"FLEXING" ITS RESEARCH MUSCLES

BINGHAMTON TAKES A NEW APPROACH TO LAB DESIGN AND MANAGEMENT

Working in a dark, dank, cavernous laboratory, with only the aid of a fortuitous lightning strike and his faithful assistant Igor, Dr. Frankenstein, one of popular culture's most fabled fictional researchers, supposedly discovered the very secret of life.

Modern life-science researchers are tackling challenges of near equal complexity, but that's where the similarity ends. Today's biomedical, biotechnology and bioengineering researchers are helping to improve quality of life, enhance health care, ensure homeland security and enable exploration of the universe, and the interlocking supports that help to advance their research bear no resemblance to cinematic stereotypes of old.

Which is why Binghamton University researchers and administrators are so excited about the addition of 37,000 square feet of new state-of-the-art laboratory space at the Innovative Technologies Complex, said Stephen Gilje, associate vice president for research.

The new facilities comprise 30,000 square feet of core facilities and flexible laboratory space, as well as two new bioengineering teaching labs, and a 7,000-square-foot clinical science and engineering research facility in the life-sciences research building. Core facilities house common pieces of equipment, including autoclaves, tissue-culture equipment and a high-powered computer lab. Flexible laboratories are designed with as much of the infrastructure as possible — plumbing, electricity and HVAC — in the ceilings, and are furnished with lab benches that can be readily moved with a motorized hand-truck.

This new approach to design and management of laboratory space allows the University to quickly respond to the expansion and contraction of particular research programs, and permits individual researchers or groups of researchers to add or remove equipment or change the laboratory configuration in a matter of days rather than months, Gilje said.

"This is just what we needed when we needed it," he added.

The University, which hopes to double its research activity over the next five years, last year saw a 24 percent increase in sponsored research activity, despite a dearth of laboratory space and a flat federal funding profile for research.

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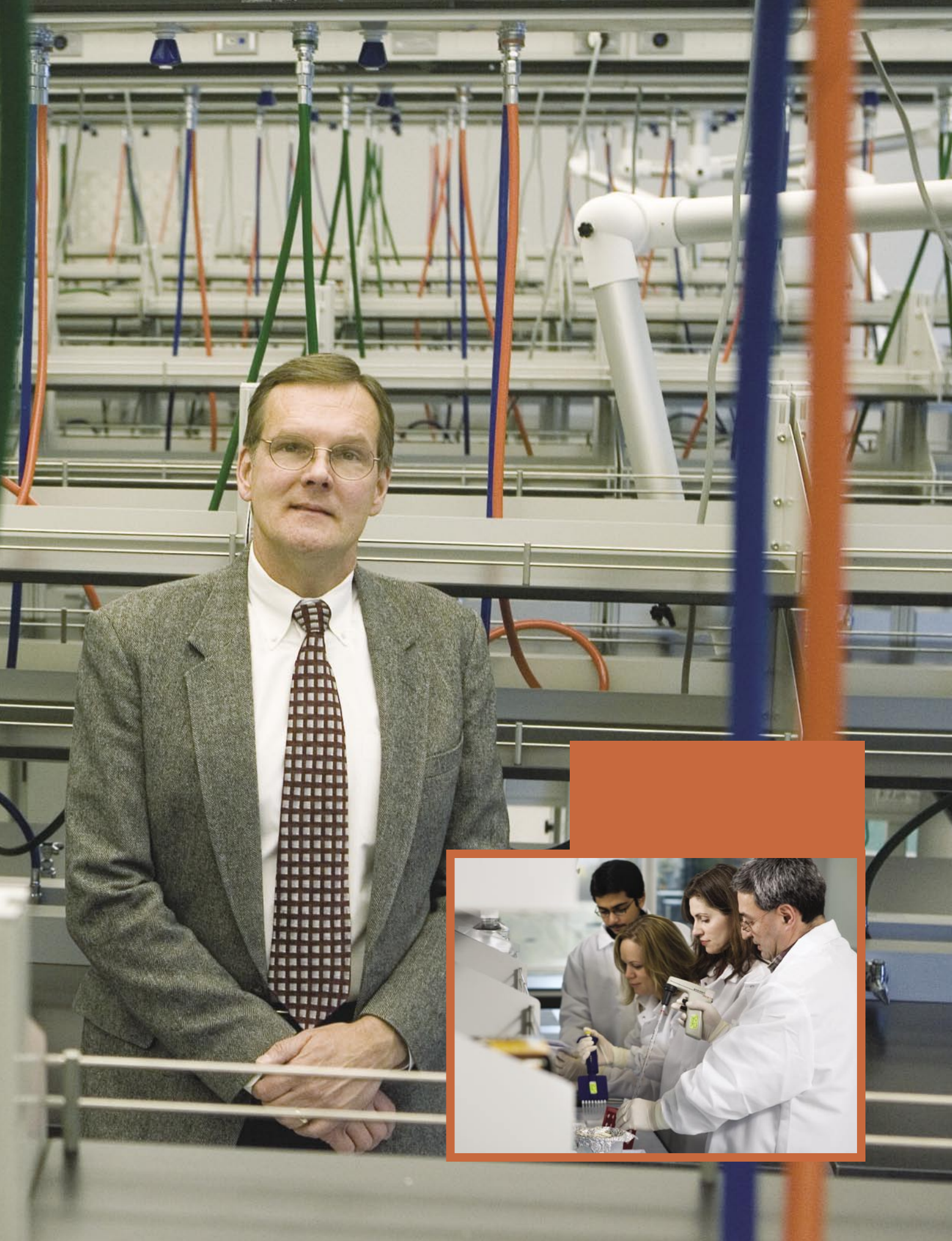

The new facilities for biomedicine, bioengineering and biotechnology research officially opened in October 2006, with the completion of the first biomedical and biotechnology research suite. Laboratories in the facility are equipped with many pieces of cutting-edge equipment and modern laboratory benches and are designed with flexibility and collaboration in mind, Gilje said. They are also helping the University to recruit bright young faculty and graduate students — and that can only help to advance the University's research initiatives, he added.

