

All government shutdowns disrupt science – in 2025, the consequences extend far beyond a lapse in funding

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The government shutdown will continue until Congress can pass a bill reopening it.

Samuel Corum/AFP via Getty Images

U.S. science always suffers during government shutdowns. Funding lapses send government scientists home without pay. Federal agencies suspend new grant opportunities, place expert review panels on hold, and stop collecting and analyzing critical public datasets that tell us about the economy, the environment and public health.

In 2025, the stakes are higher than in past shutdowns.

This shutdown arrives at a time of massive upheaval to American science and innovation driven by President Donald Trump's ongoing attempts to extend executive power and assert political control of scientific institutions.

With the shutdown entering its fifth week, and with no end in sight, the Trump administration's rapid and contentious changes to federal research policy are rewriting the social contract between the U.S. government and research universities – where the government provides funding and autonomy in exchange for the promise of downstream public benefits.

As a physicist and policy scholar, I both study and have a vested interest in the state of U.S. science funding as a recipient of federal grants. I write about the history and governance of American science policy, including the nation's investments in research and development.

In the context of broader policy reforms to federal grantmaking, student and high-skilled immigration, and scientific integrity, this shutdown has both known and unknown consequences for the future of U.S. science.

Funding freezes, data gaps and unpaid workers

Over the past two decades, the story of government shutdowns has become all too familiar. Shutdowns occur when Congress fails to pass an appropriations bill before the start of the new fiscal year on Oct. 1, and, paraphrasing Article 1, Section 9 of the U.S. Constitution, the government can no longer spend money.

This funding gap affects all but essential government operations, such as the work of postal workers, air traffic controllers and satellite operators. Nonessential employees, including tens of thousands of government scientists, are barred from working and stop receiving paychecks.

With scientists and program officers at home, activities at the nearly two dozen federal agencies participating in research and development, such as the National Science Foundation and the National Institutes of Health, come to a halt. New grant opportunities and review panels are postponed or canceled, researchers at government laboratories stop collecting and analyzing data, and university projects reliant on federal funding are put at risk.

Extended shutdowns accelerate the damage. They leave bigger gaps in government data, throw federal employees into debt or lead them to dip into their savings, and force academic institutions to lay off staff paid through government grants and contracts.

Funding, public services and the rule of law

Even for shutdowns lasting a few days, it can take science agencies months to catch up on the backlog of paperwork, paychecks and peer review panels before they return to regular operations.

This year, the government faces mounting challenges to overcome once the shutdown ends: Trump and the director of the White House budget office, Russell Vought, are using the shutdown as an opportunity to “shutter the bureaucracy” and pressure universities to bend to the administration’s ideological positions on topics such as campus speech, gender identity and admission standards.

As the budget standoff nears the record for the longest shutdown ever, agency furloughs, reductions in force, canceled grants and jeopardized infrastructure projects document the devastating and immediate damage to the government’s ability to serve the public.



President Donald Trump alongside Office of Management and Budget Director Russell Vought.

Brendan Smialowski/AFP via Getty Images

However, the full impact of the shutdown and the Trump administration’s broader assaults on science to U.S. international competitiveness, economic security and electoral politics could take years to materialize.

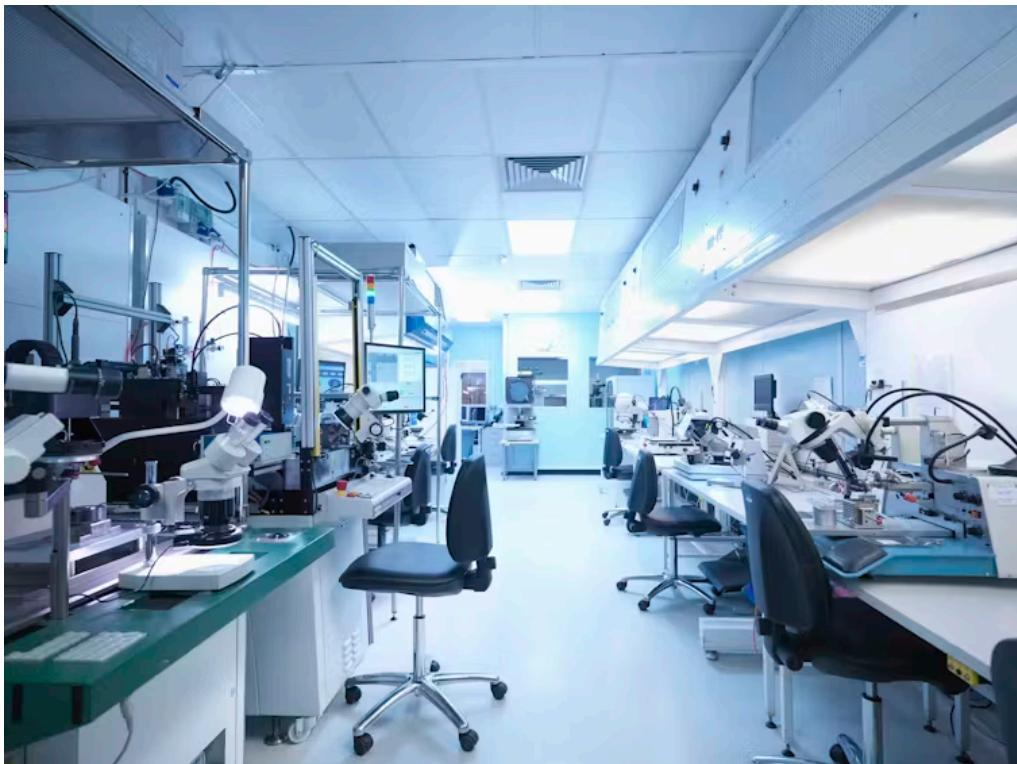
In parallel, the dramatic drop in international student enrollment, the financial squeeze facing research institutions, and research security measures to curb foreign interference spell an uncertain future for American higher education.

With neither the White House nor Congress showing signs of reaching a budget deal, Trump continues to test the limits of executive authority, reinterpreting the law – or simply ignoring it.

Earlier in October, Trump redirected unspent research funding to pay furloughed service members before they missed their Oct. 15 paycheck. Changing appropriated funds directly challenges the power vested in Congress – not the president – to control federal spending.

The White House's promise to fire an additional 10,000 civil servants during the shutdown, its threat to withhold back pay from furloughed workers and its push to end any programs with lapsed funding "not consistent with the President's priorities" similarly move to broaden presidential power.

Here, the damage to science could snowball. If Trump and Vought chip enough authority away from Congress by making funding decisions or shuttering statutory agencies, the next three years will see an untold amount of impounded, rescinded or repurposed research funds.



The government shutdown has emptied many laboratories staffed by federal scientists. Combined with other actions by the Trump administration, more scientists could continue to lose funding.

Monty Rakusen/DigitalVision via Getty Images

Science, democracy and global competition

While technology has long served as a core pillar of national and economic security, science has only recently reemerged as a key driver of greater geopolitical and cultural change.

China's extraordinary rise in science over the past three decades and its arrival as the United States' chief technological competitor has upended conventional wisdom that innovation can thrive only in liberal democracies.

The White House's efforts to centralize federal grantmaking, restrict free speech, erase public data and expand surveillance mirror China's successful playbook for building scientific capacity while suppressing dissent.

As the shape of the Trump administration's vision for American science has come into focus, what remains unclear is whether, after the shutdown, it can outcompete China by following its lead.

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