Subject: Policies and Guidance to College of Engineering Faculty Regarding Laboratory Instruction

Dear Faculty,

The College of Engineering (COE) Instructional Laboratories Task Force is working on addressing common issues to instructors and instructional laboratory facilities users in response to COVID-19 and experiential learning for Fall 2020. The task force is addressing foundation engineering labs, common labs, departmental labs, and capstone activities. Current task force activities include: 1) surveying faculty instructors (58 courses responded by July 3rd), 2) providing feedback on policies, best practices, guidance, and operational safety constraints to faculty (July 24th – this letter), 3) receiving and reviewing instructor plans (July 31st), and 4) working with instructors on implementation of plans Aug 1st – Aug 18th. We have also been working with the Provost’s office on clarification of various institutional policies as they specifically apply to laboratory teaching spaces. Below is our current information for COE lab instructors. Policies and guidance may change; we will work to keep you updated. Additional general information on courses from the Provost’s office is available. Thank you for your extra efforts and patience.

Please address specific concerns and questions for the Lab Task Force to Dr. David Staack (dstaack@tamu.edu).

Face-to-Face

The majority of COE laboratory courses have been scheduled to operate in a Face-to-Face manner. In order to meet University requirements of Face-to-Face delivery every student in the section of a lab class must have the option to come to campus for a scheduled lab activity at least once every two weeks. Every week the student must be engaged in on-campus, synchronous, or asynchronous laboratory related activities. Some courses pair lecture and lab meetings, and this on-campus, in person, Face-to-Face requirement needs to be independently met in the lab component. Considering both Face-to-Face and safety constraints, this requires a careful, lab-specific consideration of attendance logistics. A mixture of sufficiently large rooms, extra work stations, additional sections, smaller course sections, and rotating student cohorts are approaches to solve these constraints. In many solutions the duration of an individual student Face-to-Face experience is a subset of the full section duration, and, for individual students, the remainder of the required instructional time should be accomplished online. Below are three examples of approved cohort rotation schemes (this list is not exhaustive, variations and permutations of these which meet the above Face-to-Face and safety criteria can also be acceptable):

1) Break each lab session into sub-sessions and divide the lab section population into cohorts. Each cohort would be rotated through the lab each week, in a short subset of the total section time.

2) Break the lab section population into cohorts. Half of each cohort would be rotated through the lab every week, for a significant subset of the total section time. The
remaining cohort half will remote in to the lab. Every week the cohort half scheduled to be present on campus will alternate.

3) Break the section population into cohorts. Entire cohorts attend the lab for a significant subset of the total section time. Cohorts are scheduled to attend the lab at least once every two weeks. When not scheduled to attend lab in person the cohort has an online lab assignment.

<table>
<thead>
<tr>
<th>Week</th>
<th>Scheme 1</th>
<th>Scheme 2</th>
<th>Scheme 3</th>
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<tbody>
<tr>
<td>Odd</td>
<td>Cohort A - on campus</td>
<td>Cohort A1 – on campus</td>
<td>Cohort A – on campus</td>
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<td>Cohort B - on campus</td>
<td>Cohort A2 - streaming</td>
<td>Cohort B – on campus</td>
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<td>Cohort C - on campus</td>
<td>Cohort B1 – on campus</td>
<td>Cohort C – online lab activity</td>
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<td>Cohort D – on campus</td>
<td>Cohort B2 - streaming</td>
<td>Cohort D – online lab activity</td>
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<td>Even</td>
<td>Cohort A - on campus</td>
<td>Cohort A1 - streaming</td>
<td>Cohort A – online activity</td>
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<td>Cohort B - on campus</td>
<td>Cohort A2 – on campus</td>
<td>Cohort B – online activity</td>
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<td>Cohort C - on campus</td>
<td>Cohort B1 – streaming</td>
<td>Cohort C – on lab campus</td>
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<td>Cohort D – on campus</td>
<td>Cohort B2 – on campus</td>
<td>Cohort D – on lab campus</td>
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<td>On-campus session is ~20% of total section time. All students perform all in person lab activities.</td>
<td>On-campus session is ~45% of total section time. All lab activities are performed live but students only attend half of them in person.</td>
<td>On-campus session is ~45% of total section time. One half of lab activities are virtualized and one half are in person. All students perform all in person labs.</td>
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**Face-to-Face: Remote Instruction**

Students signed up in a Face-to-Face section of a class may want or need to attend remotely. Remote instruction must be available at every Face-to-Face section meeting. Students in a Face-to-Face section can choose the remote option at any time or choose to return to in person and on campus instruction at any time. They cannot be asked to choose or to notify in advance regarding remote attendance. Attendance may be checked for remote attendees as well as for those in person. Faculty are encouraged to have participation to count for a small portion of the lab grade. All sections must have synchronous live streaming active during the scheduled course period to satisfy the remote option. Remote instruction must be equivalent to Face-to-Face instruction.

