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Research Ramp-Up

Nine postdoctoral fellows and five graduate students make their scholarly home in the UC Santa Barbara lab of biologist Denise Montell. At least, they did.

When the COVID-19 crisis forced the shutdown of on-campus research operations, these budding scientists — whose professional futures depend largely on their research productivity — Montell, the Duggan Professor of Molecular, Cellular, and Developmental Biology, sent them to their actual homes to wait it out.

“We have exciting research projects, some of which are just getting off the ground and others of which are just coming to fruition. It was heartbreaking to shut them down and potentially lose momentum,” Montell said. “I am not exaggerating when I say that we were doing the most important research of my career when COVID-19 shut us down.”

The circumstances were similar in labs and offices across campus, across the disciplines. But now, a turnaround is on the horizon.

Some three months after the pandemic forced their hard stop, research activities are in the process of resuming on campus. It will be a slow return, with myriad protocols and modifications in place.

“Now that the state has started to open up some areas of the economy that present low health risks, we too want to get going because we are confident we can do laboratory research with low risk,” said Joe Incandela, vice chancellor for research. “We are in the process of ramping up research now very thoughtfully and

methodically.”

The overall plan, guidelines and educational materials the Office of Research is providing to researchers for this resumption are the culmination of a months-long effort by stakeholders in the Office of Research and across campus. They are the result of consultations with experts and from meetings with colleagues across the UC system and across the country, as well as reviews of industrial laboratory programs and those of national and international laboratories in fundamental science. “I am deeply grateful to all those who have contributed to these preparations — especially the Office of Research staff,” Incandela said. “It involved an extraordinary amount of study, a lot of meetings and many long days over the past three months.”

The number of individual researchers allowed to conduct on-campus research at any given time will be limited, so it may not be possible to include all research programs in the earliest stages of the ramp-up. The plan for resuming research looks to three guiding principles that have been established across the UC system. The first is to follow local, state and national public authority directives to shelter at home and maintain social distancing. Decisions at UC Santa Barbara will be guided by the governor’s office and the state and county public health departments.

The second principle involves protecting the physical and emotional health and safety of the research workforce, maintenance staff, clinical patients and human research subjects. The campus’s ability to carry out research and scholarly activities at any stage will depend on everyone being committed to physical distancing, face-covering and all other recommended safety measures.

The third principle is to consider the various strategies that are possible for ramping up research activities in a way that minimizes risks for all employees and is in compliance with public health guidelines. Efforts can be made, for example to minimize the number and density of people working on campus in order to minimize interactions. In addition, tasks can be planned in advance to maximize effectiveness while minimizing time spent on site.

“Laboratory researchers are well acquainted with preparing and following detailed procedures and they have now developed procedures for minimizing the risk of spreading the SARS-COV-2 virus that are generally very simple but likely to be very effective,” Incandela said. “We want to establish a new way of working that has

multiple levels of precautions that we quickly grow accustomed to, and that will enable us to avoid or severely limit infections, so that we can just keep on doing all of this important exploration.”

Guidance from the Office of Research is based on reviews of dozens of programs and research articles and includes methods and procedures that have proven to be effective around the world. Among them: wearing face coverings at all times; enhanced hygiene, including frequent hand-washing and disinfecting high-touch surfaces such as door handles, light switches, microscope knobs, shared keyboards; and understanding air flow.

“This strategy, first and foremost, involves creating a culture of keeping ourselves and each other safe,” Montell said. The campus plan, for example, includes such things as a daily symptom survey. Additionally, to enable more people to return to their research, the plan provides for working in shifts, although it does not allow for overnight work.

At this point in the phased process, undergraduates will, for the most part, not be allowed into the building.

In physics department labs, administrative staff and observational researchers will continue working remotely, as experimentalists come one-by-one, in intervals, allowing time in between to prevent air exchanges. Bathrooms and elevators will be single occupancy for the foreseeable future.

Physics also has developed and will use on a temporary basis an internal website to log arrivals and departures from its building and labs, to enable easier contact tracing if necessary, noted Claudio Campagnari, chair of the department. The log also makes clear which labs and areas would require cleaning if at some point someone using the facility tests positive for COVID-19.

“When you get into the lab you go to a website, fill out the time at which you entered and which room you’re in, and when you go home you log when you left and which rooms you went into,” he explained. “So, if somebody gets sick at least we have a record of where the person was. Of course we cannot do the tracing ourselves, but at least we’ll have the data to enable that.

This process will be replaced later this month, however, by an app that uses Quick Response codes. Using their smart phones, people entering and exiting buildings

and labs can scan the codes, which will populate a database with that information.

“A lot of people are very anxious to go back in, but it’s very important to do it safely and in a controlled way — so that’s the goal,” Campagnari added. “Also in the guidelines is that we don’t want to force anybody to go back in. Nobody should feel pressured to go back. That’s an important component of the plan, too.”

Indeed, personal comfort level around returning on a given day, or in general, is a vital consideration, concurred Rachel Segalman, Warren G. and Katherine S. Schlinger Professor of Chemical Engineering and chair of that department, who has deep expertise in protocols to prevent transmission of the virus in laboratory settings.

