Martin O'Malley Governor
Anthony G. Brown Lt. Governor
Christian S. Johansson Secretary
Dominick E. Murray Deputy Secretary

MEMORANDUM

TO: Dr. Michael Stebbins
Assistant Director for Biotechnology
Office of Science and Technology Policy
Executive Office of the President

FROM: Sally Kenyon Grant
Federal Policy Coordinator
DBED

CC: Dr. Judy Britz
Executive Director
Maryland Biotechnology Center

Dr. Charles Montague
Manager
Maryland Biotechnology Center

Rhonda J. Ray
Director of Policy and Government Affairs
DBED

DATE: December 6, 2011

SUBJECT: RFI: Building a 21st Century Bioeconomy
The White House - Office of Science and Technology Policy

To follow is our RFI: Building a 21st Century.

Building a 21st Century Bioeconomy

I. Introduction

On September 16, the President announced the development of a National Bioeconomy Blueprint (National Bioeconomy Blueprint), to be completed by January, 2012. The Blueprint will detail a new, Administration-wide effort to harness biological research innovations to address national challenges in health, food, energy, and the environment while growing the economy. The Office of Science and Technology Policy released a Request for Information on October 7, 2011(Request for Information), to solicit input to inform the development of the Blueprint. Tom Kalil, Deputy Director for Policy for the Office of Science and Technology Policy in the Executive Office of the President is directing the RFI.

The Maryland Biotechnology Center (MBC) is contributing to this RFI in the areas of "lab to market" by supporting and providing examples of:

- Promoting Commercialization and Entrepreneurship,
- Research and Development, and
- Workforce Development.

From the RFI and in response to the Administration's interest to learn further about steps to take to get science from lab to market, we are addressing seven points from the RFI and providing examples of programs in Maryland.

II. Outline

The seven areas that we will address in this paper include:

- RFI Outline No. (5) (We are combining 5 & 11)

  (5) What are the barriers preventing biological research discoveries from moving from the lab to commercial markets? What specific steps can Federal agencies take to address these shortcomings? Please specify whether these changes apply to academic labs, government labs, or both.

- RFI Outline No. (6)

  (6) What specific changes to Federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs 2 would help accelerate commercialization of federally-funded bioeconomy-related research?

- RFI Outline No. (8)

  (8) What are the challenges associated with existing private-sector models (e.g.venture funding) for financing entrepreneurial bioeconomy firms and what specific steps can agencies take to address those challenges? *Workforce development:* Investment in education and training is essential to creating a technically-skilled 21st century American bioeconomy workforce.

- RFI Outline No. 9

(9) The majority of doctorate recipients will accept jobs outside of academia. What modifications should be made to professional training programs to better prepare scientists and engineers for private-sector bioeconomy jobs?

- RFI Outline No. 10

(10) What roles should community colleges play in training the bioeconomy workforce of the future?

- RFI Outline No. 11 (We are combining 5 and 11)

(11) What role should the private sector play in training future bioeconomy scientists and engineers?

- RFI Outline No. 12

(12) What role might government, industry, and academia play in encouraging successful entrepreneurship by faculty, graduate students, and postdocs?

III. Barriers Preventing Lab to Market
Federal Agency Support
Private Sector Training Opportunities

In the outline below, the Maryland Biotechnology Center will provide examples of initiatives that support lab to market programs in the State of Maryland. We will cite specific programs and leaders who have experience in research innovation initiatives that can be associated with high skill jobs.

- RFI Outline No. (5) Combined with RFI Outline No. 11

(5) What are the barriers preventing biological research discoveries from moving from the lab to commercial markets? What specific steps can Federal agencies take to address these shortcomings? Please specify whether these changes apply to academic labs, government labs, or both.

(11) What role should the private sector play in training future bioeconomy scientists and engineers?

