The COVID-19 Crisis

Update July 1 2020
CAVEAT!
I am not THAT kind of doctor.
I study rocks.

Ariel D. Anbar
Professor
School of Earth and Space Exploration
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The Situation on April 1

http://91-divoc.com/pages/covid-visualization/
The Situation on June 2
The Situation on July 1

Confirmed COVID-19 Cases by US States/Territories, normalized by population

Data: Johns Hopkins CSSE; Updated: 06/30/2020
Interactive Visualization: https://91-divoc.com/ by @prewade

Highlight: Arizona
Data: Total Confirmed Cases
Scale: Log Linear

http://91-divoc.com/pages/covid-visualization/
The Situation on July 1
Arizona is #1 (but not for innovation)

https://globalepidemics.org/key-metrics-for-covid-suppression/
No, it’s not because we are testing more!

Daily COVID-19 Test Positivity Rate per Day by US States/Territories

[Graph showing daily test positivity rate by state, with a notable increase in Arizona.]
Number of Intensive Care Unit (ICU) Beds Available and In Use at Arizona Hospitals

- **Adult Intensive Care Unit Beds Available**
- **Adult Intensive Care Unit Beds in Use**

% of ICU Bed Capacity

Dates:
- 3/30/2020
- 4/9/2020
- 4/19/2020
- 4/29/2020
- 5/9/2020
- 5/19/2020
- 5/29/2020
- 6/8/2020
- 6/18/2020
- 6/28/2020
Where are we headed?
Distance and Masks:
It is not really “either/or”

SARS-CoV-2 travels on particles of 0.1 – 100 μm size

Larger particles settle rapidly. Controlled by:

- Masks
- Distance

Smaller particles can remain suspended in air for hours. Controlled by:

- Masks
- Limiting number of people in a space
- Air dilution
Estimating risk of SARS-CoV-2 infection on a campus…

Key Factors

• How many people?
• How big a room?
• How rapidly is air changed?
• How much contact time?
• Risk tolerance threshold?
Notes on estimating personal risk of contracting COVID19 while attending class (updated)

Modeling personal COVID19 infection risk in university classes can help inform effective risk reduction strategies

Primer on the Immune System

Martin J. Spiering, Ph.D., ELS


[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4590614/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4590614/)
The Adaptive Immune System

**Antibody-Mediated:**
*Attack the pathogen*

**Cell-Mediated:**
*Attack the infected cells*
“Immune warriors known as T cells help us fight some viruses, but their importance for battling SARS-CoV-2, the virus that causes COVID-19, has been unclear. Now, two studies reveal infected people harbor T cells that target the virus—and may help them recover. Both studies also found some people never infected with SARS-CoV-2 have these cellular defenses, most likely because they were previously infected with other coronaviruses.”

Immune hunters called T cells can seek and destroy a cell (green) infected with and making copies of SARS-CoV-2 (yellow). NIAID

T cells found in COVID-19 patients ‘bode well’ for long-term immunity

By Mitch Leslie  |  May 14, 2020, 9:00 PM
News/SESE Leadership

Meenakshi Wadhwa
Director

Meenakshi Wadhwa is the Director of the School of Earth and Space Exploration.

Her research focuses on isotope cosmochemistry, in particular the sources and distributions of extinct radionuclides in the solar nebula; the formation and evolution of crust-mantle reservoirs on Earth, Moon and Mars; and the abundance and origin of water and other volatiles on rocky bodies in the solar system.

Ramon Arrowsmith
Associate Director of Operations

Ramon Arrowsmith studies active faulting, earthquake geology, tectonic geomorphology, and the geologic framework for human origins. Dr. Arrowsmith teaches Field Geology, Structural Geology, Geomorphology, and Computers in Earth and Space Exploration.

