The largest building Lehigh has ever built, HST is designed to encourage collaboration among faculty and students across disciplines.

Written by: Christina Tatu | Photography by: Douglas Benedict Posted: April 7, 2022

Working for HGA, Vanderweil provided MEP/FP engineering, tel/data, lighting, energy modeling, and sustainable design services for the new Health / Science / Technology Building at Lehigh University.



Rising up from the northeast corner of Asa Packer campus, Lehigh's newly opened 200,000-square-foot Health, Science and Technology Building (HST) is different than any other on campus, with sweeping windows that offer passersby a look at the research under way in its state-of-the-art facilities, and a community room with doors that open directly to the South Bethlehem neighborhood, welcoming residents to public events and lectures.

Inside, open-concept labs allow faculty across disciplines to work side-by-side on interdisciplinary projects. Large open spaces with glass walls replace closed-in offices and narrow hallways, encouraging encounters between faculty, staff and students throughout the day.

"Research buildings and research facilities on our campus, and many campuses across the country, traditionally have been designed in such a way to create separate little boxes where particular labs, faculty and projects can be done," Provost Nathan Urban said. "The HST building, quite literally, eliminates walls, eliminates barriers to the kind of collaboration we think is critical for advancing research areas that are going to be a focus for Lehigh, for the country and, to some extent, the world."

The largest building on the Asa Packer campus—and the largest Lehigh has ever built—HST provides the most modern, up-todate environment for interdisciplinary research on the university's campus. "For those reasons," Urban said, "it's a very significant development for Lehigh."

HST opened in the Spring 2022 semester, with 32 faculty members and 15 labs being moved in mid- to late January from

existing areas on campus, including the P.C. Rossin College of Engineering, the College of Health and College of Arts and Sciences. A ribbon cutting is planned for this spring.

From faculty research to layout, HST is all about interdisciplinary research. It incorporates a pedestrian bridge that connects the new building to Lehigh's other core research facilities: Seeley-Mudd, Sinclair and Whitaker labs.

HST will advance Lehigh's mission to cultivate more interdisciplinary interactions, Urban said.

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https://www2.lehigh.edu/news/new-health-science-and-technology-building-a-hub-for-interdisciplinary-research

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"The goal is to have this building be a place where that kind of work is routine. You can see that in terms of the makeup of the people who are going to be in the building," Urban said. "They're coming from multiple colleges, from multiple departments. The design of the building and the decisions about who is going to be in the building were intended to foster this kind of intermixing."

Among the researchers working in HST are polymer chemist Elsa Reichmanis, who wants to collaborate with Israel E. Wachs, the G. Whitney Snyder Professor in the chemical and biomolecular engineering department, to study how polymer and hybrid materials behave in real-world conditions; and Hyunok Choi, an associate professor in the College of Health and environmental epidemiologist, who plans to work with colleagues in education, biology, psychology, business and engineering to explore how pollution causes asthma in children and how to develop better treatments and new health policies.



In the basement is the Nano | Human Interfaces Visualization and Data Analysis Lab run by Martin Harmer, the Alcoa Foundation Professor of Materials Science and Engineering, and Chris Marvel, a research scientist in the department of materials science and engineering. The visualization lab, a Lehigh presidential initiative, features three 98-inch touch screens that allow multiple researchers to interact with one another as they visualize and analyze data in the same space. A separate human observation lab, set up in the same room, enables cognitive psychologists to observe the individuals conducting research and gain a better understanding of how people communicate in an interactive research environment.

In another project that will take place at HST, Kelly Schultz, associate professor of chemical and biomolecular engineering, and colleagues Steven McIntosh, department chair, and Angela Brown and Mark Snyder, also associate professors, will combine their specialties of antibiotic resistance, biomaterials, scaffold microstructures and electrochemistry to grow fake meat in a lab, a project they say could reduce greenhouse gas emissions generated by the meat processing industry.

"The most natural thing you can do in the space is work with the people around you," said McIntosh, who served as a faculty liaison to the advisory committee that oversaw HST's design. "You have to create the environment for interaction and then you have to let people go. They will do new and interesting things. They will work together, but you can't dictate it."

McIntosh and Snyder chose to merge their labs once they settled in HST.

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"We both synthesize materials, co-advise students and have multiple collaborative research grants, so it makes sense. Having my students next to his students, they can say, 'How do you do it that way?' or 'Maybe I can try that technique,'" McIntosh said. "There's no reason to have walls and barriers, and that's the way this building was designed. It eliminates them."

Details, even down to the building's doors, were carefully planned. The staircases offer sweeping views between floors, ensuring the entire space feels open, yet connected. The minimalist gray-andwhite interior is accented with contemporary couches and lounge chairs in shades of lemon and lime, with an occasional pop of primary color.



The welcoming spaces are set up around the perimeter of the building with faculty offices in the center, a strategic design that ensures professors will be among their students as soon as they step outside their offices.