**Web-Based Version**

A minority of COE laboratory courses have been scheduled to operate in an online only Web-Based option. If the course has a Howdy listed time, synchronous delivery is required. Instruction can be a mixture of pre-recorded videos, and streaming with a GAT or lab group member. Aspects of this may serve as additional instruction for Face-to-Face students or as a contingency plan for closures. The Web-Based options should be comparable to the Face-to-Face experience in so far as possible.

**Web-Based Version: Closure Contingency**
Closures could occur as a result of decontamination activities, government policy changes, or university policy changes. It is possible that during such closure students, instructors, GAT, and/or technicians will not be allowed access to laboratory facilities for teaching related activities. Laboratory courses should continue with course material in a Web-Based version. As noted above if the course has a Howdy listed time, synchronous Web-Based delivery is required. Preparation for such Web-Based versions is important and materials prepared for this contingency can also augment Face-to-Face instruction. Missed Face-to-Face activities due to closures should be substituted for by an alternate version and do not require a Face-to-Face makeup.

**Additional Policies, Guidance and Response to Common Questions**

**SAFETY**

1) Instructors must include a syllabus statement on lab safety requirements. This should cover all laboratory required PPE, (long pants, closed shoes, eyewear, gloves, lab coats etc… as necessary).

2) In addition to the laboratory safety statement the syllabus must include a syllabus statement on COVID safety. This must address 6 ft physical distancing, cleaning of laboratory equipment between users, face covering and other access requirements. July 22nd the Faculty Senate office released a [new minimum syllabus requirement](#). This includes COVID related statements and how to address non-compliance of these safety instructions by students. Similar safety policies apply to staff and faculty. Laboratory staff, GAT, and instructors will help each other to enforce these rules.

3) Occupancy limits must be set per workstation. Typically, this is 1 person per workstation to meet distancing requirements.

4) Occupancy limits must be set per lab room. In many cases this will mean the entire registered section cannot meet at one time. This analysis must be done on a per lab basis. The Zachry Common Labs will send this information to instructors using that space.

5) Fieldwork is allowed with students and staff wearing masks and maintaining physical distancing at all times. Travel for class is not allowed, so the fieldwork must be local. Field site must be assessed and have occupancy limits applied similar to a lab room. Travel to the local field site also must comply with physical distancing and other safety rules.

6) Instructors and GAT must maintain 6ft when helping students on lab benches. Student should step away prior to instructors or GAT coming to the bench. Contact surfaces must be cleaned between users. Similarly, student can be observers of other students or GAT for demonstrations in Face-to-Face instruction only when there is sufficient space.

7) Students at lab benches should not be seated facing each other. It is better to arrange it such that they are facing the same direction or away from each other.

8) Dividers or other measures can be used for additional safety but do not reduce the 6 ft spacing requirement.

9) Equipment contact surfaces (switches, keyboards, valves etc….) must be cleaned between users. This can be cleaned by staff, instructors or GATs. It is also appropriate to give students sanitizing materials for use in cleaning their stations prior to use. Contact your facilities manager for cleaning supplies.
10) The Texas A&M University Office of Risk, Ethics, and Compliance (OREC) will help to identify facilities which may require disinfection. If a lab space is known to be contaminated by SARS-COV-2 the lab facility should be closed immediately. The lab space should remain closed for between 24 hrs to 7 days from the time it was contaminated depending on the cleaning protocol followed. Please refer to Texas A&M University Guidelines Related to the Monitoring of COVID-19 Reporting and Cleaning and Disinfecting for up-to-date details such as timelines, who can authorize a closure, who is authorized by OREC to clean and how this is coordinated. During such closures the lab space cannot be access for educational reasons and the course should operate in an online only, Web Based manner.

