# t n d i a n a U n i v e r s i t v Simon Hall 2008 Lab of the year high honors

- and physics departments.

- Simon Hall ushers in a new age of scientific research at Indiana University, one which will push forward the boundaries of knowledge in proteomics, genomics, and bioinformatics. The work of the solitary scientist will be amplified by the combined force of intellects spanning departments and disciplines. Indiana University President Michael A. McRobbie

#### Indiana University Simon Hall | Bringing Science and Campus Together

Indiana University's Simon Hall, designed by Flad Architects, Year competition. The Lab of the Year, one of the most prestigious renovated laboratories that combine all aspects of the building into a superior working environment.

A state-of-the-art research facility designed to fit seamlessly into the historic context of the Old Crescent.

A literal and philosophical intersection of the chemistry, biology,

A building that promotes collaboration and provides convenient access to highly specialized equipment.

A home for laboratories, thoughtfully planned to achieve maximum flexibility, that are easily adaptable to changing research needs.

A design that facilitates **teamwork and interaction** through transparency and public space.

A building constructed for longevity and sustainability

with durable materials, efficient systems, and craftsmanship.



### "On the outside, Simon Hall is a beautifully traditional building that is right at home on the Old Crescent, but inside we can truly see the future of the life sciences."



# Objectives



As Indiana University considered its strategic objectives for the twenty-first century, a goal emerged: to develop a biotechnology program that would produce highlyqualified graduates in all biotechnology areas, as well as business and law associates with strong biotechnology backgrounds. But in order to embark on this specialized scientific exploration, the university needed a

building that would provide more space — flexible laboratory space that was specifically designed for interdisciplinary research. A new, state-of-the-art building was also essential for recruiting and retaining leading researchers in the biological and chemical sciences who could implement such a biotechnology program.

The university developed objectives for this new building, including:

- Providing a **central**, **unifying** venue with shared facilities for investigators from multiple scientific disciplines.
- Changing the "silo-ed" departmental culture to one of free intellectual exchange and collaboration.
- Creating flexible lab space that is adaptable to **both future** research needs and changing priorities.
- Preserving campus heritage and architectural integrity.



#### **Creating a Science Crossroads**

The resulting building — Simon Hall — is a unifying hub within the college of arts and sciences. By incorporating open laboratories, shared technical support areas, and centralized analytical facilities in its design, the building fosters collaborative research. Designed to encourage interdisciplinary study in biology, chemistry, cognitive science, physics, and biochemistry, the facility redefines boundaries and broadens scientific **advancement.** This approach is intended to expedite the next generation of crucial advances in proteomics, genomics, and bioinformatics. It is also essential to the university's ability to attract the best students, scholars, and scientists.



### "This new building is a dynamic monument to the grand possibilities of interdisciplinary science."

Michael A McRobbie, Indiana University President

# Design

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#### Fitting Into a Historic Campus

Indiana University is considered one of the most beautiful college campuses in the nation. The character of the campus is defined by the organic and picturesque woodlands, consistent use of limestone quarried in the surrounding area, and a strong collegiate gothic architectural influence in many of the buildings.

#### Bringing Science and the Campus Together

Researchers insisted that in order to most effectively utilize the building's labs, and to expedite their research, **the new science structure should be located at the physical intersection of each science department in the middle of the historic "Old Crescent".** Project planners and architects talked extensively with stakeholders and carefully studied the site to understand the quality of the place – from the physical environment, the light and the textures of the Old Crescent, to the people who work there and their culture. They listened to faculty and staff talk about their experiences in the environment, observed the land formations, and studied the pathways, trees, bridges, even the transition of stone to slate roofs on the campus. **Simon Hall is a response to its context**, while integrating broad program requirements, the client's vision and Indiana University's strong sense of stewardship to the campus.



#### Sharing an Architectural Language

Surrounded by historic structures, Simon Hall takes visual cues from neighboring Myers Hall, a 1930s *art moderne* building that was originally home to the medical school. Simon Hall echoes Myers in its isolated symmetry, and works in unison to complete it. By creating tension between the buildings, the relationship between them is reinforced. **Aesthetically it fits with the distinctive limestone buildings and collegiate gothic architecture on the Old Crescent**, creating a dialogue with the existing structures by sharing an architectural language.