"There will be lots of interactions, lots of engagement between faculty members, students and research staff," Urban said. "The structure of the building is designed to foster these interactions with labs that are very open. Even walking upstairs can be a barrier in some buildings, but the way HST was designed was to invite people to see what's happening on each floor, to easily move between spaces."

At nightfall, "Lehigh" is illuminated in LED lights at the top of the building, a 60-foot-by-10-foot beacon visible from various vantage points across the city. The café on the first level has a "green roof" overtop where native plants sprout, and the upper windows with

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western and southern exposure have solar shades that mimic the microscopic image of a cell.

It's all very modern with lots of metal and glass, but the entranceway doors, Project Manager Joe Klocek '98, pointed out, are wood. That design decision was a nod to Lehigh's oldest buildings, which also feature heavy wood doors.

Designing Lehigh's Newest Research Facility

HST was designed by HGA, a national interdisciplinary design firm.

Throughout the academic world, there's a growing idea that buildings should no longer be department-specific, but interdisciplinary, said Bill Wilson, an architect and principal with HGA's science and technology division in Boston.

"In the design profession, the spaces we are trying to guide clients to use are generic spaces that can be reassigned to anticipate unknown change. You can call that flexibility, but also sustainability or resilience," Wilson said.

"We are looking at three to four generations of faculty who will be doing things here that were undreamed of at the outset of the building. It needs to be very robust so that it can adapt itself to a lot of different arrangements and equipment."

HST was designed to have large, open spaces that can easily be reconfigured. The labs feature moveable tables with overhead gas lines that can accommodate almost any arrangement.

The building is targeting LEED Gold Certification by the U.S. Green Building Council. It also earned a Fitwel Certification given to buildings that emphasize public health through measures such as walkability, access to natural daylight, indoor air quality and offering healthy food options.

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The overall building is designed and constructed to minimize vibrations. One particular area in the basement, which Wilson called "the bathtub," is especially important to Lehigh's high-performance microscopy work. The room is built extra tall and deep with three feet of concrete flooring resting over floating blocks that significantly minimize disruptions from the outside world.

"The reason for this is that the resolution of research has increasingly become tighter and tighter," Wilson said. "That's why our devices are getting smaller and smaller," he said, holding up his smartphone.

The space is quiet enough that researchers can examine particles down to five nanometers of resolution. For comparison, a piece

of paper is 10,000 nanometers thick, according to the National Nanotechnology Initiative.

Lehigh first considered a new interdisciplinary building during the 2015-2016 academic year, following a study of the university's research infrastructure.

"We had done an assessment of our facilities and a lot of them are aging, but they also weren't conducive to interdisciplinary work," said Brent Stringfellow, who had served as Lehigh's University Architect.

"You're forcing people to interact, to see what's going on, supporting the idea that different researchers can be next to each other." BRENT STRINGFELLOW

In the older buildings on the Lehigh campus, each researcher is assigned a room off a hallway and those rooms are walled off, concealing what's going on inside, Stringfellow said. At HST, in contrast, the labs are open spaces surrounded by glass. And although there are a lot of conference rooms and places to gather, there are no formal classrooms.

"You're forcing people to interact, to see what's going on, supporting the idea that different researchers can be next to each other," Stringfellow said.

For now, the third and fourth floors of the building remain unfinished with the option to convert them into more lab space, depending on the university's future needs.

Wilson said he and his colleagues considered facilities across the country to get ideas for the building, including Stanford University's Bio-X program, housed in the James H. Clark Center. That facility brings together biomedical and life science researchers, clinicians, engineers, physicists and computational scientists in open labs with glass walls, exposed staircases and bridges that link wings.

Another space was Paul M. Gross Hall at Duke University, a building that dates back to 1968 but was extensively updated in 2014 to add a curtain wall of glass and aluminum, flooding the building with natural light. Offices were moved to the perimeter of Gross Hall and open work stations were intermingled in the center, encouraging colleagues to collaborate.

"We weren't trying to find a building we wanted to copy," Stringfellow said. "We chose the features that were best for Lehigh."

While HST has features occasionally seen in other buildings, it stands apart because of its configuration, Wilson said. The open-space concept with labs that are easily reconfigurable, plus Lehigh's Core Data Visualization Lab, make the facility unique. "I think HST will be a pioneer in creating research culture," he said.

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Wilson compared the building itself to a staircase, the first step at the base of the hillside leading into Lehigh's steep campus. "It's a very prominent site because you're going to arrive on campus and this will be one of the first buildings you see. You are invited into it and up through the campus," he said.

A Home for the College of Health

Just as the building creates a stepping-stone to the rest of Lehigh's campus, it also forges a link to the community with doors that open onto Morton Street at both Webster and Adams streets. Bethlehem residents will be able to visit the community room for public events and lectures. There's also a separate entrance for individuals to arrive anonymously for focus groups and interviews



The space is especially significant for the College of Health, where many faculty members do community-based research, said Beth Dolan, the interim dean of the college. Projects include studying the effects of air pollution on the health of those living on the South Side and the effects of the pandemic on maternal and child health in the community.