Examples: The BioMaryland Alliance
The Maryland Industrial Partnerships (MIPS)
NIH Intramural Launch Program – For Post-Doctoral Fellows

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The Maryland Industrial Partnerships (MIPS)

The BioMaryland Alliance

The BioMaryland Alliance is a 501(c) 6 organization of business and community leaders created to facilitate Maryland companies working with the cluster of federal life sciences facilities located in Maryland ("facilities"), in particular the 27 Institutes and Centers that comprise the National Institutes of Health. The BioMaryland Alliance works to increase technology transfer and translational research opportunities at these facilities for Maryland companies by:

1) Facilitating communication and understanding with Maryland business leaders; and local, federal and state officials.

2) Promoting and supporting Maryland companies as they engage these facilities in business enterprise through contract relationships, collaborations, clinical trials, public-private partnerships, commercialization of technology, joint ventures and other activities; and

3) facilitating the transfer of technology and translational research activities at these facilities by increasing interactions with the business community and assisting in the development of policies which enable these activities to result in business growth for companies in Maryland.

The Maryland Industrial Partnerships (MIPS):

Concept:
Establish a NIST-based federal program based on the well-proven Maryland Industrial Partnerships program that effectively promotes commercialization of American innovations from US universities into US industry. By capitalizing on the base of research innovation in US universities, American companies can enhance their competitiveness and remain dominant providers of technology-based products.

Background:
A successful new economy relies heavily on intellectual capital and new technological innovations. Leveraging university assets to streamline product development and spur economic development makes sense, and fits into the NIST-MEP Next Generation Strategy to help manufacturers develop new products and new markets for US-made goods.

Why MIPS?
The Maryland Industrial Partnerships (MIPS) is a proven model for academic-industrial collaborations. MIPS has a 23-year history of successfully enhancing early stage technology commercialization. MIPS was recognized in March 2005 by the US Small Business Administration's Office of Advocacy as a best practices program in technology transfer in the US. The MIPS program could be broadly applicable in other US states in order to enhance technological competitiveness. There are fewer than five similar programs in existence now.

How does MIPS Work?
MIPS and Maryland companies jointly fund product development projects at the University of Maryland which must directly benefit the commercialization goals of the company. MIPS-supported products have achieved sales in excess of $21 Billion. MIPS often plays a critical role in proof of concept or prototype projects crucial to successful product commercialization. This is particularly true for start-up and newly emerging companies. The ideal situation occurs when innovations are carried directly to market by companies working hand in hand with university innovators.

What kind of technology can be developed?
The MIPS program can effectively work in a wide range of technologies including: biotech/life sciences, information technology, homeland security, nanotechnology, information security, telecommunications, clean energy/sustainability, environmental, optical and chemical technologies, etc.

How can MIPS be applied elsewhere?
Matched by state funds, federal funds could establish MIPS-like programs in any state that has an active research university system. By creating successful university-company linkages, states can compete more effectively in the new global economy. Federal funds would be matched not only by state funds, but also by corporate funds from participating companies. MIPS processes (application process, guidelines, contracts, evaluations) are well established (www.mipstrack.umd.edu) and could be applied immediately to other new programs.

What would this do for Maryland?
Maryland would become known as a leading state for innovation. With Maryland's history and track record of research and development (with more than $14 Billion in federal funds spent in Maryland alone on R&D), Maryland is uniquely positioned to be the leader in technology innovation programs. The missing piece has always been the ability to translate basic research into useful new products. Applying the award-winning MIPS model on a federal level establishes Maryland as a catalyst for US innovation.

What would this do for the US?
This new program would establish a smooth path for academic-industrial partnering throughout the US and help states compete in the global marketplace. The value of such a program may fundamentally change the way innovation proceeds to market. As the US has effectively invested in research, it must also invest in the ability to translate that basic work into products in the global marketplace. This would ensure the continued competitiveness of the US in the world.

NIH Intramural Launch Program – For Post-Doctoral Fellows

• At the orientation of new NIH fellows the Launch Program is presented as a viable career option.

• If interested, a post-doc begins entrepreneurship and business training during their fellowship using resources available in the Montgomery or Frederick County bio-incubator facilities. In parallel they begin discussing commercialization possibilities with their principal investigator (PI).

• When ready, the fellow licenses intellectual property from the NIH to form a new company or nonprofit entity, collaborating with their NIH PI in a seamless partnership that builds upon their subject matter expertise and the unique environment of the intramural research program.

