

University of Bridgeport

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Remarks for the Hearing of the Commission on Fiscal Stability and Economic Growth

We appreciate the opportunity to be here today to talk about important issues to higher education and the revitalization of our cities. It is my pleasure to represent the University of Bridgeport, home to the largest graduate engineering program in CT and the fastest growing School of Engineering in the nation, and the institution exhibiting the highest growth of external research funding across the State in the last 10 years.

Many of you already know that greater than 40 years of research by economists have demonstrated a strong link between education and economic performance. This association is achieved by investment in basic human capital, fostering the innovation approach, and facilitating knowledge transfer. Towards this end, the University of Bridgeport (UB) has embraced a critical paradigm shift by recognizing that success and economic growth have more to do with the quality of education rather than the amount of time spent in education. Furthermore, as we prepare our students for jobs that do not exist yet; we recognize as educators, scholars and researchers, that the path to success in the STEM-based future economy is a function of innovative, interdisciplinary, creative, industry-linked instruction. Therefore, as higher education in general and UB, in particular, formulates a path forward, it is our vision to emphasize professional, entrepreneurial, career-oriented, research-and-scholarship-focused multidisciplinary approaches to learning and instruction at the undergraduate and graduate levels in order to achieve distinguished outcomes in preparing students for 21st century innovative careers. We can and we will realize our potential to serve as a think tank for new ventures in the emerging world of technology-oriented markets and innovative solutions. We believe that it is our obligation to the community to develop a world-class trained workforce that helps in the continuing growth of industries and communities in CT and in all parts of the world where our graduates work and live. It should be our promise to provide an education that improves overall critical thinking, scholarly adaptability, life-long learning potential, and to prepare our students for unique opportunities, rewarding distinguished professions and eminent careers in an ever evolving futuristic economy that is globally-interconnected and technology-based.

Critical to achieving this educational and career-preparation vision is that we:

- 1) Provide theme-based interdisciplinary educational programs that are adaptable to a job market that is continuously changing, [[[autonomous vehicles, nanotechnology, block chain technologies, robotics, deep learning and AI, Cloud-based technologies, etc.]]]

- 2) Support an ecosystem on campus and in the State that encourages and supports the emergence of basic and applied research, technology transfer, industry involvement, entrepreneurship and the production of commercializable intellectual property. We need continued State and Local support to help strengthen these activities and provide the appropriate incentives to locate emerging businesses across the region and within developing research parks and to help create an exciting and supporting environment for entrepreneurs, start-up founders and a high-tech workforce to incentivize them to stay and grow their business in CT. [[[examples about very large percentage of our engineers, CS, and STEM majors leaving the State; given that we are the producers of the largest such population of graduates in the State]]]
- 3) Implement an infrastructure that promotes interdisciplinary research, faculty and student development, innovation, and entrepreneurship, and
- 4) Help the community and area schools to implement early STEM education and find ways to promote educational equity.

Delivering a Theme-based Multidisciplinary Curriculum

This strategy addresses many real world issues and is achievable through the creation of instruction centers around specific concepts, issues, problems, or experiences in a career-themed context. Therefore, multiple academic disciplines connect by a unifying concept that reinforces learning in a meaningful way. Through this educational programming, our graduates will acquire multiple skill sets that are adaptable for job titles that do not yet exist. Expansion of our Health Sciences programs, STEM majors and degree programs and the development of a theme-based multidisciplinary curriculum requires the invigoration of faculty and faculty-led student research, innovation and very involved and tight collaboration with industry, government, and research funding agencies.

Interdisciplinary Research and Faculty Development

To encourage the formation of multidisciplinary and interdisciplinary research that facilitate breakthrough and discovery and are parameters of competitive performance, UB has developed the following:

- UB Engineering Research Centers and select thematic laboratories that have contributed to projects that have garnered numerous awards, grants, and scholarships. Some of these research include: Multimedia Information Group Laboratory, Wireless and Mobile Communication Laboratory, Interdisciplinary Robotics, Intelligent Sensing and Control Laboratory (RISC), Renewable Energy Research Laboratory, Center for Sustainable Energy and Environment, Cloud Computing Cluster, and 3-D Printing and Advanced Manufacturing and many more.
- The “Collaborative Biomedical Research Center” (CBRC) is a state-of-the-art biomedical research facility that serves UB’s growing research enterprise and is designed to foster a shared culture of

multidisciplinary research collaboration. The center is dedicated to best practices and shared leadership across disciplines.

- The “Health Sciences Research Lab” (HSRL) is designed to augment the research profile of the graduate and professional health science programs by advancing translation of research to clinical practice. Notably, UB Health Clinics feature 4 health care disciplines that serve over 20,000 patients per year. These clinics include naturopathic, chiropractic, acupuncture and Chinese medicine, and dental hygiene that offer state-of-the-art training and clinical care to many who are uninsured and underinsured.
- The creation of research discussion groups, lecture series, research development seminar series, innovator speaker series, and grant-writing workshops that nurture and sustain innovation, research and partnerships.
- The development of a research infrastructure that provides UB researches and innovators with the necessary resources to conduct, manage, and seek funding for their inventions, research and scholarly endeavors in an ethical and safe manner. These structures were sponsored in part by federal grants from the NIH (National Institutes of Health) and the NSF (National Science Foundation) and include: Graduate Studies & Research; Office of Sponsored Research; Biomedical Research Development; Post-Doctoral Research Program; Institutional Review Board; Intellectual Property Board; Industry Advisory Board; UB Ctech IncUBator; Institutional Biosafety Committee; Undergraduate Council on Research and Scholarship.
- The development of summer research programs for high school students and UB undergraduate students. Summer camps for high school students teach programming, basic machine learning, and offer hands-on courses that teach about the Internet-of-Things. UB’s Summer Scholars program introduces undergraduate students to interdisciplinary research, team science and scholarship under the guidance of seasoned faculty research mentors.
- In recognizing the strategic needs in STEM education, UB implemented the Student Spaceflight Experimental Program (SSEP) which is a model U.S. STEM initiative designed to expose faculty mentors and UB undergraduate students to STEM research fields while motivating and encouraging them to adopt best research practices with real-world application. Notably, a UB experiment is already chosen to be part of a payload on a space shuttle that will launch to the International Space Station in late Spring 2018.
- Support early stage research and pilot studies by faculty through internal seed grant funding mechanisms.
- The mechanism to showcase and disseminate research conducted by faculty and students and to demonstrate UB’s Intellectual capital. This is accomplished through Faculty Research Day which is UB’s research symposium, as well as Breakthroughs which is UB’s research review featuring articles on select innovative, interdisciplinary research.