LOGISTICS
11) Students attendance should be tracked. Remote and Web-Based options should also have a roster check. It is useful to make this participation a part of the grade on the syllabus. Users of the Fischer Engineering Design Center (FEDC) and Common Labs must follow a check-in and check-out procedure.
12) It is recommended to divide the students in the lab sections into cohorts on ecampus or canvas. Use the syllabus to communicate when each cohort attends their Face-to-Face portion of the lab each week.
13) Schedules must be strictly adhered to. Time must be built into the lab periods to allow for extra cleaning and safety related activities.
14) Time between sections can be used by instructors, GAT, and technicians for additional cleaning. Students cannot participate in safety protocols outside of their section period.
15) It should be made clear to students engaging through Remote or Web-Based options that the synchronous options have a strict schedule in Howdy. Remote students can be held to this schedule.
16) Make ups for excused absences (any instruction format) can be online only.

CAPSTONE AND PROJECTS
17) The Fischer Engineering Design Center (FEDC) and Common Labs are open to all students with scheduled courses with lab credits. The FEDC will host course project tables (as available) for groups that register. Student can train on fabrication equipment and use the fabrication and 3D printing services for projects. There are project space, scheduling and occupancy constraints. FEDC will have an occupancy constraint of about 33% of normal; this is room specific and considers physical distancing. Common Labs are available for course project usage within availability and distancing limits. Student can only go to the FEDC and Common Labs as individuals (not to meet as groups). Adjust course expectations of physical project builds for these limitations.
18) The FEDC is not open to student organizations for projects.
19) There is no course related student travel away from their primary campus.
20) TAMU guidance for group meetings is: When possible, virtual technology should be utilized when needed to maintain physical distancing. Student huddle and conference room facilities within the college of engineering are closed to student group meetings. To meet the remote option requirements group coursework outside of scheduled howdy times
should be planned such that virtual student group meetings are always possible. Taking this into account:

a. In-person, on-campus meetings of groups of students working on course projects (outside of Howdy scheduled course meetings) is not allowed.

b. In-person, off-campus meetings of student groups working on course or student organization related projects is not allowed.

**IMPLEMENTATION AND RESOURCES**

21) For Face-to-Face instruction there may be an online portion to supplement the in person portion. Approaches to address the online portion are varied and include various combinations of:

   a) pre-recorded videos and data sets
   b) live streaming of experiments by instructors and teaching assistants
   c) live streaming of experiments by students in Face-to-Face sections using smartphones
   d) having labs performed on student owned devices (i.e. myDAQ, mRIO, AD2). Note there are significant supply chain issues with getting these devices
   e) remote operation of on campus hardware
   f) virtual simulations

22) Instructors who elect to have labs performed on student owned devices should be careful of any extra costs incurred to students and also clearly list items on the syllabus so that student may include this in their financial aid. Additional purchases should be minimal. Note, there are potential supply chain issue on timely procurement of these.

23) Common lab programs such as Labview and Matlab are available to students as a zero-cost purchase from [https://software.tamu.edu/](https://software.tamu.edu/). Issues with specific implementations arise and compatibility with your course cannot be guaranteed. Please contact engineering IT (engr-helpdesk@tamu.edu) as soon as possible to test the implementation, arrange for other software and communicate with IT about what LabVIEW modules and similar packages are needed for your specific course.

24) The common labs and FEDC are currently accessible to instructors preparing for fall laboratory courses. Please use the Zachry Lab Access Request form: [https://forms.gle/EYwy8kGNUopSFNNu6](https://forms.gle/EYwy8kGNUopSFNNu6)

25) COE Studio for Advanced Instruction and Learning ([https://learntech.engr.tamu.edu/](https://learntech.engr.tamu.edu/)) has provided production tips and budget priced equipment lists to help create high quality online course content: [https://rise.articulate.com/share/IftrMljWVbrLMr10bnek_ey9Jrdxc4Nb#/](https://rise.articulate.com/share/IftrMljWVbrLMr10bnek_ey9Jrdxc4Nb#/)

26) Instructors and GAT should be specifically trained on how to use remote instruction equipment and how to interact with local and remote students.

27) Engineering IT has some resources (cameras, mic, tripods, etc..) for support of remote instruction. Please contact engineering IT (engr-helpdesk@tamu.edu) to arrange for usage.

28) FEDC will manufacture at department request face shields. Currently 100 shields per department and we expect to be able to deliver more. $8 per face shield.

