



MAKING SCIENCE FICTION COME TO LIFE

ROADMAP TO INVENTING THE FUTURE: 2020 AND BEYOND



Stony Brook University
College of Engineering
and Applied Sciences

Stony Brook University

Stony Brook is one of America's **most dynamic public universities** and an **internationally recognized research institution**. Home to more than **26,800 students**, the University offers more than **200 undergraduate programs** and **140 graduate programs**. It's ranked among the **top 100 universities in the nation** and the **top 40 public universities** by *U.S. News & World Report*.



Message from the Dean

In the **College of Engineering and Applied Sciences** we are inventing engineering education and research in the era of exponential technologies, intelligent machines, and global existential challenges as we prepare students for the technocentric economy of the future.

Transformed through a period of tremendous growth and achievement, our bachelor's degree production has doubled, and our graduate degrees have grown by 50 percent over the past five years. We now lead engineering colleges across New York state in bachelor's degrees and rose from 38th to the 19th largest producer in the U.S. We are firmly committed to diversity and inclusion among our 5,600 graduate and undergraduate students, and now rank 19th in the nation in bachelor's degrees awarded to women. The academic success of our students is now among the best in the University, with our four-year graduation rate currently exceeding 66 percent.

Broad-based collaboration and bold ideas have increased annual research expenditures per faculty by 44 percent over the past five years. Our research and curricula have transformed into cross-cutting research communities, as we advance University-wide convergence-science initiatives and stimulate the fusion of technology and engineering with medicine, humanities, the arts, marine and atmospheric sciences, and beyond.

As we reflect on our growth and achievements, we know our path forward has challenges. Our space constraints limit future growth, student and faculty recruitment are increasingly difficult with upcoming changes to U.S. demographics and rising international competition, and reduced public funding for higher education challenges our resources. To stay competitive, we must be even more efficient, innovative, and entrepreneurial.

The *Roadmap to Inventing the Future: 2020 and Beyond* outlines our path forward: a vision for sustainable and inclusive excellence in educational innovation, societally impactful cross-cutting research, diversity and outreach, and innovation and entrepreneurship. Assembled by the Strategic Planning Leadership Committee of nine faculty members, with input from four subcommittees of 24 faculty members, it is rooted in the success of the initiatives implemented over the past five years. It supports our steadfast commitment to educating the next generation of global innovators and entrepreneurs and conducting research aimed at improving the human condition and sustaining humanity.

This is how we are making science fiction come to life every day.

Fotis Sotiropoulos, PhD

Dean, College of Engineering and Applied Sciences
SUNY Distinguished Professor of Civil Engineering



mission:

The **College of Engineering and Applied Sciences (CEAS)** is driven by four pursuits that support the missions of Stony Brook University and the State University of New York system:

- **PROVIDE** comprehensive undergraduate, graduate, and professional education of the highest quality to produce technically competent, creative, empathetic, and globally conscious engineers and applied scientists who pioneer solutions to global challenges.
- **CONDUCT** cutting-edge research of the highest quality that advances knowledge, drives technological innovation, and improves the human condition.
- **PROVIDE** leadership in economic development by advancing technology for the good of society, fostering innovation and entrepreneurship, and engaging in community outreach.
- **SERVE** the community and society at large by promoting diversity, equity and inclusion, and ensuring that faculty, staff and students have the opportunity to succeed professionally and academically.

vision:

Our vision over the next five years is to:

- **BECOME** a national model of a welcoming and inclusive community that supports the professional and academic success of all individuals in engineering and the applied sciences.
- **EDUCATE AND ENGAGE** a high-quality and increasingly diverse community of students with broad representation from across the State of New York, the US and the world who will become innovators, leaders, and change-makers for our technology-driven society.
- **STRIVE** for continuous improvement as an elite and agile research institution that attracts and retains world-class faculty and students who seek to join a supportive, interdisciplinary community of scholars driven to advance knowledge and improve the human condition.
- **EXPAND** our role as an engine for innovation, economic development, and technological transfer.
- **BECOME** a convergence point for engineering and applied sciences, the arts, humanities, business, and medicine to collaborate on technocentric solutions to global and regional societal challenges.

1 EXCELLENCE IN DIVERSITY & INCLUSION



19th
IN THE
NATION
in bachelor's
degrees
awarded
to women.