• The NIH PI uses an amended IRTA mechanism to provide laboratory space, research funds, and a salary stipend to support the career development of their fellow; serving as a collaborator, mentor, and 'skin-in-the-game' vicarious entrepreneur to co-commercialize the science.

• Based on background and interest, the NIH PI may play a significant role in advising the fellow on commercialization activities, or may focus only on the scientific aspect and leave the business guidance to other mentors available within the Launch Program.

• The fellow shifts his or her emphasis to include both inventive- and discovery-based science to further the goals of the new entity.

• The fellow and PI engage in an extended and synergistic R&D partnership at NIH, with an understanding that some biotechnology efforts will take many years to complete.

• The fellow accesses federal, state, country, and private resources to raise funds to support the entity, and when ready opens a manufacturing center in a county bio-incubator or local facility.

• The partnership is renewable based on regular external reviews of progress, using both academic (scientific publication) and commercialization (product development) milestones.

• Special emphasis is placed on encouraging, starting, mentoring, advising, and supporting women- and minority-owned entities, including use of government set-aside programs.

• Exit strategy – even with the advantages of an NIH partnership, many entities will fail. In that circumstance, a terminal year of support will be provided and the post-doc will be considered to have formally completed a second NIH fellowship with an emphasis on entrepreneurial training.

• Metrics of Launch Program Success:

1. Provide exciting career option for a subset of NIH fellows – new opportunity for early scientific independence outside the traditional academic system.

2. Increase utilization of NIH intramural inventions and discoveries for public good.

3. Create women- and minority-owned businesses and research institutions.

4. Royalty- and equity-based payments to NIH to support additional basic research.

5. Economic value to local, state, and national economies.

6. Business innovation, e.g., two NIH post-docs join forces to spin out a non-profit entity using a scientific crowd sourcing business model that nobody thought of before...x 1000.

II. SBIR and STTR Programs to Accelerate Commercialization of Federally-Funded Bioeconomy Related Research

- RFI Outline No. (6)

(6) What specific changes to Federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs 2 would help accelerate commercialization of federally-funded bioeconomy-related research?

Example: **TEDCO**

State Partner: **Rob Rosenbaum**
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TEDCO

The Maryland Technology Development Corporation (TEDCO), an independent entity, was established by the Maryland General Assembly in 1998 to facilitate the transfer and commercialization of technology from Maryland's research universities and federal labs into the marketplace and to assist in the creation and growth of technology-based businesses in all regions of the State.

In 2008, for the fifth consecutive year, *Entrepreneur magazine* ranked TEDCO #1 as the most active investor in seed/early-stage companies in the nation (the magazine has not produced a report since 2008).

TEDCO's mission is to:

- *Support* transferring to the private sector and commercializing the results and products of scientific research and development conducted by colleges and universities and the federal laboratories in the State of Maryland.
- *Assist* in the commercialization of technology developed in the private sector.
- *Foster* the commercialization of research and development to create and sustain businesses throughout all regions of the State.
- *Promote* entrepreneurship and the creation of jobs in technology-related industry by establishing and supporting effective business incubators throughout the State that provide adequate physical space and programs to increase or accelerate business success in the field of technology.

TEDCO's role is to be Maryland's leading source of funding for seed capital and entrepreneurial business assistance for the development, transfer and commercialization of technology. To date, TEDCO's portfolio totals 244 companies.

As a government intermediary, TEDCO has done the following programs:

- TEDCO Hosts Small Business Innovation Research Conference

  TEDCO's conference aims to provide Maryland's Small and Minority Businesses with the necessary tools to master the complexities of the SBIR application process, and understand the intricacies of the selection process while tapping into the minds of the selectors.