In addition to the community room, HST will also feature a Health Data Warehouse to house publicly available, subscription and privately held data sets on demographics and population health. The information will be utilized by both the College of Health and College of Business to study ways to improve health outcomes in populations, increase quality of care and reduce the cost of healthcare.

The building's design "demystifies science" and allows for collaboration, Dolan said. "You can see folks doing collaborative research with community members in the community space. The building has unlimited potential, actually, because we don't know what's going to happen, we can't completely predict what will happen here, which is great."

The College of Health launched in Fall 2020 offering a bachelor of science degree in population health, and last spring unveiled a new bachelor of arts degree in community and global health. There are plans to launch graduate degrees in Fall 2022 along with a Ph.D. program in population health, and a dual degree with the College of Business next year. HST is the college's new home base, which has created a sense of renewed excitement among students and faculty, Dolan said.



"We have existed, obviously, but there's a link between place and identity, and so I think that being in this place helps us really get on the map, literally and figuratively," she said.

The college plans to have 12 faculty members by Fall 2022 and is in the process of hiring an additional eight faculty members, Dolan said. At full capacity, it plans to have 55 faculty members. There are also five staff members and eight research scientists with the Institute for Indigenous Studies, which is affiliated with the college. In January, 14 faculty and staff members associated with the college moved into HST. The college's administrative suite is on the first floor of the building.

"HST has been really helpful in terms of recruiting students and faculty," Dolan said. "The students are so excited, what they keep saying is, 'We have a home now. The College of Health has a home.""

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Fathima Wakeel, associate professor and director of graduate programs at the College of Health, joined the faculty in 2020. She came from Ferris State University in Big Rapids, Michigan, where she focused on public health.

"Personally, I've always been interested in community-based research. My Ph.D. is in public health, specifically community health sciences," she said. "I'm really excited about the HST building because it's facing outward into the community. An emerging priority while I've been at Lehigh is for the university to be immersed in the community and contribute to the lives of its residents."

Wakeel will use the space for her community-based research, which includes a study on the physical and mental health impacts of the COVID-19 pandemic and an interdisciplinary study launching this spring to address the needs of adolescents with autism, who often lose support when they transition into adulthood.

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Moving 15 Labs in a Week

HST was under construction for two-and-a-half years, facing supply chain issues and other delays resulting from the pandemic.

"It's a longtime coming," Klocek said in January as he oversaw the faculty and lab moves. It took dozens of workers per lab to facilitate, since each lab had its own advanced equipment and sensitive chemicals.

"Every lab is different. We are moving chemists, biological scientists, chemistry; there's materials science and microscopy in the basement," he said. "Every lab has some different equipment, and all those items have movers related to them and specialty groups that have to decommission the equipment and move it."

Equipment manufacturers from as far away as Germany and California came to assist with the move, Klocek said.

"It's definitely very nice. It's a very modern building," said Manoj Silva, a fourth-year P.h.D student in chemical engineering, as he helped move a chemical engineering lab. "I think the open space concept is pretty cool because we used to be in our own lab [at lacocca] but now we'll be able to see more people walking around and talk to them and learn more about what other labs are doing."

The development of HST was one of the factors that led Reichmanis, a member of the National Academy of Engineering and a groundbreaking researcher in the world of microlithography, to join Lehigh's faculty in 2020 as a professor and the Carl Robert Anderson Chair in Chemical Engineering. Her new office, on the second floor of HST, is also across from her new lab space.

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"Just the idea of having an open lab environment with multiple research groups coming from a range of different departments creates opportunities for interacting with people," Reichmanis said. "That sort of chance meeting, at least in the past for me, has led to some interesting research. It's exciting to me."



Reichmanis was also attracted to Lehigh for its cutting-edge microscopy tools, which will be housed in one location in the basement of HST. Reichmanis and Wachs have been discussing future collaborations that bridge the electrochemical research in the Reichmanis Group with the operando molecular spectroscopy expertise in the Wachs Group, an effort that will be made easier now that both groups are located on the lower campus and critical characterization tools used by both are in the same building. Their research could impact many advanced technologies, ranging from longer lasting batteries to flexible, lightweight sensors for biomedical applications or environmental monitoring.

McIntosh said the layout of HST makes it easier to collaborate with Schultz, Brown and Snyder on their project to adapt human tissue engineering techniques to grow meat in a lab, and with colleagues in other departments on topics such as green energy and materials.

The team was recently awarded a \$250,000 grant from the Good Food Institute, an international nonprofit devoted to reimaging how meat is produced. In lacocca the team had four separate labs, but in HST they easily have access to the same space, McIntosh said.

"This is the physical realization of what we talk about in terms of collaboration," McIntosh said.

He's excited to have his students experience the space and a new way of working together. It will lead to a better, more enriching experience for everyone, he said.

"What does it mean to come to Lehigh as a student?" McIntosh asked. "I think it means that the faculty and their research are more accessible and that the communication barriers are extremely low. This building makes them disappear."

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