29) Considering the simultaneous use of face coverings and safety glasses it is highly recommended that students, faculty, and staff purchase for their own use anti-fog safety
glass or solutions. Proper use of PPE will be enforced. Hands should be washed after touching the face or face covering. Anti-fog approaches can reduce such interruptions.

On the following pages please review examples of Instructor Plans for ideas on how to implement these concepts and various constraint in your course. Please note these are only examples meant to address various potential circumstances. It is at the instructor’s discretion how to best meet all pedagogical, Face-to-Face and safety policies and constraints. This task force would like to receive and provide feedback to your instructor plans as soon as possible. You may format your instructor plan similar to the examples below.

Thank you,

COE Laboratory Instruction Task Force
Tony Cahill (sub-chair foundations)
Angie Hill Price (chair)
Michael Johnson (sub-chair capstone)
Sunay Palsole
Jay Porter
Benjamin Sasse
David Staack
Shei Sia Su (sub-chair common labs)
Jim Wilson
Mitch Wittneben
Example Instructor Plan for Lab course XXX with identical workstations:

Lab conditions / constraints:
- Course is listed as traditional Face-to-Face
- The lab component is the only Face-to-Face part of this course
- Section meets 3 hours (ex: Wed 11:10am – 2pm)
- Section size is 20 students
- **5 identical workbenches for experiments**
- COVID-19 related safety concerns:
  - Room occupancy limit is 8 people (6 students, a GAT and a technician). This was estimated looking at the square footage, and layout of where benches are and where people could stand.
  - The workbenches are of a size that only 1 student can work at them at a time.

Logistics:
- Student section divided into 4 cohorts of 5 students (Cohort: A, B, C, D).
- To satisfy Face-to-Face requirements each Cohort meets in the lab for 80 minutes of individual hands on experiments every other week. (Cohort scheme 3).
- The schedule is as follows:
  - 11:10-12:30 Cohort A (odd weeks), Cohort C (even weeks)
  - 12:30-12:40 transition and equipment cleaning
  - 12:40-2:00 Cohort B (odd weeks), Cohort D (even weeks)

Implementation:
- The cohort schedule is posted on the syllabus, along with a directive that students attend in person or remotely their assigned time only.
- A webcam is set up on one of the workstations showing the work at the bench through an online meeting to remote students.
- An additional webcam points at the room and the GAT is wearing a microphone.
- Remote Option:
  - Remote student participates with a live student or GAT on the webcam workstation
- On alternate weeks when the cohort is not on-campus they are assigned a laboratory simulation exercise. Note: this could also be relatively easily converted to cohort scheme 2 by requiring attending a live streaming of the lab for the off-campus cohort.
- As additional lab work, each student is assigned:
  - pre-recorded videos which is instructional laboratory material
  - pre-recorded video which is a video with voice over of the GAT properly completing the experiment
  - e-campus quiz on laboratory procedures and expected outcomes
  - analysis of additional lab data that has been prerecorded
  - writing an individual lab report
Example Instructor Plan for Lab Course YYY with various unique workstations:

Lab conditions / constraints:
- Course is listed as traditional Face-to-Face.
- There is an associated lecture, but the lab component is the only Face-to-Face part of this course.
- Section meets 2 hours (ex: Wed 12:10pm – 2pm).
- Section size is 16 students.
- **4 unique workstations for student experiments (equipment: m, n, o, and p).**
- **1 unique workstation on which the instructor does demonstrations (equipment: q).**
- Over the semester there are 12 total experiments (2 on each station) plus one safety orientation that the student is expected to complete or observe.
- COVID-19 related safety concerns:
  - Room occupancy limit is 8 people (6 students, 1 GAT, and 1 Instructor).
  - All the work stations are of a size that only 1 person can work at them at a time.
  - Several work stations could not be used but duplicate other stations.
  - The demonstration station has 2 spots where students can watch the experiment from a safe distance and not interfere with other activities.
  - These criteria were estimated by laying out typical usage on the lab floor plan as shown below. Student and staff are drawn with non-overlapping 6-foot diameter circles to help estimate physical distancing.