Panelists include:

• experts from federal agencies
• qualified speakers on SBIR funding
• specialists in the venture capital community
• industry leaders skilled at taking small businesses from product development to commercialization

- Maryland Technology Transfer and Commercialization Fund (MTTCF): MTTCF, TEDCO's signature program, provides up to $75,000 as a reimbursable award for initiation of technology transfer projects that involve collaboration between a Maryland company and any federal laboratory or academic research institution in Maryland as well as a tenant in one of Maryland's technology incubators. Funds are to be used to defray direct costs of further developing early-stage technology. TEDCO has made investments in 169 MTTCF companies. With TEDCO's support these companies have collectively raised downstream funding from venture and angel investors, government grants (e.g. NIH, SBIR), private placements, product sales, etc., for a leverage of the State's investments through TEDCO of over $42 to $1.

- University Technology Development Fund (UTDF): The UTDF provides up to $50,000 for proof-of-concept studies or patent extension research on Maryland university-owned technologies to demonstrate their ability to meet identified market needs. The objective is to make the technologies more attractive to licensees preferably based in Maryland.

- TechStart Program (TSP): TSP provides up to $15,000 to further evaluate the feasibility of a technology from a Maryland university or federal lab to be the basis of a startup company. The feasibility team must include the principal investigator, entrepreneur, and tech transfer manager. Funds are to be used for tasks critical to determining the viability of a new company formed around the spin-out technology.

- Rural Business Innovation Initiative (RBI2): The RBI2 program supports technology-based companies in rural Maryland. The program provides intensive business and technical assistance to help companies advance to the next level. Companies may receive a maximum of $7,500 of assistance provided by industry experts.

- Maryland Stem Cell Research Fund (MSCRF): MSCRF provides a variety of grant programs for human stem cell research in the State of Maryland, including: Investigator-Initiated Grants, Exploratory Grants, and Post-Doctoral Fellowships. Maryland-based organizations of all types are eligible for the grants. Such organizations include public and private, for-profit and nonprofit, universities, colleges, research institutes, companies, medical centers and others. Funding of $55,000 to $500,000 a year is available. For more information please go to www.mscrf.org.

- Joint Technology Transfer Initiative (JTTI): TEDCO has contracted with the Department of Homeland Security (DHS) and the U.S. Army Medical Research and Materiel Command (USAMRMC) to facilitate transfer of technology. Funding up to $75,000 is available to company can show how the proposed technology will meet the needs of DHS and/or USAMRMC (Spin-In) and/or the commercialization of DHS or USAMRMC technologies (Spin-Out).

- Working Capital Loan Fund (WCLF): WCLF is designed to provide loans to incubation-stage, technology-related companies in Maryland. The maximum loan is $50,000, with low interest rates and flexible terms, and includes a quick turn-around from application to a decision. Funds can be used to assist a company with expansion, market entry, staffing or other working capital needs.

INCUBATOR INITIATIVES

- Incubator Development Fund: This is a funding program designed to support the capital needs of developing a new incubator facility or renovating an existing facility. The funding leverages other private and public investment.

- Incubator Feasibility Study Grant Program: The Incubator Feasibility Study Grant Program is designed to assist higher education institutions and local economic development organizations in creating and expanding technology business incubators. The grant funds are used to hire a consultant to complete a feasibility study for a technology incubator. TEDCO provides matching grant dollars up to $30,000 per study.

- Intensive Business Assistance Program: This program promotes the growth of technology companies in the State of Maryland through support of business incubators. Each of the 19 technology incubators receives an annual grant, based on a Scope of Work, to provide targeted business assistance services to their tenants and affiliates.

TEDCO Program – NASA Technology Opportunities

TEDCO can help identify NASA-sponsored research, technology, technical expertise and R&D capabilities that match the needs and interests of your business. TEDCO assists Maryland businesses to improve their competitiveness by providing free technical assistance and information to help resolve specific technical questions or needs that can be addressed within a limited amount of time. This is routinely done on a confidential basis. Also, TEDCO funding programs can help you develop NASA technology.

Currently Featured NASA Technologies
For the convenience of Maryland companies TEDCO has listed some of the promising NASA technologies here:

- Goddard Space Flight Center

TEDCO can help you with questions regarding a NASA technology match, establishing technology agreements with NASA, patenting products and intellectual property, working with NASA scientists to commercialize new products, and measuring program success. NASA is deeply committed to spreading the unique knowledge that flows from its aeronautics and space research to businesses. Numerous technologies originally developed for NASA missions have wide commercial application and are now available for license.

