
Outmoded Engineers?

A department at Cornell, founded in the '60s, is latest of its kind to be merged or eliminated. Critics say more theoretical programs are valuable, but vulnerable because they generate fewer large grants.

By [Jack Stripling \(/users/jack-stripling\)](/users/jack-stripling) // January 8, 2009

It's not every day that faculty mourn the death of their own department at an Irish wake, but that's exactly what happened at Joe Burns's house recently.

Upon learning that Cornell University plans to merge its department of theoretical and applied mechanics with the mechanical and aerospace engineering program, professors like Burns immediately feared the worst. They wondered what the future held for their department, and by extension what the future holds for their entire field of research.

The theoretical and applied mechanics department at Cornell, formed in 1964 and commonly abbreviated as "TAM," is the latest in a series of such departments to be merged or eliminated from a marquis engineering college. Engineers in TAM departments have helped lay the theoretical framework for subjects as diverse as robotics, insect flight and the formation of the cosmos. Even so, these departments have been criticized as relics, focusing more on broad-based theoretical concepts than the hands-on laboratory work that many argue will be the key to future technological advances.

"I think our department suffers in the sense that we're a nontraditional engineering department," said Burns, a professor in TAM and astronomy. "If you look at things like department rankings in *U.S. News & World Report*, our field is not even ranked."

Cornell officials say TAM faculty will find a home in their new department, but a news [release \(http://www.cornell.edu/president/statements/2008/20081222-tam.cfm\)](http://www.cornell.edu/president/statements/2008/20081222-tam.cfm) made clear that administrators don't view TAM departments as synonymous with excellence.

"Cornell is the last of the top-ranked colleges of engineering to maintain a TAM department," the release bluntly concluded.

While such mergers may seem like inside baseball to anyone outside of engineering, the decline of stand-alone TAM departments is indicative of a long-term shift in research priorities on college campuses, according to faculty at Cornell and other TAM programs. Cornell's TAM program was respected, but it was by no means a rainmaker for research dollars.

"The thing that hurts us is our research funding has been low," said Alan Zehnder, chair of TAM at Cornell. "That has become, I don't want to say the key metric, but there is always a chart on research dollars."

TAM has brought in about \$2 million in annual sponsored research for the past five years, likely the lowest figure of any engineering department in the college, Zehnder said. But that's perhaps not too surprising, or even that damning, when one considers what TAM departments have traditionally done. With a strong basis in mathematical theory, TAM faculty don't typically need large, expensive laboratories – or even fat research grants – to explore the questions that interest them. As such, they have the luxury of doing research that many other engineering faculty couldn't or wouldn't pursue. There's a freedom to that model that stimulates creative work and benefits academe, Zehnder said.

"You and your students [in TAM] work on your own curiosity-driven research, rather than what's the latest thing in the [National Science Foundation]," he said.

TAM has historically carried a relatively heavy teaching load, and that provides the department with institutional funds for graduate assistants, further lessening the need to rely on grants.

Theorists on Defensive

The merging or closing of departments is often attributed to cost cutting, but that's not the primary driver at Cornell, according to Kent Fuchs, the former dean of engineering who took over as provost this month. Tough economic times have forced the college to slow hiring, but Fuchs said he would have wanted to "reinvent" TAM absent any financial pressures.

"The primary move is looking at what our priorities will be for the future," he said.

The college aims to invest in its mechanical and aerospace programs, in part by adding faculty slots to those areas when TAM faculty leave or retire over time, Fuchs said.

"It's not that we're moving out of the area of theory, and we're certainly not moving into just lab research," he said. "The new faculty we hire tend to do both."

Ishwar Puri, head of a department similar to Cornell's TAM at Virginia Tech, said it's appropriate for TAM faculty to evolve into hot areas like nanotechnology and biotechnology. That said, Puri argued that stand-alone TAM departments are essential because they provide the theoretical underpinnings that drive engineering advances. TAM's function cannot be simply "absorbed" into other departments, as many professors would suggest, Puri said.

"What I would admit is many people have misconceptions about these departments," said Puri, head of Virginia Tech's Department of Engineering Science and Mechanics. "And some of those misconceptions arise because those who are in administrative positions in engineering come from very classical [programs].

"When you fragment [TAM departments], I think some of the scholarship that emerges from these units is not as profound as it might have been otherwise," he added.

Nonetheless, these mergers continue. Ohio State and Michigan State University have closed their TAM departments in recent years, and Puri said he feels "doubly threatened" every time a TAM program hits the chopping block. In order to avoid closure, leaders of the remaining TAM programs have to walk a tightrope, evolving in a way that keeps them vibrant without changing their core identities along the way, Puri said.

"Really, sometimes you get squeezed," he said. "You get squeezed between administrators who want something and squeezed between faculty who consider themselves the standard bearers of an age-old philosophy, and they think you're too quick to compromise."

Similar Concerns at Illinois

The concerns expressed by TAM faculty at Cornell have a familiar ring to Petros Sofronis, associate head for mechanics programs at the University of Illinois at Urbana-Champaign. Sofronis was a TAM faculty member at Illinois before the department merged into a newly created department now known as mechanical science and engineering.

"There was a group of faculty that had this viewpoint against the merger," Sofronis said. "I think they went overboard fighting the merger, and now we've been almost two years since and things didn't turn out the way faculty were worried [they might]. Mechanics did not die."

Faculty who opposed the merger at Illinois predicted that good professors would leave the department, and TAM would be given short shrift in the new department. While some faculty have left, the majority stayed to find that new opportunities and funding possibilities emerged, Sofronis said.

"I would reverse the argument [of critics]," he said. "I would say that when theorists collaborate with experimentalists, I think theorists can find more resources to carry out their theoretical work."

So what of the engineers who want to be pure theorists, and aren't interested in partnering up in the lab? Sofronis says they're yesterday's news. The theoretical framework has already been laid, and it's time to move on from there, he said.

"Those types of theories, mechanical theories that evolved in the fifties or even [centuries] before the fifties, we are done with those," Sofronis said. "We have all these theories. The purists that says 'I would like to do pure mechanics,' we have it [already]. We have the theories."

Expounding on his thoughts in an e-mail days later, Sofronis added "Now, the new challenge is to see how existing theorems, theories, and methodologies can be used to delve into new areas and increase our understanding of the issues involved ... The future is not mechanics by itself, but mechanics along with other disciplines."

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