WE ARE COMMITTED to expanding access to science, technology, engineering and mathematics (STEM) education while engaging all segments of society in technological advancement. We have been a major contributor to advancing STEM diversity for over forty-five years, prior to most national initiatives in this area. Our diversity efforts are founded upon two pillars: the *STEM Smart programs* and the *Women in Science and Engineering (WISE) honors program*. STEM Smart is committed to the development of programs that deliver a variety of enrichment, support activities, and services to underrepresented minority and economically underserved students. WISE Honors offers educational and professional STEM opportunities for women at all levels of their development by facilitating individual, institutional, and social change. Together, these programs have broad reaching impact that we leverage to lead efforts towards broadening participation in engineering and applied sciences.

objectives:

- **BUILD** a culture of diversity, equity and inclusion that provides a welcoming environment for everyone.
- **FOSTER** a respectful and tolerant community of scholars within which the talents and skills of individuals with diverse backgrounds, passions, and experiences can be cultivated and harnessed to full potential.
- **ENGAGE** the broader community to expand awareness, accessibility, and preparation in engineering and applied sciences.

strategies:

- 1. Foster an inclusive and welcoming environment.** Engineering and applied science disciplines in the US are challenged by a lack of diversity. Targeted efforts are needed to ensure our disciplines build welcoming and supportive environments that elevate minorities in the profession and encourage broad participation. We will foster a culture that embraces *diversity as strength*, in which equity and inclusion shape a community that respects all individuals.
 - a. Promote inclusive teaching and research:** We will expand our ongoing efforts to develop and follow best practices for the recruitment and retention of faculty, students and staff who contribute to the diversity goals. These practices include proactive recruitment strategies, mentoring programs to support success as well as training on inclusion, diversity and equity through workshops on creating inclusive and brave classrooms and spaces.



b. Create opportunities: Dedicated curricula and opportunities will be expanded to help students excel. This includes broadening the experiential learning opportunities that WISE Honors offers through its recently launched four-year curriculum. We will work to grow scholarships and support for both first-year students and transfers, and leverage the New York State Collegiate Science and Technology Entry Programs (CSTEP) and the NSF-funded Louis Stokes Alliance for Minority Participation (LSAMP) to recruit and retain diverse students in STEM. Graduate-student recruitment and retention will be enhanced through collaboration with the Center for Inclusive Education.

c. Build a supportive culture: CEAS will lead outreach/diversity efforts for a more effective implementation of the strategies and activities of individual departments and programs. This will be facilitated with the recent addition of an Associate Dean for Diversity and Outreach to the College leadership team. CEAS-wide teams will be engaged to seek funding from federal agencies, non-profit organizations, and industries to support new initiatives and research their impact to CEAS and beyond.

2. Expand outreach and partnerships to broaden participation. Engineering and applied science professions must be made accessible and tangible to all, particularly to those without direct personal exposure from their family or community. We will continue our existing outreach programs and partnerships while creating new ones to recruit and retain talent as well as increasing technical literacy.

a. Expand our reach: Our College is active in K-12 outreach with many events and programs, including TechPREP, STEM Tech, High School WISE, ECE Outreach and the Garcia Research

Scholar Program. Existing programs for middle- and high-school students, teachers, counselors and administrators will be expanded to reach more individuals including parents and the general public. Participation within the University will be expanded by engaging non-STEM students in engineering and applied science projects and through collaboration with other colleges to:

- Develop and offer new courses introducing computational thinking and the fundamentals of coding to all University students, and
- Integrate digital intelligence training in the arts, humanities, and social sciences.

b. Maintain a large network of partners: We will maintain and expand strong connections with industry and local and national networks working to broaden participation in engineering and the applied sciences. Examples include the NSF-funded LSAMP, National Center for Women & Information Technology (NCWIT), the Association of American Universities (AAU), the American Society for Engineering Education (ASEE) and other professional societies. Partnerships with local community colleges, school districts, alumni, and corporations will be expanded to serve Long Island and the New York Metropolitan Area.

c. Organize College-wide efforts: We will lead outreach and diversity efforts for a more effective implementation of the strategies and activities of individual departments and programs. This will be facilitated with the recent addition of an Associate Dean for Diversity and Outreach to our leadership team. College-wide teams will be engaged to seek funding from federal agencies, non-profit organizations, and industries to support new initiatives and research their impact at Stony Brook and beyond.

3. Be steadfast in progress. We will diligently pursue efforts to broaden participation in engineering and applied sciences. Steady progress will be made with careful planning, broad collaboration, and regular benchmarking and assessment.

a. Collaborative planning: Our departments will develop, implement and continuously assess the effectiveness of diversity and inclusion plans, which will be adapted to reflect and respond to the reality of their respective peer community. Plans will be drafted in connection with a College-wide committee to share ideas and commonalities and to identify opportunities for collaboration. These plans will be instrumental in assessment of diversity progress as well as for engagement of faculty in research and educational initiatives.

b. Institutional transformation and accountability: Systemic improvement will be advanced by addressing diversity and outreach activities in annual faculty reviews, formally introducing such activities as an integral component of the faculty promotion and tenure process. Experts from the Chief Diversity Officer's unit will support faculty diversity and inclusion efforts, and provide feedback on evaluations.

c. Regular benchmarking and assessment: Progress will be tracked and strategies will be revised through regular quantitative and qualitative assessments. Qualitative insight will be obtained with town hall meetings and focus groups, leveraging student clubs, mentors, and the Dean's Council of Student Advisors. Quantitative measures of student, faculty, and staff demographics will be tracked both broadly and within individual programs. Individual assessments will be reviewed to identify successful strategies and best practices.