TEDCO provides Maryland companies with information about these “technology opportunities” and how to pursue them within NASA. NASA is also seeking industrial partners to pursue joint research and development projects that have potential application to both NASA missions and the commercial market. TEDCO serves as a point of contact for businesses seeking information about

NASA technologies. TEDCO will work with you to understand your specific opportunity, question, or need. We will then provide assistance through our own expertise, the knowledge base of NASA, and other partners within the TEDCO family. After providing the assistance, we may send you a brief evaluation survey to determine your satisfaction and the economic impact of our assistance.

TEDCO Program Links to Federal Labs

Federal Labs Consortium

NAVY

- Pax River
- Carderock
- Naval Medical Research Center
- Indian Head
- NAVAIR

NIST - National Institute of Standards and Technology

NASA

- Goddard Space Flight Center

NSA - National Security Agency

NIH - National Institute of Heath

- Seeking an NIH Grant?
- NCI
- NCI-Frederick

ARMY

- Army Alliance for Technology
- Aberdeen Proving Ground
- Science & Technology Board at Aberdeen
- Center for Health Promotion & Preventive Medicine
- Army Research Lab
- Fort Detrick

APL - Applied Physics Laboratory

ARS - Agricultural Research Service

- Beltsville Agriculture Research Center

III. Challenges for Financing Entrepreneurial Bioeconomy Firms

- RFI Outline No. (8)

  (8) What are the challenges associated with existing private-sector models (e.g.venture funding) for financing entrepreneurial bioeconomy firms and what specific steps can agencies take to address those challenges? *Workforce development:* Investment in education and training is essential to creating a technically-skilled 21st century American bioeconomy workforce.

Example: **Greater Baltimore Committee (GBC)**

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The Greater Baltimore Committee (GBC) is a regional, membership organization of more than 500 businesses, nonprofit organizations, and educational and civic institutions. Members are located in Baltimore City and Anne Arundel, Baltimore, Carroll, Harford and Howard counties.

The GBC's mission is to improve the region's business climate by organizing its corporate and civic leadership to develop solutions to problems that affect the region's competitiveness.

GBC can work toward leveling the funding field between academia and commercial companies. Far too great a percentage of federal funding goes to universities with a focus on basic research, grant procurement and publication. GBC, in the private sector, would like to see major research universities held accountable for how these funds are spent and what practical outcome(s) they achieved. GBC would like to see far more federal funds in bioscience directed toward small and emerging company funding. Finally, GBC would like to see a significant increase in the percentage of funds currently allocated for SBIRs for small companies.

IV. Professional Training Programs to Prepare Scientists for Private-Sector Bioeconomy Jobs

- RFI Outline No. 9

  (9) The majority of doctorate recipients will accept jobs outside of academia. What modifications should be made to professional training programs to better prepare scientists and engineers for private-sector bioeconomy jobs?

Examples: **Johns Hopkins University**

1.) Center for Biotechnology Education at Johns Hopkins

2.) **Masters in Biotechnology Enterprise and Entrepreneurship**

3.) **Certificate in Biotechnology Enterprise**

4.) **Joint MS Biotechnology/MBA**

5.) **Johns Hopkins University Carey Business School INNOVATE Technology Commercialization Program**

Professional Science Masters (PSM) at UMBC

Biological Sciences Department Graduate Programs at UMBC

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Johns Hopkins University

1.) **Center for Biotechnology Education at Johns Hopkins**

2.) **Masters in Biotechnology Enterprise and Entrepreneurship**

3.) **Certificate in Biotechnology Enterprise**

4.) **Joint MS Biotechnology/MBA**

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Professional Science Masters (PSM) at UMBC

Biological Sciences Department Graduate Programs at UMBC

Johns Hopkins University

1.) LANGUAGE REGARDING CENTER FOR BIOTECHNOLOGY EDUCATION

About the Center for Biotechnology Education

The Johns Hopkins University Zanvyl Krieger School of Arts and Sciences created the Center for Biotechnology Education to engage diverse audiences in the world of biotechnology and to prepare the leaders of today, tomorrow, and the next generation for the challenges of the 21st century. By expanding the scope of biotechnology education, the Center for Biotechnology Education is building a pipeline of students and professionals prepared to achieve success in K-12 education, graduate school, and the work environment in the fields of biotechnology, bioinformatics, bioscience regulatory affairs, and bioscience business and leadership.