Innovation and Entrepreneurship

UB is committed to advancing technology-based entrepreneurship innovation as part of its role in promoting economic growth and development for CT, the region, and the nation. Towards this end, UB has implemented the following mechanisms:

- UB's CTech IncUBator, the first on-campus incubator in Fairfield County, is a State of CT partnership between UB and CT innovations for the purpose of enabling growth and commercialization of UB's applied research and innovation. UB's business incubator encourages external companies to participate, has created jobs, and fostered regional economic development.
- An industry advisory board that provides feedback and sponsorship of new degrees, professional programs, and academic events as well as participates in UB job fairs and the hiring of student interns, co-ops and graduates.
- As part of UB's newly received CTNext grant, UB has established a consortium of small, medium and large institutions to develop a CT inter-disciplinary and inter-institutional network for improving innovation and entrepreneurship collaboration amongst partner institutions that will accelerate the growth of new business/technical ventures in CT. This consortium will support the formation of new ventures and existing startups in the STEM disciplines across a broad variety of business sectors such as biotech, manufacturing, health sciences and software, among others. This consortium will also establish a Collaborative Technology transfer, Licensing, Intellectual Property and Commercialization office.
- The newly developed Bauer Hall Innovation Center will be home to UB's existing venture programs, including the Student Entrepreneur Center (SEC) that has helped launch 11 student-owned companies in two years, and the UB Incubator. The Innovation Center will consist of offices, conference rooms, brainstorming booths, an International Trade Center, a Professional Service Office, a maker space, and room for additional resources throughout four floors. Experts—including attorneys, engineers, financial consultants, marketing professionals, and more—will be on hand at the Center to help guide entrepreneurs.

Early STEM Education and Educational Equity

To create an adaptable workforce that can contribute to economic growth, it is important to introduce our students at a young age to newly emerging technologies, and to teach them how to think creatively and to manage their projects. Simultaneously, UB recognizes STEM achievement gaps in neighboring school districts and that some are at a larger disadvantage as compared to others. Thus, UB strives to achieve equity in education by collaboration with district schools to address STEM achievement gaps and to provide a large number of K-12 students with hands-on STEM-focused skills. UB community projects include:

- Offering a dual enrollment program as an opportunity for high school students from Bridgeport and neighboring school districts throughout Fairfield and New Haven counties to earn college credit while attending classes at their high school.
- The development of engineering and biotech labs as well as STEM curricula for schools such as the Fairchild Wheeler Inter-District Magnet campus

- Inviting UB high school partners to participate in UB's annual research symposium entitled "Faculty Research Day". The goal is to foster research collaborations between schools and colleges in our community as research becomes increasingly interdisciplinary.
- Inviting K-12 schools to participate in Engineers Week that include make and take STEM activities and demonstrations of innovative engineering research projects.
- The newly awarded CHEFA Client Grant program to UB will fund the retrofitting and development of "The UB-Discovery STEM on Wheels". In collaboration with the discovery museum, a bus will be retrofitted to provide STEM learning experiences to schools lacking resources

The State, local and other agencies would do well for our future by supporting and funding STEM education, innovation and similar activities across all school districts and working with higher education to help enrich and strengthening such collaborations.

A strong transportation infrastructure in CT is a necessary compliment to education in revitalization of our cities. Aside from building new roads and adding rail systems that are costly and time-consuming [[1 trillion -> 2+ trillion \$\$; land, sea and air — roads, rail, pods, hyperloops, UAV's.. etc.]], it is important to realize that Artificial Intelligence and Robotics researchers and many entrepreneurs have made great strides in autonomous innovations for societal benefit. Notably, the Department of Defense is harnessing this rapidly growing technology for the creation of autonomous un-manned systems and swarming drones on land, sea and air that follow simple rules and have the capacity to interact together communicate and efficiently utilize transportation pathways. The world-wide interest of the militaries in these systems is two-fold, reduce the cost of war and protect valuable human life.

These un-manned autonomous technologies should not just apply to military interests, but also serve our urban areas. A simple solution that is foreseeable in the near future is the implementation of autonomous technology in cars, planes and boats that run on renewable energy. Researchers believe that self-driving cars can be safer than cars operated by human drivers because they are programmed to adhere strictly to traffic laws, they don't get distracted, and they usually refrain from taking unnecessary risks; in addition to being aware of each other and communicating at all times. Indeed, dozens of companies are testing self-driving technology on public roads across the United States and some autonomous features are available in today's cars. In an effort to reduce fatalities, many states consider this development a top priority in public safety and would like to advance these efforts to reduce crashes and deaths on its roads; in addition to reducing traffic jams, delays and very efficiently utilizing existing infrastructures or providing alternative ones. We very highly encourage looking and supporting these endeavors and technologies in order to complement our infrastructure and transportation revitalization efforts.