2 EXCELLENCE IN EDUCATION

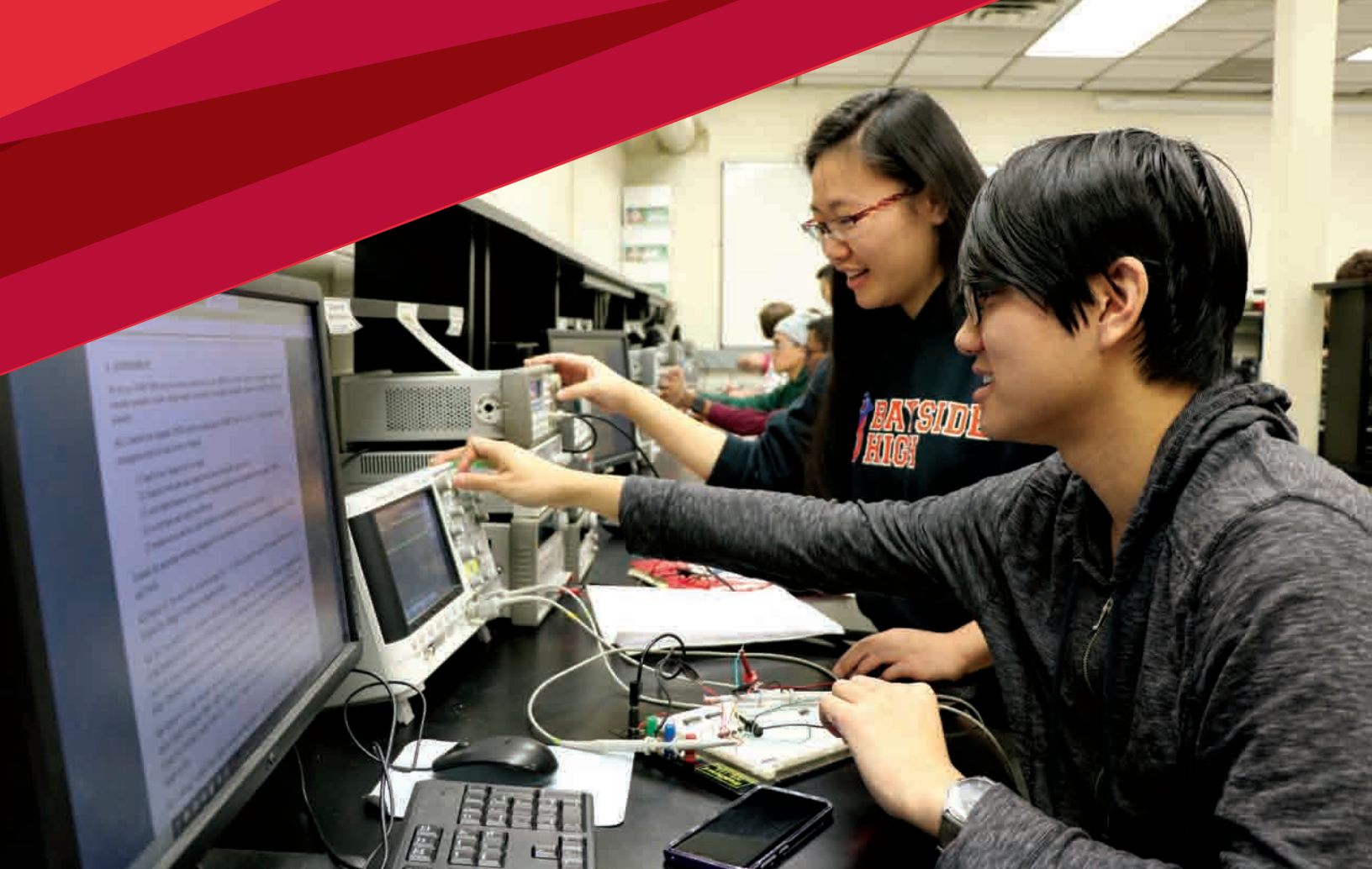


Four-year graduation rate
EXCEEDS
66%

ENGINEERS AND APPLIED SCIENTISTS must be knowledgeable, ethical and compassionate and maintain a broad awareness of the global implications of their creations. Technological advances must consider the interests of society as a whole, hence engineering education should embrace disciplines outside of STEM. Through programs in interdisciplinary capstone design, vertically integrated projects, and off-grid global innovation, we will expand perspectives by engaging students from the humanities, arts, social sciences, medicine, and business in team experiences. This collaboration will challenge our students to refine their soft skills while advancing technical literacy within the non-STEM community. To help guide the transition from student to professional, we will provide students with a professional experience, a context for fundamental knowledge, and a setting to practice lifelong learning. Leveraging our long history of engaging undergraduates in research, integration of technical understanding as a general education requirement, and advancements in project-based learning, we are well-positioned to rise as leaders in educational innovation.

objectives:

- **ATTRACT** and retain a diverse, talented, and dynamic student body.
- **PROVIDE** a cutting-edge, cross-cutting, societally-relevant educational experience that
 - Integrates fundamental knowledge with practical application, professionalism, ethics, and communication.
 - Emphasizes creative thinking, teamwork, inclusiveness, global understanding, empathy for humankind and lifelong learning.
 - Develops entrepreneurship, innovation, and leadership skills.
- **CONTINUOUSLY ADAPT** and reimagine engineering and applied science education in today's era of exponentially growing technology and intelligent machines.



strategies:

1. Continuous innovation and improvement in education: We will strive to continuously progress topically and pedagogically. Topical adaptation starts with world-class research on problems of current and future relevance to society. Targeted strategies will ensure broad-based benefits that extend beyond research-active students and translate into curriculum revisions and new tracks. Frequent communication and collaboration with alumni and employers will ensure technical and soft skills meet changing industry needs. Pedagogical innovation must be valued by all faculty and driven by leaders who focus on teaching and educational research.

a. Breakthroughs in cross-cutting education: We will continue to work to expand educational programs beyond traditionally siloed disciplinary structures. Broad-based graduate programs that bring together disciplines around common technologies have already been developed. Examples include new programs in data science, engineering artificial intelligence, and the Internet of Things. We will lead efforts to introduce cross-cutting innovation and flexibility in undergraduate curricula by:

- Establishing a unified framework for capstone design courses to facilitate interdisciplinary collaboration among seniors.
