UNLV’s Science and Engineering Building is open for business – the business of conducting world-class research. Step inside and find out why some are calling it the most important structure built on campus since the university was established more than 50 years ago.

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UNLV's Science and Engineering Building is home to a variety of multidisciplinary research teams that focus on wide-ranging subjects, from arid lands to transportation.
What is a building, if not a bricks-and-mortar promise to house an activity of significance?

In the case of UNLV’s Science and Engineering Building (SEB), the promise is research, and the significance is the impact it will have on the future of the community, state, region, and beyond.

Containing more than 205,000 square feet and housing some of the most advanced technology available, the SEB creates an environment ideal for interdisciplinary research. It was specifically designed as a research facility to support innovative approaches that are conceived and developed through collaboration among faculty in the sciences, engineering, health sciences, and other units on campus.

The vision for the research facility began to take shape more than a decade ago when economic diversification re-emerged as one of the state’s top priorities. State and community leaders, including the late Gov. Kenny Guinn, key legislators, and the Nevada Development Authority, recognized the need to provide additional space for research on new technologies with commercialization potential that would support a more diverse Nevada economy.

In the meantime, enrollment was also growing in engineering and the sciences, placing heavy space demands on the colleges housing these disciplines. Given that a highly educated workforce also helps support economic diversification, it became clear that a new technology-based research facility would be critical to the future of UNLV and Nevada.
University, government, and private-sector representatives recognized a shared interest in building such a facility and began to commit time and resources to making the SEB a reality. Support for the new building expanded, and it moved from the university’s wish list to the top of the state’s planning and construction project list. The building was approved by the 2001-03 Nevada Legislature; construction started in 2005, and a phased move-in and commissioning of equipment has been under way since construction was completed in early 2009.

“The SEB serves as a testament not only to the vision of UNLV’s current and former administrators, but also to those leaders in Nevada who recognized the contribution that academic research can make to the state’s economic progress and resiliency,” says Ron Smith, vice president for research and dean of the Graduate College. “In many ways, the SEB was developed for and is dedicated to the future of this state.”

This point is not lost on faculty now occupying the building. UNLV chemistry professor David Hatchett, who recently moved into the SEB with his research team, sees the opportunities the building and its research can provide.

“Applied research results in technology,” Hatchett says. “The ability to leverage research dollars and produce technology that can be patented, marketed, and generate revenue in a time of budget constraint is extremely important to the university, community, and region. The research and technology developed at SEB can provide business opportunities for the future success of this region and the state.”

In order to achieve this kind of success, the SEB was designed to address one of the most pressing challenges facing academia: how to foster the interdisciplinary research collaboration that is often credited with jumpstarting scientific innovation and discovery and...
garnering grant funding.

“Interdisciplinary collaboration is not just some fleeting trend in academic research, but rather the model by which all great research programs and institutions will be measured going forward,” says Stan Smith, associate vice president for research and director of the SEB. “UNLV scientists and engineers have long recognized and embraced the importance of developing close working relationships with their colleagues, but the SEB actually makes physical interaction among them a daily occurrence. It fosters an easier, more free-flowing exchange of ideas, which has always been the foundation of discovery and innovation.”

The SEB design concept is deceptively simple: Position researchers and their labs in close proximity to their peers, providing ample opportunity for professional interaction, and support the flourishing partnerships that result. The building accommodates this goal through unique design principles, including a “dance-floor” configuration, which means that faculty labs are not separated by walls. This provides researchers from a variety of disciplines greater opportunity for interaction and facilitates their access to highly specialized equipment. These labs also contain movable lab benches and casework, as well as open overhead utility line carriers, which provide easy access and flexibility in use of the space. Near each group of labs are also breakout rooms where researchers can congregate and discuss ideas.