In the spirit of the nearby chemistry building, which is adorned with chemical symbols and snippets of the periodic table; and Myers Hall, itself decorated with medical and biological symbols; Simon Hall's designers integrated symbols of the type of work which takes place inside. Conceived by faculty, translated into clay by sculptor Amy Brier and carved by Indiana Limestone Co., Inc. artisans, renderings of organisms important to geneticists adorn stonework near windows and doors. **Visual grace notes on the edifice include the e-coli bacterium, a fruit-fly, an ear of corn, a paramecium, and a mouse** skittering up the wall toward the lintel where a limestone depiction of the RNA code is installed.

While Simon Hall holds the promise of collaborations deeply embedded in state-of-the-art research in biochemistry, biotechnology and proteomics, the design of the research building reflects craftsmanship, artistry, and elegant details that honor the heritage of the university.





#### Enhancing the Landscape

In order to provide the amount of space required by researchers in Simon Hall, several levels of the facility are located underground. **An expansive green roof covers 26,000 square feet of laboratory space**, located directly beneath the grassy, park-like quadrangle. After construction, the character of the landscape was extended into the quad, contouring the land, rebuilding the hills that had been leveled off in the 1940s. A selection of flowers and plants that thrive in shallow soil dot the area, which is also equipped with special waterproofing, drainage, and irrigation systems.

To enhance the experience of the scientists and researchers who inhabit Simon Hall,

the ground plane was manipulated to work with the architecture for maximum daylighting. This effort provides access to natural light and exterior views for virtually all occupied offices, labs, and common areas within the building, even those located below grade.

Further encouraging collaboration, the building's exterior environment provided new opportunities for staff and students to interact. Outdoor spaces were planned to shield pedestrians from the wind and sun, while capitalizing on woodland views and topography. Construction materials were specifically chosen to enrich outdoor spaces.





#### Inspiring, Collaborative Spaces

Intended to be a physical and intellectual intersection of the science departments it serves, Simon Hall was designed as a comfortable, inspiring space. A unique design feature that accomplishes this is the **balconies**, **which provide access to the outdoors and a strong connection to the rest of the campus** from many points in the building. This element was incorporated after project architects spoke with faculty and researchers about potential improvements to their working conditions. The professors indicated that since they spend so much time in the labs, it was important to be able to step out, get some fresh air, and enjoy the campus quad. To facilitate collaboration and socialization, large gathering areas are also located along the main building entries. Adjacent to the main lobby, a rustic terrace offers a transitional indoor/outdoor area with seating and pleasant campus views. Additional **impromptu meeting spaces** were included in the corners of the southwest stairwell. Within Simon Hall, a large conference center includes a formal breakout room, and a catering kitchen for limited food service. These spaces provide opportunities for socializing, as well as spontaneous interaction and exchange of ideas.

#### Improving Productivity through Design

In scientific research environments there is evidence to suggest that investigators who have daily contact with colleagues perform at higher levels. In buildings that incorporate areas for interaction, research teams gravitate toward these spaces to solve complex problems. In addition, improving opportunities for interaction generally increases a researcher's stimulation and satisfaction, leading to improvements in productivity. Coupled with the close **proximity of researchers that is inherent in a collaborative, multidisciplinary environment**, the speed at which collaborative research can be conducted also increases, bringing discoveries to the academic and scientific community at a faster rate. All of these factors were incorporated into the design of Simon Hall.





"We've used funds to create as much lab space as possible, without sacrificing the qualities that researchers value. We are confident the people who move into Simon Hall will like the spaces and be able to do their work effectively."

# Lab Design



#### **Functional and Productive Laboratories**

Unlike other science buildings on the Bloomington campus, Simon Hall is configured to facilitate collaboration between scientists from sometimes disparate fields. These groups were traditionally housed in "silos", cloistered in their own departments making intellectual cross-pollination very difficult. By contrast, Simon Hall inter-mixes researchers and activities. Space is available for cell biologists, microbiologists, molecular biologists, geneticists, analytical chemists and biochemists, and biophysicists, including expanding initiatives like the Biocomplexity Institute and the Center for Genomics and Bioinformatics. This collaborative environment provided the opportunity for a new interdisciplinary department to emerge. Biochemistry formed as its own entity, after biochemistry faculty had been housed in both the biology and the chemistry departments.

