving instructions and using the 'hands' of the lab instructor - was too time consuming and had safety concerns. So, we either need more people or we will just do video recordings that students can watch later. - Marcin

**Two models** - recording offline and then posting to Google Drive/ecampus or recording how the experiment is done with no voiceover or explanation and connect on Zoom during the scheduled lab time to play the short video (3 minutes, 2 minutes, bits and pieces) with a live voiceover.

- Breakout rooms for teams to work separately during a live Zoom during the scheduled lab time.
- Students missed doing things. Ran a simulation involving building a circuit online - it worked better than watching the video and doing the analysis.
- Goal is to include more simulation, not 100% simulation nor 100% videos, but a mix of both.
- Comprehensive ready experiments are tough to find, some elements are useful and others not. This takes time to plan out since there's no link that you can send with a whole experiment from beg to end. Some simulations are great because they allow students to change parameters. - Maya

Theory understanding seems to be better online. Their mastery of analysis also seems to have improved. These sides of learning went well.

- The challenge for the summer is that many students are encountering equipment for the first time. Video recordings now have to be much more in-depth.
- The online simulations went well for some labs but not necessarily for the mechanics lab (we didn't get real-time measured values).
- Also, the lack of facial expressions is hard because you can't check for understanding. May ask them to turn their videos on for the summer. – Primal

There wasn't a huge deviation between students who did an in-person mid-term and those who took the final. The final was MCQs and there was no online proctoring involved. – Randa

**At-home** experiments are a possibility. They may not be the same experiment or the same complexity but they will at least be more involved. There is an opportunity for students to do some hands-on work. This will break up the monotony of following videos. Labs try to solve real-life situations, so at-home experiments could work. Identifying everyday problems could work. One could think of acid-base titrations without needing equipment, for example. – Ibrahim

Controls is being offered this summer and we’ll upload videos to ecampus, have students run simulations and setting aside a percentage of the grade for coming to the lab. - Shameel
Teaching Staff Meeting Notes 5/19

Build a crane ... students were a little lost. We need to do something a little specific for team projects. This was for the mechanics part. Overall, having participation points helps as does asking questions (especially open-ended questions) throughout but often those who need help may lag behind those who are focused. Students have had problems with the technology (quizzes on ecampus).- Primal

There are sandbox applications online – students can build, take screenshots and send files. Check out Algodoo. – Shameel

Other Resources

https://soundcloud.com/user-607324765/tlbuzz-episode-6-teaching-labs-courses-remotely - This is a podcast and it's two months old but there is some good stuff in there.

Check out McGraw Hill Resources

Pandemic Pedagogy Facebook page – join and search 'lab' and it'll pull up specific posts about labs, a lot of the discussion is about anatomy/bio labs but there are some very useful posts

https://nerdist.com/article/ikea-how-to-build-forts-at-home-instructions/

https://virtuallabs.merlot.org/vl_ee_science.html (Engineering)

https://docs.google.com/spreadsheets/d/18iVSleOqKjj58xcR8dYJS5rYvzZ4X1UGLWhl3brRzM/edit#gid=0