Logistics:
- Student section divided into 3 cohorts of 5 or 6 students each (Cohort: A, B, C).
- Student attend lab once per week (cohort scheme 1)
- Define 6 spots in the lab where students can be located: m, n, o, p, q1, q2.
- Set a schedule up where each student rotates though the various experiments and stations over the semester.
- To satisfy Face-to-Face requirements each Cohort meets in the lab for 33 minutes of individual hands on experiments each week.
- The schedule is as follows:
  - 12:10-12:43 Cohort A
  - 12:43-12:53 transition and equipment cleaning
  - 12:53-1:26 Cohort B
  - 1:26-1:36 transition and equipment cleaning
  - 1:36-1:59 Cohort C
Implementation:

- The cohort schedule is posted on the syllabus, along with a directive that students attend in person or remotely their assigned time only.
- The 5-6 students per cohort are rotated through the equipment stations on a schedule determined 1 week prior to the class meeting.
- A webcam points at the room and the GAT and instructor are wearing a microphone.
- At least two additional webcams can be set up at any workstation showing the work at the bench through the online meeting to remote students. These are placed in breakout rooms in the online meeting.
- Student will utilize the full 33 minutes working and gathering data. Incomplete data sets will be supplemented with instructor provided data.
- Compared to a typical semester the student is in the lab 30% of time. Although the time is less, the direct hands-on time is comparable, as in typical semesters the work was group work.
- Remote Option
  - The uniqueness of each workbench makes this more complicated than the first example
  - Each student is directed to be prepared (e.g. having completed prelab) any given week to operate on one of three experiment locations (primary and two alternates).
  - When a student elects to attend remotely they watch the live stream feed from one of their alternate workstations.
  - When necessary (e.g >50% of students attend remotely), the GAT and/or instructor step in and live stream operate the experiments for remote students.
  - After each session the schedule for the next week is released based on actual experiments completed. The first two lab week students have 2 pre-labs all subsequent weeks the student only has only 1 pre-lab.
- As additional lab work, each student is assigned:
  - pre-recorded videos which is instructional laboratory material
  - pre-recorded video which is a video with voice over of the GAT properly completing the experiment
  - e-campus quiz on laboratory procedures and expected outcomes
  - analysis of additional lab data that has been prerecorded
  - writing an individual lab report
Example Instructor Plan for Lab capstone course ZZZ:

Lab conditions / constraints:
- Course is listed as traditional Face-to-Face
- There is both a lecture and a lab component of this course
- Group work, “An ability to function on multi-disciplinary teams” is an ABET outcome for this course.
- Lecture meets twice per week (MW 8:00-8:50) in a room with a normal capacity of 145 students.
- Section size is 45 students.
- Lab/Studio sections meet once per week for 3 hrs (M 5:45 PM - 08:35 PM). Typically (non-COVID semesters), this scheduled time is a mixture of project updates, student presentations, lab training, and occasionally does not meet in the scheduled time with students scheduling their own project work time.
- The capstone class is divided into 12 projects (students normally work in groups of 3-4 students).
- The projects typically complete hands-on work in the Fischer Engineering Design Center (FEDC).
- COVID-19 related safety concerns:
  - Lecture room COVID occupancy limit is 52 students.
  - All the project benches, work benches, and equipment in the FEDC are of a size that only 1 person can work on them at a time.
  - The FEDC requires individual students to sign up and preschedule time in the FEDC for project or work spaces in 1-hour to 3-hour time blocks. The FEDC has student capacity limits that is about 1/3rd of the normal capacity.

Logistics:
- Lecture can meet as a single cohort in this large room.
- All concurrent group work and presentations are scheduled to happen through Zoom meetings.
- The FEDC is still used for project building in student scheduled access. No project building occurs off campus.
- The Howdy scheduled lab time meets as a zoom meeting.
- Students are required to schedule two hours of time at the FEDC (or remote equivalent) every two weeks.

Implementation:
- Considering the FEDC capacity limits, expectations for project builds have been reduced to 1/3rd of normal to be replaced by additional project simulation and design work.
- The FEDC usage requirements (and remote options) are posted on the syllabus.
- Student access the FEDC webpage and schedule a training activity, equipment usage, or project bench usage at the FEDC.
- Students at their own discretion schedule at least 2 hours at the FEDC every two weeks. Similar to typical semesters, students on their honor report this at project update meetings with the instructor.
- Remote Option
  - Rather than direct in person usage of the FEDC, student can elect to take an FEDC training course remotely.
  - Rather than direct in person usage of the FEDC, student can elect to schedule their FEDC time concurrent with another group member, attending virtually via a video call.
  - Rather than direct in person usage of the FEDC, student can elect to schedule project simulation or design work rather than work in the FEDC.