Chris Groppi
Associate Director of Undergraduate Initiatives

Christopher Groppi is an experimental astrophysicist interested in the process of star and planet formation and the evolution and structure of the interstellar medium. His current research focuses on the design and construction of state of the art terahertz receiver systems optimized to detect the light emitted by molecules and atoms in molecular clouds, the birthplace of stars.

Patrick Young
Associate Director of Community Outreach

Patrick Young is a theoretical astrophysicist interested in the lives and deaths of stars and their effects on their environments, from synthesis of the chemical elements to planetary habitability. His current research touches on computational hydrodynamics simulations of stellar interiors, supernovae and gamma-ray bursts and the synthesis and ejection of elements by nuclear fusion in stars and stellar explosions. He also models the evolution of stars and how their radiation, winds, and stellar activity may affect the habitability of nearby planets.

Hilairy Hartnett
Associate Director of Graduate Initiatives

Hilairy Hartnett has joint appointments in the School of Earth and Space Exploration and in the School of Molecular Sciences. Her current research interests are in the areas of biogeochemistry and organic geochemistry and focus on how geochemical, microbial, and anthropogenic processes affect the dynamic linked elemental cycles in modern, and paleo-environments.

Christy Till
Associate Director for an Inclusive Community

Christy Till is a geologist who teaches classes and leads a multidisciplinary research program on the role of magma in the formation and evolution of planets, known as the E.P.I.C. lab. E.P.I.C. lab research includes determining the timescales and triggers for eruptions at active volcanoes in the US, growing minerals and magma in high pressure and temperature laboratory experiments, and studying the likely compositions of magma and crusts on exoplanets. Dr. Till also has deep interests in working for justice, equity, diversity, and inclusion in academic science and improving science communication.
News/Launch of new fully online degree program
News/Communications: On campus presence

Re-opening of research operations (Research Intensification Plan) is currently on-going

- Research PIs asked to create and submit lab safety plans
- Most have received approval (status on KE website); some faculty, postdocs, research staff, and students back on campus
- “Community of Care” safety training for all coming back to campus; additional supervisor training for faculty and staff
- PPE (face coverings), hand sanitizer, disinfectant provided centrally
- Testing is starting to occur for ASU employees; registration required (https://cfo.asu.edu/employee-testing)
News/Communications: On campus presence

Plans for broader re-opening

- A team of senior staff and faculty representing various SESE buildings/spaces are meeting weekly to plan for a broader return to campus for the future
- All SESE buildings to have appropriate signage (incl. maximum occupancy limits) in common use spaces, kitchens, restrooms, elevators
- Plans for physical distancing with no more than 50% (nominally 30%) occupancy expected in any given building at any given time with staggered schedules
- Plans currently under review by Provost’s office; broader re-opening expected to occur no sooner than late July
News/Communications: Teaching

Plans for Fall 2020

- All classes will be taught in **ASU Sync mode** (synchronous teaching via Zoom, with some in-class component for limited numbers of students allowing transition to full remote teaching if that becomes necessary)

- At present, all full immersion classes that were not already designed as online courses will have some in-person component (although students may choose to join remotely)

- Lab components in courses have some flexibility to be fully immersion or fully online, or a hybrid; no decision yet for large-enrollment courses

- Classroom will be outfitted centrally through ASU with additional technology/tools (fixed or portable kits) to allow the above
News/Communications: Budget & Finances

- Enrollments increased significantly for this summer relative to last summer
- Enrollments continue to increase for the fall (but lower than this time last year); significant uncertainties for international and out-of-state students
- Plan for a significant cut to our annual budget
Community activities that are ongoing virtually through the summer:

- SESE Community Conversations (first Wednesday of June, July, & Aug)
- SESE Summer Colloquium (Wednesdays, 3:30-4:30 PM, weekly)
- SESE Virtual Tea (Thursdays, 3:00-4:00 PM, weekly)
- Open listening sessions with SESE leadership (weekly, 9-10 AM Tuesdays)
- Office hours with the director (biweekly, 8-10 AM alternate Fridays)