- Instituting central course offerings of introductory engineering subjects, programming fundamentals, ethics, communication, and professional skills to dissolve traditional disciplinary boundaries.

- Reducing minimum core degree requirements to provide the flexibility to pursue new opportunities in cross-cutting tracks and educational collaborations between departments.
- Introducing new cross-cutting programs on topical and emerging areas such as net-zero carbon engineering, engineering-driven medicine, technology in the era of pandemics, and resilient and smart urban infrastructure.

b. Industry engagement: We will continue to expand collaborations with industry and alumni through innovative partnerships, advisory boards, workshops, and professional training. Opportunities for direct curricular engagement will be advanced through cooperative education, co-mentoring in capstone design and graduate research, and partnerships with teams in our Vertically Integrated Projects program.

c. Emphasize and reward teaching innovation and excellence:

- Expand focus on pedagogical innovation through targeted initiatives and hires in engineering education research.
- Infuse cutting-edge research findings into pedagogy by encouraging full-time teaching faculty to work with research-active faculty. They will attend research group meetings and participate as senior personnel on grants with the role of translating research topics into the classroom experience.
- Continue to emphasize the importance of teaching excellence in tenure and promotion decisions.
- Establish annual teaching awards in each department with recipients to be recognized alongside our Excellence in Teaching Award during the State of the College Address.

2. Project-based learning as professional experience: Our educational philosophy is founded on the premise that the transition from student to professional must occur prior to graduation, and this requires professional experience. We will leverage our Vertically Integrated Projects (VIP) program and the Global Innovation Field School at the Turkana Basin Institute (TBI) in Kenya, require unified frameworks for capstone design, and incorporate students at all levels into integrated teams.

a. Leadership: Students across all levels of experience and leadership must be integrated in project-based learning to incorporate professional experience and provide a realistic leadership structure. Leaders need to first experience the role of reporting to a superior, and those who are not natural leaders should have the opportunity to lead with the leverage of their experience.

We will build integrated teams by:

- Expanding the VIP program, which integrates sophomores through doctoral students, and connect it to senior capstone design and master's projects.
- Engaging juniors to provide supporting roles on senior capstone design teams as a curricular requirement.
- Engaging master's students as mentors for senior capstone design.

**#1
PRODUCER**

of bachelor's
degrees from
engineering
colleges in
New York State.