#### **Essential Lab Properties**

Lab planners worked with representatives from multiple departments to determine what components made up

ideal "generic" spaces, and what elements would only be needed in extreme, specialized cases. Through an iterative process over a series of workshops, the group devised guidelines for essential lab properties:

**Interactivity –** To promote communication between laboratory groups and provide increased flexibility, large laboratory blocks were created. Each laboratory block consists of three to six modules, and is interconnected by an open ghost corridor to an adjacent lab block and faculty office. Offices are arranged in clusters of three to five faculty and an administrator. The office suites are located on each floor, and have direct access to the corridor and labs, providing connections between the faculty and research assistants. These labs can also be reassigned easily and quickly, depending on research grant priorities.

**Modularity** – The labs needed to accommodate a range of science disciplines. For maximum flexibility, labs and lab support areas were designed at a consistent size with a consistent layout. **Modular Utilities –** The same utilities had to be available at standardized lab locations, including reverse osmosis water, laboratory hot and cold water, natural gas, compressed air, cylinder gas, vacuum, and domestic water. As a result, to maximize cost and efficiency of building systems, generic labs with higher- or lower-hood intensity were designed. These labs have the system diversity to be converted, if warranted, at a later date.

Adaptability – Each lab needed support functions that directly related to the current research requirements. Uniform support zones were created which are adaptable for a variety of uses, including chemical/ media prep, tissue culture, dark rooms, equipment rooms, constant temperature rooms, or cold rooms. These zones were planned to be directly adjacent to the laboratory and accessible to neighboring researchers to promote shared use and collaboration. Flexibility – Instrumentation labs were developed around a "dance floor" concept, allowing them to be renovated very quickly, if needed. The fixed casework, hoods, and sinks were located around the perimeter of the lab, with utilities provided via overhead service carriers. The peninsulas use mobile instrument carts, mobile tables, or equipment carts. Where provided, fixed casework is free of utility services. This simplifies quick reconfiguration, necessitated by changes in equipment and/or research objectives.

Simon Hall is also outfitted with built-in mechanical, and systems capacity to reconfigure or add more fume hoods, without impacting adjacent research. To adapt easily to potential changes, duct routing allows for the highest use capacity on any of the lab floors.











Instrumentation Lab Model

#### **Creating Optimal Lab Models**

Three generic lab models were planned for the building, which support the full spectrum of sciences including biology, chemistry, cognitive science, physics, and biochemistry. Researchers are provided with low- and high-hood intensive lab spaces, and instrumentation labs.

A row of generic labs and office space for research assistants and post-doctoral students occupies the north side of the building. In the center of the building, lab support spaces and offices occupy each side of the glass-lined corridors. This window-filled hallway promotes transparency, allowing investigators to see each other, and directly observe the activities of each lab. The south side of the building contains more chemical intensive lab stations with correlating fume hoods to promote cross-pollination of disciplines. Every floor has a mixture of configurations for wet labs, each flexible and adaptable for specific customization for low- or high-density chemical use.

- A BSL3 (biosafety level 3) facility.
- An ISO 6 (formerly class 1,000) cleanroom.
- A high-resolution cryo-transmission electron microscope.

Each of these research platforms comes with its own unique demands for supporting building systems. With those specialized requirements in mind, the core facilities were designed to be flexible enough to respond to the next evolution of scientific research and instrumentation. This capability not only pushes the limits of Indiana University's research now, it is also designed to respond to the unknown.

High-Hood Intensity Lab Model

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Low-Hood Intensity Lab Model

#### **Robust Core Facilities**

In addition to flexible lab spaces, Simon Hall also provides specialized core facilities for cutting edge research across several disciplines. By housing these instruments and centers in one multidisciplinary hub, the university has maximized its investment, allowing multiple researchers access to state-ofthe-art technology. The core facilities include:

A high field NMR (nuclear magnetic resonance) facility.

An X-ray crystallography suite.

"Before Simon Hall was built here, students and faculty couldn't imagine how the building would fit in the space. But now, they can't imagine the space without it."

-David Black, Flad Architects Design Principal

### Flad Architects

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