Look around the nation at the institutions that are historically synonymous with scientific innovation,

Design with the Future in Mind

The Science and Engineering Building has obtained a Leadership in Energy and Environmental Design (LEED) Silver rating, which indicates that the building meets environmentally responsible and sustainable design, construction, and operation standards. Its design received the 2004 Citation Award in the Unbuilt Category in the American Institute of Architects’ Nevada Design Awards. It also received the Best Green Practices Award in the building category from the Las Vegas Business Press in 2009. Some of its sustainability-oriented features include the following:

- A satellite energy plant, housed in a separate building, provides heating and cooling for the SEB and future buildings on the north side of campus.
- Construction materials for the building include recycled glass, steel, concrete, and wood. More than 60 percent of the leftover construction waste was recycled for future use instead of being sent to a landfill.
- High-performance glazing reduces solar heat gain from the exterior, insulates the building from heat loss on the interior, and allows adequate levels of light to penetrate the building.
- Incoming air is pre-cooled through evaporation, reducing air-conditioning needs. Occupancy and ambient sensor controls are used to automatically turn off lights in unoccupied rooms, reducing electric light usage during the day.
- The building is also designed to reduce water consumption by 42 percent through use of drought-tolerant native landscaping and a drip irrigation system, along with low-flow plumbing.
and you’ll see buildings like the SEB that were either recently completed or currently under construction. It’s a relatively new concept, but one that’s gathering momentum, according to Ron Smith.

“The SEB sends a clear message that UNLV is serious about inspiring, developing, and increasing the kind of intellectual infrastructure necessary to support economic diversification,” he says. “The impressive portfolio of our faculty scholarship, combined with the high caliber of students and the great potential of this new facility, demonstrates our commitment to this goal.”

Take a look at the directory of the SEB and you’ll see no shortage of “star” scientists and engineers who are leading teams that collaborate on research of critical significance to the state and region. The building houses a wide range of research projects on such subjects as increasing the efficiency of renewable energy technologies, analyzing cutting-edge materials science, and enhancing understanding of the effects of climate change on desert environments. Here are just a few of the research themes being addressed in the SEB.

Arid Lands – Soil/Plant/Water Stress Interactions

The team of researchers focusing on this theme studies how arid land plants adapt to stressful environments. Their goal is to advance landscape water conservation, water reuse for urban applications, development of crops for tolerance to desert lands, and restoration of disturbed desert areas. Researchers conduct studies on a variety of subjects, including utilizing urban reuse water to grow turfgrass and ornamental trees; inserting plant genes that promote stress tolerance into crops to make them more resilient; and restoring the ecology of desert lands after devastating wildfires. Their work involves scientists in the areas of plant physiology and ecology, molecular biology, and soil science. Each of the principal investigators in this group conducts extensive outreach activities associated with their research. They have formed partnerships with such off-campus organizations as the Southern Nevada Water Authority, Nevada Cooperative Extension, Las Vegas Master Gardeners, and Lake Mead National Recreation Area.

Inorganic Materials and Nanomaterials

This research team employs experimental and theoretical methods to investigate solids, surfaces, and interfaces in a variety of materials systems. This research has applications

Lloyd Stark, Arid Lands Research Group

“The SEB allows faculty to ‘bring the lab into the classroom’ by bringing our research experiences to bear on current concepts. Similarly, we can ‘bring the classroom into the lab’ by inviting promising students into our research programs, where they can initiate and conduct research under supervision. This is where research meets the educational goals of the university. UNLV does this much better than other universities with which I am familiar. We encourage the active participation of undergraduates in research. Several of us in biology publish with our students, which gives their careers in science a great boost.”

David Hatchett, Inorganic and Nanomaterials Research Group

“The Science and Engineering Building has provided a central research facility and laboratory that houses all of the equipment for my research that was previously housed in four different facilities. This has increased the efficiency of my laboratory and research. Also, the quality of the lab space and the ability to collaborate with a diverse group of researchers is greatly appreciated. Currently, there are faculty and students from engineering, physics, health sciences, and radiochemistry that regularly use my laboratory to run experiments.”
Frank Van Breukelen,  
Integrative Physiology Research Group  
“The Science and Engineering Building offers a very modern venue to conduct our research. The little things that come with the SEB add up and significantly facilitate our work. For example, the air supply in the building is much cleaner than in our old building; this translates into a better environment for conducting research. Having a machine shop on site is also very helpful. We had a collaborator from out of state who forgot a piece to his instrument set up. We just went downstairs to the machine shop, fabricated the piece, and we were up and running in an hour.”