**RANKED
#19**
nationally.

b. Multidisciplinary collaboration: A professional experience benefits from multidisciplinary elements. We will promote broad-based student collaboration by growing participation in the VIP program and our Global Innovation Field School at TBI, which is ideally suited for building multidisciplinary teams. Establishing a unified framework for senior capstone design and master's projects will broaden multidisciplinary engagement in degree-required experiences.

c. Lifelong learning: Lifelong learning requires a long-term goal and the ability to identify milestones along the pathway to this goal. We will cultivate a culture of life-long learning by creating opportunities for students to participate in long-term projects, including VIP and student research, to provide them with context and motivation.

3. Increase accessibility: Our mission to educate extends beyond training students to enter engineering and applied science professions. We are a generator and a conduit of knowledge to serve all levels of education and technological advancement. The strategies below address our broader educational mission and alternate modes of education that enhance accessibility.

a. Online education: We will build on the experiences of our recent COVID-19 online transition and our Electrical Engineering online bachelor's degree, one of the first ABET accredited online programs in the country. We will collaborate across the University and with other institutions to provide online options for existing degrees and create new online degree programs that bridge multiple disciplines. Mechanisms to share course modules between departments will be established to facilitate collaboration, enhance efficiency, and broaden multidisciplinary education.

b. Service to industries and professionals: We will invite industry partners to collaborate on new courses that address targeted needs of their employees and their industry in general. New professional programs will be developed that focus on retraining working adults in emerging areas of exponentially evolving technologies. Adjuncts from industry who are practiced experts in their respective fields will be recruited to teach courses both in person and online. We will identify research that is suitable for commercial translation and deliver content through credentialed short courses and workshops.

c. Hybrid educational opportunities: Bridge programs will be explored to facilitate and encourage cross-disciplinary educational exchange, where undergraduates of one discipline are taught the fundamentals needed to enter the graduate program of another discipline.

75
POINTS
growth in
average
SAT scores



d. Teacher certification in engineering: To support the introduction of engineering design to the Next-Generation Science Standards, we will collaborate with the School of Professional Development to offer a much-needed engineering certification for K-12 teachers.

4. Nurture high standards of academic success and integrity: We must maintain excellence in academic success and integrity and become known as a destination for students who hold the same high standards. Standards should be uniformly maintained across onsite, off-campus, and online degree programs and courses. Efforts include:

a. Advance an environment of success and integrity: We will advance curricular innovations and inclusive teaching that engage our students' diverse strengths and experiences. Project-based contexts will motivate learning through a long-term, goal-oriented perspective, and inclusion of peer evaluations in student assessment will provide accountability in teamwork.

b. Support and reward excellence: Enhance academic advising with increased staff support. Utilize technologies that augment in-person advising and communication. Reward excellence in peer and faculty mentoring.

c. Expand opportunities for success: Continue to grow winter and summer course offerings to address the needs of off-track students. Institute a uniform process of outreach to advise off-track students of these offerings for their academic plans. Expand online course offerings to address the unique needs of part-time students.

d. Build a supportive and inclusive community: Improve the student experience by supporting extracurricular activities and interactions between students, faculty, and staff.

3 EXCELLENCE IN RESEARCH & ENTREPRENEURSHIP



EXPONENTIALLY GROWING TECHNOLOGIES play a dominant role in sustaining humanity, transforming society, and improving the human condition. Examples include artificial intelligence, biotechnology, nanotechnology, carbon-free energy sources, robotics, smart cities, and advanced manufacturing. We are well-positioned to lead the way in these and many other areas.

objectives:

- **POSITION ENGINEERING AND APPLIED SCIENCE RESEARCH** at the cusp of exponential technological growth to solve the fundamental scientific challenges needed to address critical societal needs.
- **ELEVATE OUR RESEARCH PROFILE** by increasing research expenditures to \$60M by 2025, representing a doubling of expenditures over a ten-year period.
- **BUILD STRATEGIC TEAMS** among our community of scholars and other partners to target high-value funding opportunities and center-scale activities that address grand societal challenges.
- **PROMOTE A CULTURE** that seamlessly blends faculty research with entrepreneurial pursuits and leads to start-up creation and economic development for the region and the state.
- **POSITION THE COLLEGE** among the **TOP 50 ENGINEERING COLLEGES** in the *US News and World Report* rankings

strategies:

44%
GROWTH
in research
expenditures
per faculty

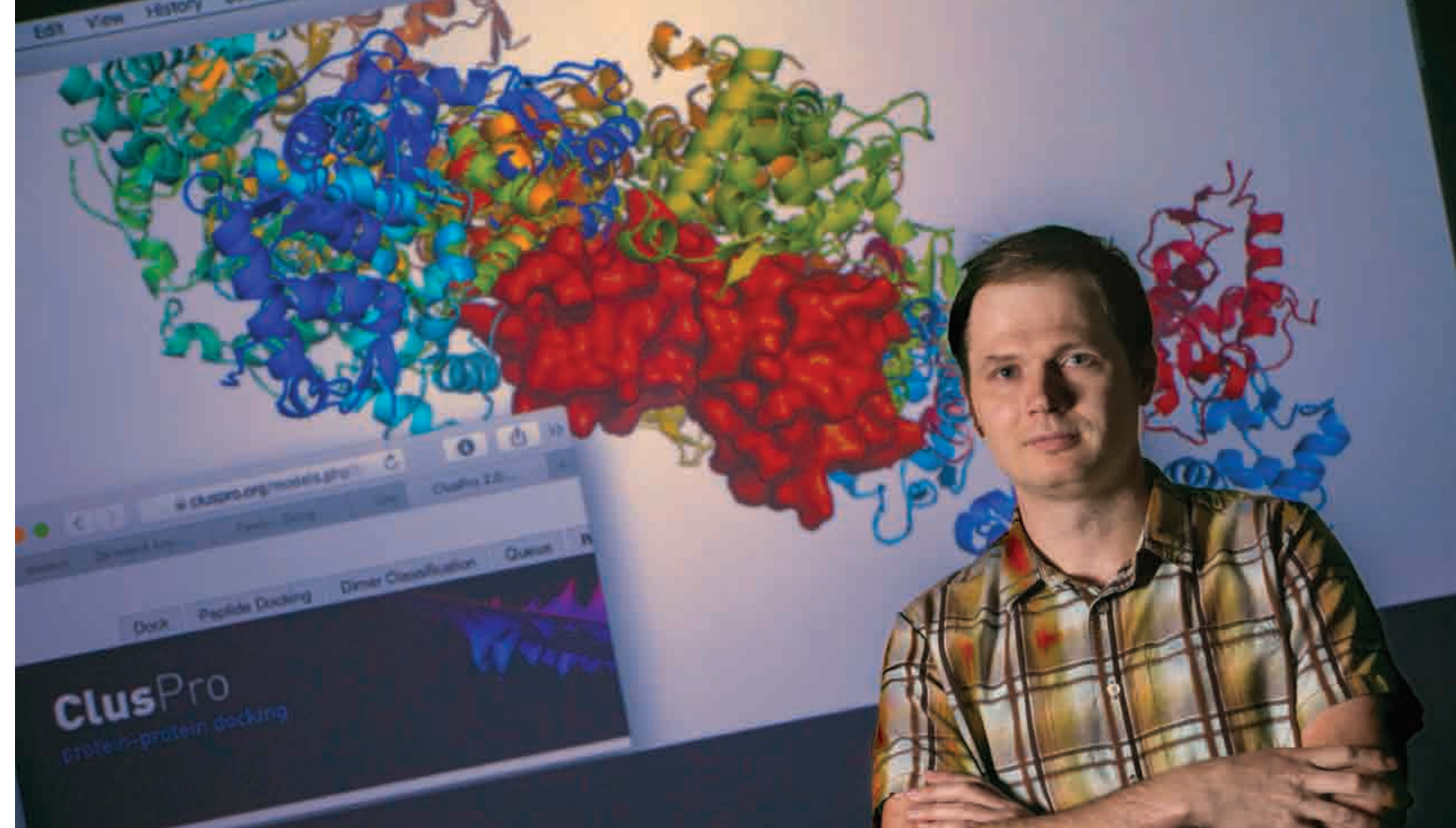
1. Develop strategic research initiatives targeting the engineering challenges of the 21st century. Leverage core strengths and strategically expand cross-cutting research initiatives that are aligned with the National Academy of Engineering's *Grand Challenges for the 21st Century* and the National Science Foundations' ten "Big Ideas," and support the state's research, economic development and entrepreneurial goals.

- a. Sustainable energy and the environment:** We will expand our already considerable energy research portfolio in energy storage, offshore wind, smart grid, clean water technologies, and coastal resilience by capitalizing on new national and state initiatives in renewable and sustainable energy solutions, nuclear fusion, zero-carbon systems, end-of-life plastics, and advanced heating and cooling systems. Investments and strategic cluster hires across our nine departments will be made to support bold cross-cutting college initiatives such as the new *Sustainable Energy Institute*, a joint venture between Stony Brook University and Brookhaven National Laboratory (BNL), as well as in sustainable manufacturing for advanced "cradle-to-grave" technologies.
- b. Smart and resilient urban infrastructure:** Smart infrastructure, fusing innovations in materials, additive manufacturing, sensing and communication, internet of things technologies and artificial intelligence among others, provides an unprecedented opportunity for building the resilient urban communities of the future. We will leverage our proximity to one of the world's largest and most vulnerable cities. We will lead in this area by expanding faculty expertise and by advancing a cross-cutting research vision that integrates technological innovation with the social aspects of community to increase public welfare, improve urban infrastructure resiliency, and foster entrepreneurship.
- c. Engineering-driven medicine:** The new *Institute for Engineering-driven Medicine (IEDM)* develops novel engineering and applied sciences solutions, which are transforming clinical care by advancing new therapies and improving patient quality of life. We will grow the Institute through strategic cluster hires of game-changing faculty and new partnerships, a culture of intensive collaboration, creative collisions, and cross-pollination of ideas. Collaborating with the Renaissance School of Medicine we will develop, pursue and support bold research initiatives in the convergence of technology with neurobiology, regenerative medicine, biomedical informatics, cardiovascular health, mental health, and oncology.

