HANDS-ON (LAB) INSTRUCTION ONLINE: CNS DISCUSSION

A group of ~30 CNS undergraduate lab coordinators and instructors met to share ideas for achieving the goals of their hands-on instructional labs in an online environment. Here is a summary of that meeting.

GUIDING PRINCIPLES

This group developed a set of guiding principles to help make decisions about the instructional content, activities and assessments they will be implementing for the remainder of this semester.

- Less is more. Focus on things that you know students can achieve, and that you as an instructor can feasibly manage.
- Do not focus on trying to make the *best* online version of your course right now. Try to keep everything as simple as possible, and deliver instruction that will benefit your students.
- Focus on learning! This is an opportunity for students to learn, for the sake of learning. Help your students recognize that they will need to guide more of their learning this semester.
- Opportunity to really focus on one—or a few—priority goal(s). Focus on what you are trying to accomplish in your course, and make sure what you ask students to do will accomplish that goal.

GOALS & IDEAS

The table below provides ideas that were common among all these faculty.

GOALS	IDEAS FOR ACCOMPLISHING GOALS
Students mastery of many lab techniques and skills	Lab equipment use and techniques were mentioned by many. • Provide as many videos as possible of various lab techniques
Students demonstrate mastery of content	Several mentioned that students need to demonstrate mastery of content in your course. • Several suggested holding Zoom meetings with individuals to evaluate student understanding. • Quizzes and short assignments.
Provide a research experience	There is a strong desire to provide an immersive research experience for students. • Difficult to simulate a true research experience, so many suggested focusing on scientific literacy skills listed on the next page.

GOALS

Apply general research skills

- Data analysis & interpretation
- Experimental design
- Read/understand literature
- Scientific writing
- Oral communication
- Problem solving
- Observation of nature

Establish and maintain community, collaboration and motivation among students

Manage student stress

IDEAS FOR ACCOMPLISHING GOALS

There was a strong message of focusing on skill building, especially concerning data management, analysis, and interpretation.

- Focus on making data available / accessible to students so that they can carry out analyses. Would like to take advantage of online data repositories so that students only need a web browser to access the data.
- Provide datasets and focus on a few things already covered to date (eg, phylogenetics, microbiome data, introducing R), to allow students to practice in these areas.
- Students can replicate the *design* portion of experiments, which I can evaluate through individual Zoom conversations.
- Going to focus more on scientific writing and data analysis. Students can give presentations through Zoom at the end of the semester.
- Have students research materials they would need to run an experiment, and be very explicit about how they would setup and use these materials in their experiment.
- Provide example data sets to teach analysis skills, such as DNA analyses.
- Emphasize writing component of course, and will offer Zoom workshops on writing to my students.
- Focus more on theoretical approach and scientific literacy.
- Have them do observations and collect data from outdoors where they are, within the constraints of their environment.

Many of you expressed ideas for maintaining community among your students, and helping to keep them motivated to learn.

- Mentors will hold open office when students can ask questions.
- Create groups and have mentors who have different research projects hold group meetings with each group. All students will learn about the different research projects that are happening.
- Hold individual meetings with every student.

Many of you expressed concern for student stress, and were thinking of ways to help manage your students' stress.

- I will meet with each student twice individually.
- Do not want to overwhelm students with intense data sets and new skills we have not covered yet.
- Keep it simple.