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To optimize their chances for success in today's competitive research climate, junior and senior life-science researchers alike need a number of other supports that the ITC labs will provide. Perhaps first among them are opportunities to engage in cross- and multidisciplinary collaborations, said Gerald Sonnenfeld, vice president for research.

Sonnenfeld ought to know. He is an eminent immunologist whose research into the effects of stress on the immune system has multiple sponsors, including the National Aeronautics and Space Administration. He is engaged in collaborative projects with colleagues at home and abroad, including a recent collaboration with Dr. Karen Burg of Clemson University, with whom Sonnenfeld is trying to develop, through tissue engineering, lymphoid tissue that will allow testing of new vaccines even before they are used on animals or humans.

In a world where advances in technology and knowledge are blurring the lines and leading to an enmeshment of major scientific disciplines, collaboration is critical to researchers who want to stay at the leading edge of inquiry, Sonnenfeld said.

"Science has progressed and changed so that now research techniques that apply to one area are often useful across the board. That means today, if I want to be a good immunologist, I have to know about proteomics, genomics, bioengineering, chemistry and physics, where 20 years ago I didn't have to know much about these things," he said. "As a researcher, the greatest benefit to me of these new facilities is the potential for collaboration that they afford. It's a very powerful tool to have."

Omowunmi Sadik, professor of bioanalytical, materials and environmental chemistry, and director of the Center for Advanced Sensors and Environmental Systems, agrees.

"Our group is working with industrial sponsors to utilize flexible substrates for fabrication of new sensors and devices," she said. "Our activities rely on the need to interact directly or indirectly with other ITC occupants, such as the Center of Excellence, and incubator companies with interests in commercialization. This could foster innovation in the area of sensors and environmental monitoring, and help translate sensor research into finished products."

Modern research programs also demand ready access to high-end computers and assay equipment, and the availability of state-of-the-art, environmentally controlled, vibration-free laboratory space — space that can be quickly adapted to the new directions and priorities that regularly spin off from the discovery of new knowledge. Working in such space not only better ensures faculty success in attracting sponsored funding but enhances the academic credibility of their work, Gilje said.

The new ITC labs offer all of the above, and do so in a building where involved faculty also find ready access to technology transfer services designed to help them protect and/or commercialize the intellectual property they develop; translational research support that can help them explore business opportunities; and a Start-Up Suite that facilitates pre-incubation of new companies arising out of faculty research.

Any faculty whose work is externally funded, related to biomedicine or biotechnology and potentially marketable within five years through the development of new products or processes is eligible to apply for lab space at the ITC.

What's more, faculty with other science and engineering research interests can anticipate access to similar facilities in the not-so-distant future, Gilje noted.

"I'm very excited at the prospect that this building is not the end, that we will also be developing another building comparable to this for science and engineering," he said. "Hopefully it will be modeled on this successful building and will just add another layer of expansion onto our programs."

The University received $6 million in state funding to design the proposed science and engineering building, and last year was tapped to receive an additional $60 million to construct it at the 21-acre Innovative Technologies Complex. Construction is expected to begin in 2007 and to be completed by 2011. ■

The Clinical Science and Engineering Research Center (CSERC)

When senior researcher Kenneth McLeod was recruited to Binghamton in 2002 to start a new bioengineering department, he faced an enormous challenge: no laboratories and very little office space.

All that changed with the opening of the Innovative Technologies Complex, where bioengineering has found a home, replete with modern offices and thousands of square feet of laboratory space, including a new Clinical Science and Engineering Research Center.

"We're growing by leaps and bounds now," McLeod said. "When you're trying to recruit research-active faculty, it's very different to be able to show somebody an actual lab and an office rather than to have to say, 'Someday in that building we're going to have those things.'"

The bioengineering department, which graduated its first class last year, now has 16 faculty on its roster. Joined by four colleagues from the Decker School of Nursing — Sarah Gueldner, Geraldine Britton, Carolyn Pierce and Debra Bohunicky — they are tackling a host of research challenges, not just in laboratories, but also in the Clinical Science and Engineering Research Center.

"My experience in the clinic has been fantastic," said Craig Laramee, research assistant professor. "The facilities in the CSERC have allowed me to quickly set up and investigate new protocols for my research, without wasting time searching for space or equipment. Beyond optimizing our use of resources, the clinic has also helped to foster a collaborative environment, which I think is essential as we are increasingly challenged by complex diseases."

Laramee's research focuses on the identification of biomarkers for human diseases such as Polycystic Ovarian Syndrome (PCOS) using high-technology approaches. Specifically, he works with surface-enhanced laser desorption/ionization time-of-flight (SELDI-TOF) mass-spectroscopy technology.

Other areas being addressed in the clinic include smoking cessation, diabetes, edema, osteoporosis and two large-muscle studies, one looking at the musculature of the lower leg to develop new fibromiography techniques, and another, working in collaboration with a group of physical therapists, to accomplish proof of concept on an easy, quantitative measure of muscle force.

"Given that we only opened in February or March of 2006, the center really ramped up nicely," McLeod said.

Though he and others in his department work with equipment such as atomic-force microscopes and measuring devices that require vibration-free space, McLeod said the new ITC facilities afford something even more valuable.

"For what I do, I'm a pretty simple engineer-type person, and space is space," he said. "To me, state-of-the-art space means there are really good people there to collaborate with."

That being the case, the research facilities at the ITC are clearly state of the art, he added.