Brendan O’Toole,  
Materials and Structures Research Group  
“The SEB has allowed our research group to have a materials processing lab separate from our mechanical testing and computational lab. We were able to fabricate components for four different projects last semester (including two from outside our group) without interrupting our testing or computational work. This was not possible before, and we would have had to turn down some of that work when we were crowded in the older building.”

in a variety of fields, including nanoscale light-emitting devices; renewable energy conversion (e.g., solar cells and hydrogen fuel cells); chemical sensors; nuclear waste management and stockpile stewardship; and combustion science. These investigations cut across several fields of science and engineering, requiring, by their very nature, interdisciplinary research collaborations. This involves chemists and physicists, engineers, spectroscopists, and theoreticians; the team also collaborates with industrial and national laboratory partners, helping to raise the profile of UNLV in the research and business communities.

Integrative Physiology  
SEB researchers who focus on integrative physiology take a multi-disciplinary approach to how animals interact with their environment, from the level of individual genes to animals in their natural habitats. These internationally recognized faculty members investigate how long-term and short-term climatic changes affect a wide variety of animals by studying behavioral and physiological responses to environmental stress. They also support a core genomics facility located in the SEB. The integrative physiology team is highly collaborative and works closely with other UNLV research groups as well as scientists at other universities. Their research is funded by the National Science Foundation, the National Institutes of Health, and other sponsors.

Materials and Structures  
The goal of the research in this thematic area is to develop and analyze new materials and structural components that help optimize the performance of machines, vehicles, manufacturing equipment, and large engineering systems. Most of the research projects in this area involve making materials or components, measuring their physical and mechanical properties, and developing computational simulations of their behavior, including failure analysis under extreme environments such as high temperature, multi-axial loading, impact, and blast loading. The researchers in this group utilize well-equipped labs with sophisticated systems used to measure material properties and test their components. They employ control and data acquisition systems for tests in tension, compression, bending, fatigue, impact, and high temperature. They also use high-speed cameras and 3-D digital scanners, as well as several different commercial software programs for design and computational simulations.
Renewable and Alternative Energy

This team focuses on a broad range of solar and renewable energy projects with the goal of advancing renewable energy technologies, developing concepts that could evolve into commercial products, and working with private partners to refine and improve renewable energy systems. The researchers focus on such areas as utility scale power generation, building applications, and advanced vehicular systems (hydrogen and fuel cells), utilizing a wide range of techniques and types of analysis. Their research involves several engineering disciplines, environmental studies, business, and architecture.

Transportation

This group of researchers seeks to address a broad range of transportation issues, including safety and congestion on highways and surface streets; traffic flow and incident management; roadway access; and strategies for traffic control, to name a few. The group’s goal is to contribute scientific data and analysis to traffic and pedestrian issues through multi-disciplinary research in order to bring solutions to fundamental and applied transportation problems. This research involves faculty from civil engineering, electrical engineering, statistics, mathematics, finance, and marketing, among others.

To learn more about the Science and Engineering Building, please visit the website at http://seb.unlv.edu/. To schedule a tour of the building, call the SEB administrative offices at (702) 774-4732.

Sean Hsieh,
Renewable and Alternative Energy Research Group

“My research is on information technology integration with renewable energy systems and smart grid applications. The SEB facility provides reliable IT infrastructure that I can use to productively pursue such research, which involves intensive information exchange and data manipulation activities. Also, the building’s design elements, such as small breakout rooms and low-noise student office/laboratory spaces, produce an effective research communication environment for interaction with students and other researchers.”

Pushkin Kachroo,
Transportation Research Group

“We must invest in research so that we can diversify the state economy and make it more technology-driven. This will protect our state from economic downturns. The Science and Engineering Building will contribute to this effort by providing an environment that facilitates research and fosters collaboration. Its attractive architecture and design, combined with its effective function and amenities, make it a wonderful addition to the campus.”

Building Quick Facts

Project Cost: $113 million
Size: 205,779 square feet
Architecture Firm: Dekker/Perich/Sabatini
Construction Firm: Sletten Companies
Special Features: Contains a 200-seat auditorium, a dance-floor configuration of labs, smart conference rooms, and a café/coffee shop, which is located adjacent to the lobby.
Location: The Science and Engineering Building is located on the north side of campus along Cottage Grove Avenue, just west of the Cottage Grove parking structure.