- d. Artificial intelligence:** The *Institute for AI-Driven Discovery and Innovation* was created to promote New York State as the epicenter of artificial intelligence research, education and discovery. The Institute is grounded in the principle that AI should *amplify* human intelligence instead of replacing it, while preparing the workforce of tomorrow to co-exist creatively in the AI-driven economy of the future. Through partnerships with Cold Spring Harbor Laboratory, BNL, sister SUNY Institutions, and other stakeholders, we will identify new initiatives in research, entrepreneurship, and workforce training with a focus on engineering AI in areas such as sustainable energy, smart and connected urban infrastructure, precision medicine, neuroscience, cyber-manufacturing, ecology, arts and the humanities, and education.
- e. Cybersecurity and privacy:** The scope and scale of security challenges have grown dramatically, encompassing software and supply chain vulnerabilities, sophisticated malware, targeted cyber attack campaigns, cybercrime, and unwanted tracking, surveillance and censorship. In the era of intelligent machines, the Internet of Things, and exponentially growing computing, cybersecurity is intertwined with nearly all other major research initiatives and thus requires a holistic approach. As such, we will continue to support and expand the cross-cutting excellence of our National Security Institute with faculty hires in areas such as software and hardware engineering, secure and usable systems design, modeling, validation and verification, cryptology, human-computer interaction, psychology, and policy.
- f. Quantum computing:** Quantum computing has enormous potential in numerous sectors critical for economic growth, enabled by the convergence of mathematics, computer science, engineering, and physical sciences. We have an ambitious plan for building, growing, and sustaining a long-term, interdisciplinary quantum computing research enterprise, leveraging collaborations with the College of Arts and Sciences and BNL.



g. Engineering for emergency global health challenges: The COVID-19 pandemic highlighted the urgency to proactively develop technological solutions for future global biological threats. Examples include solutions to support emergency care under extreme time and resource constraints, innovative technologies to proactively track and stop the spread of pandemics, and new drugs and therapies. Traditional education and research do not address improvising under severe time and resource constraints, which is partly why pandemics are so devastating. We will advance cross-cutting research initiatives in these areas that augment our strengths in AI and engineering-driven medicine, and advance solutions for the developing world that leverage our Global Innovation Field School in Kenya.



2. Foster a diverse community of scholars to address fundamental scientific challenges of great societal and educational impact. Promote a culture of excellence among the faculty and students by recognizing, incentivizing, and rewarding research accomplishments, particularly those that address grand societal challenges through inclusive and interdisciplinary research projects.

- a. Grow faculty talent via strategic cluster hires:** The College will invest in faculty hires to support cross-cutting initiatives that engage our departments and the entire Stony Brook community. Emphasis will be placed on hiring game-changing faculty who have the potential to lead large-scale, high risk, high reward research initiatives and strengthen our ability to effectively compete for center-scale grants.
- b. Expand support to foster interdisciplinary collaboration among faculty:** We are augmenting the innovation capacity of our scholars by enhancing administrative support, fostering opportunities for team building, and providing seed grants for research. Two new associate dean (AD) positions have been established: 1) the Associate Dean for Research and Entrepreneurship; and 2) the Associate Dean for Strategic Initiatives. The two ADs work synergistically to explore novel research directions, assemble collaborative teams, prepare competitive proposals for new initiatives, and support faculty entrepreneurship. Also the *Engineering Serendipity Seminar Series* has been established to foster collaborations and interactions within the College and beyond. We will continue to expand these efforts to bring faculty and students together in collaborative environments.
- c. Supporting the State of New York:** New York State is at the forefront of the nation, advancing a bold vision to fight climate change by supporting research and innovation in renewable energy, a net-zero economy, clean water, and sustainable urban development. We are uniquely positioned to support the state of New York and realize its goals through research, economic development and workforce training, which will continue to inform and guide our future strategic investment, research and growth.