“We have had the time to flatten the local curve from an epidemiological sense and also to make careful plans for safe experimental work on campus,” said Segalman, who also is the Edward N. Kramer Professor of Materials. “COVID-19 will be with us for a while and it is not possible to shelter for the whole period; instead we formulated plans that incorporate social distancing, protective equipment, sanitizing and air/traffic flow in a laboratory setting to make work as safe as possible.

“We are fortunate in the sense that laboratories for physical experiments are generally designed to have really high air flow that comes into the building and is released without recirculation (in order to prevent cross contamination and spread of hazards),” she added. “This is particularly good in preventing the spread of an infection like COVID-19, which spreads effectively via aerosols and droplets. In laboratories, however, there are also inherent chemical, electrical and physical hazards, so we have had to be careful to implement plans that incorporate both COVID safety elements and general lab safety. For example, hazardous laboratory experiments should not be run when working in the lab alone, in case something goes wrong, so we’ve had to think about work-arounds like ‘virtual’ buddies in lab (via Zoom or text message) or socially distanced buddies and careful scheduling.”

Rod Alferness, dean of the College of Engineering, said, “After a nearly three-month coronavirus closure, we are excited to be able to re-open labs in the college. Our laboratories are where much of the important work is done to generate solutions that help to make life better. Perhaps even more important is the role that labs play in the teaching component of our mission, for it is there that students acquire the deep learning and experience they need to be successful in their careers.”

A limited amount of essential research has continued through the shutdown. Some of that work was being conducted at the UCSB Nanofabrication Facility, run by electrical and computer engineering faculty director Jonathan Klamkin. Pre-COVID-19, Nanofab, as it's known, supported some 600 users from the university and local industry.

With significant safety protocols and engineering controls already in place, including full linen gowning and HEPA-filtered cleanroom air handling, Nanofab was in a unique position to remain open under limited operation. It did so, Klamkin said, initially to support COVID-19 research and DoD critical programs, and to serve as a sort of 'test case' for how to operate during the pandemic.

"We constructed a detailed set of new protocols to enable safe social distancing and to minimize transmission," he explained. "This required additional PPE, modified entry and exit procedures, extensive cleaning protocols, relocation of some equipment, distancing rules and many other actions. And the most important aspect of our operation was the recognition that we should record as much data as we could, observe, learn and modify and improve our protocols regularly."

Between efforts at Nanofab and elsewhere, the projects allowed to continue were either related to the virus or otherwise deemed critical — and altogether amounted to "a very small fraction, perhaps 5%, of the total research we normally do," noted Incandela.

"This research during the shutdown is in what we have called Stages 1 and 2 of the current UCSB ramp-up plan," he said. "We are now preparing to start Stage 3 (of 6 stages), mainly for research that cannot be done remotely and which requires access to laboratories. We are focused on limiting the number and density of people on campus and in each laboratory adding about 15% of our normal pre-pandemic number of researchers, not including undergraduates."

As the process evolves, Incandela explained, the campus in Stage 4 should reach 30-35% of normal research personnel on campus, and up to 50% in Stage 5. The later stages will also see an increase in the number of researchers doing research in offices and the library, while Stage 6 "corresponds to when there is a vaccine that is widely administered to our community."

It will come none too soon, researchers across campus agree, but they're in no rush. Slow and steady — and safe — is their shared commitment as operations ramp up.

“The education and training that our students and researchers receive while carrying out sponsored research is crucial to their growth and development,” Klamkin said. “Access to laboratories is essential for their training, and although our lab practices will look different for the foreseeable future, we are all looking forward to getting back in the labs.”

Added Susan and Bruce Woster Dean of Science Pierre Wiltzius, “In the sciences, research is vitally important. Access to funding opportunities and a stellar reputation for supporting faculty in their projects are key reasons we are able to attract and retain top professors. Beyond fulfilling our division’s mission to be leaders in innovation and discovery, research helps drive us forward as a society by building essential scientific knowledge. I know that our faculty, students and staff scientists are eager to resume their work as soon as it can be done safely, and are excited to get back to projects that will help us better understand the world around us.”

That sentiment is echoed beyond the hard sciences, too, as researchers across the disciplines look to restart virus-stalled projects or begin new ones.

“Rarely has there been a time in U.S. and global history when social science research has been so crucial: from the devastating effects of COVID-19, which must be understood with social equity lens; to the deeply ingrained racial injustice that protests across the globe are demanding that we address,” said Charles Hale, the SAGE Sara Miller McCune Dean of Social Sciences. “Data rich, problem-driven, interdisciplinary social science research must guide our analysis of these and related issues, the first essential step for the accountable actions that need to follow.

“Social science research comes in all forms, from lab-based and highly quantitative, to qualitative participant observation,” Hale added. “In much of this work, site-specific interactions with people in real time is essential: we often need to travel, and to be in community, to carry out social science research. We must follow broad public health parameters in plans to resume this work, but resume we must.”

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society.

All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.