d. Become the technology hub in the Long-Island innovation corridor: We will leverage our unique geographic location as the only AAU university on Long Island by expanding our role as the regional focal point for high-tech innovation partnerships. We will expand our partnership with BNL, which adds expertise and resources in areas as diverse as energy, synchrotron-enabled science, nanomaterials, advanced and additive manufacturing, computing infrastructure, and smart grids. We are working synergistically to expand our collaborative interactions with joint-appointment BNL faculty. We are also pursuing new initiatives with Cold Spring Harbor Laboratory in artificial intelligence, biotechnology and engineering-driven medicine.

e. Expand experiential learning opportunities for undergraduate and masters students: Collaborating closely with faculty, we will expand summer research programs, internships engaging our alumni scholar community, and projects available through the VIP program, while growing resources for programs that align underrepresented students with experiential learning opportunities in engineering and applied sciences.

3. Promote and aid grant-seeking excellence. Our research activity has grown by 40 percent over the past five years. To continue on this trajectory, strategic opportunities will be leveraged to foster immediate and long-term impacts on the state of research within our College.

a. Target larger federally funded research projects: An analysis of funding in recent years shows that, while our funding rates are similar to those of our peer institutions in the smaller (< \$200k) as well as larger (> \$1M) research projects, we have significant potential for growth among intermediate-size projects (\$300k - \$1M). We will invest resources to facilitate faculty transition to capture intermediate size grants across all federal funding agencies, while continuing to expand the pursuit of large multi-million dollar funding opportunities.

b. **Grow our research portfolio in mission-oriented programs:** We currently sponsor workshops and networking events focused on targeted opportunities from various agencies, e.g., DOE, DOD, DARPA, ARPA-E, NIH, and NASA. A task force will be developed to identify suitable programs and bring together faculty across multiple disciplines, colleges, and institutions.

c. **Incentivize and reward faculty leadership in high-risk, high-reward research projects** by easing the administrative burden of proposal preparation, rewarding high-productivity researchers with reduced teaching and service loads, and providing administrative support to help manage large projects. We will also revise promotion and tenure guidelines to recognize faculty who take the lead to develop and submit highly competitive center-scale grant proposals.

4. Modernize laboratory infrastructure to strengthen the research enterprise. Actively repurpose our laboratory space to accelerate growth of emergent research initiatives and meet the ambitious research expenditures goal of \$60M by 2025.

a. **Incentivize departments to modernize existing laboratories** in a manner consistent with the department's strategic plan for research and experiential learning.

b. **Leverage opportunities to build multipurpose research centers**, e.g., advanced characterization and sustainable manufacturing, to support interdisciplinary research across our departments and programs.

c. **Explore shared-use models for high-cost equipment** that faculty oversee. This will increase the utilization of equipment, reduce maintenance burdens, and provide additional resources for new equipment.

d. **Raise the resources to build a new engineering building** to enable the future growth by providing space for cross-cutting research neighborhoods and makerspaces for students to support our new educational vision.

5. Entrepreneurship and economic development. We will strive to promote a culture of entrepreneurship and economic development measured by excellence in scholarship, research and entrepreneurial productivity, such as the number of patents and start-up companies our faculty and students generate. We will create an inclusive entrepreneurial ecosystem by:

a. **Identifying and hiring entrepreneurially oriented tenure-track faculty** with an aptitude for and track record in generating patents and starting up companies.

b. **Revising our promotion and tenure guidelines** to recognize patents, start-up creation and similar entrepreneurial activities, in addition to the traditional benchmarks.

c. **Hiring non-tenure research faculty and entrepreneurs in residence** to help our faculty scholars and students pursue entrepreneurial activities.



d. **Partnering with the Stony Brook Office for Economic Development** to develop a vision for our Centers of Excellence and company incubators at the Stony Brook Research and Development park including a higher level of integration among facilities and people. These efforts will maximize faculty- and student-driven economic impact to the region and the state.

e. **Leveraging our Vertically Integrated Projects and Global Innovation Field School** to promote a culture of entrepreneurship among our students throughout the duration of their studies, particularly from an international perspective.

f. **Developing the new Stony Brook Innovation Gateway**, a major collaborative initiative with the College of Arts and Sciences, College of Business, Vice President for Research, and the Office of Economic Development. The Innovation Gateway will be a central, state-of-the-art innovation space on our campus for students, faculty, and local industry to collaborate on entrepreneurial projects, large and small, and at all phases of development.

g. **Creating an innovation continuum at Stony Brook** that engages students early and across the spectrum ranging from experiential learning to mature start-up incubation. Resources will be put in place that reward the success of nascent start-up companies originating from faculty research, student projects, and joint collaborations by giving them resources to grow at our research park incubators.



Stony Brook
University

stonybrook.edu/ceas

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