The Center's mission is to expand the reach of biotechnology education through three channels:

- **Graduate Education -** Our graduate programs are designed for working professionals – delivering the rigorous and practical curriculum they need to advance their careers or academic ambitions. Johns Hopkins' Advanced Biotechnology Studies (ABS) Program is rooted in the multidisciplinary skills of basic research, drug discovery technologies, bioinformatics, regulatory affairs, and product commercialization. The program offers four master's degrees, graduate fellowships, and certificates.
- **Youth Programs –** Inspiring the next generation to explore the world of biotechnology is an important objective of the Center. We developed several hands-on programs for children in elementary, middle and high school that introduce them to this exciting field.
- **Professional Development –** Orchestrating partnerships with industry and government organizations to provide community outreach, professional development, educational opportunities, workshops, research symposia, and lecture series for academia, industry, and the general public.

Our goals are to increase public awareness and understanding of biotechnology, to inform educators of the resources and programs available locally and nationally, to become a resource center for biotechnology information, to coordinate training workshops for students and professionals, and to support biotechnology training and education locally, nationally, and internationally.

2.) LANGUAGE REGARDING MASTERS IN BIOTECHNOLOGY ENTERPRISE AND ENTREPRENEURSHIP

Masters in Biotechnology Enterprise and Entrepreneurship

For a biotechnology enterprise to be successful, it requires trained professionals who understand science and who are also skilled in the complexities of biotechnology commercialization. This exciting new program brings together a strong science foundation with biotechnology enterprise and entrepreneurship.

About the Program

This new master's program is intended for biotechnology professionals who seek a career beyond the laboratory either within an existing biotechnology group or organization or for those who seek to start a new biotechnology enterprise. The curriculum is designed to prepare the next generation of interdisciplinary professionals to address the enterprise and regulatory challenges organizations face in the biotechnology industry.

Students will complete 10 graduate courses, including a final practicum course to gain real-world experience. Students may choose three electives across a broad range of science, enterprise and regulatory courses, (no more than one elective may be a business course) or they may choose a concentration in Bioscience Communications or Legal/Regulatory Affairs.

Courses are offered at the Homewood campus, the Montgomery County Campus, as well as online. The entire degree can be completed online or a combination of online and on-site.

3.) LANGUAGE REGARDING CERTIFICATE IN BIOTECHNOLOGY ENTERPRISE

Certificate in Biotechnology Enterprise

Merging science and business is at the center of biotechnology. Students who want to become part of the development and commercialization of science must first understand the running of a biotechnology organization. To acquire this experience and knowledge, students can earn a Certificate in Biotechnology Enterprise. This certificate offers the opportunity to learn critical aspects including how to create a new enterprise, finance, marketing, and other areas of commercialization. This certificate is ideal for students planning to engage in the enterprise of biotechnology beyond the science. Applicants should have an undergraduate degree preferably in the life sciences with a grade point average of 3.0 on a 4.0 scale.

Certificate requirements consist of five courses. Students who successfully complete the certificate and subsequently decide to seek admission to the master's degree program in biotechnology or bioscience regulatory affairs will receive credit for three of the courses taken in the certificate toward the master's degree. Conversely, students who complete their master’s degree first, may count 3 of their enterprise courses toward the certificate.

4.) LANGUAGE REGARDING JOINT MS BIOTECHNOLOGY/MBA

Master of Science in Biotechnology/MBA

A joint offering of the Zanvyl Krieger School of Arts and Sciences and the Carey Business School

In today’s aggressive biotechnology business environment, there is an acute need for leaders who understand both the science and business of biotechnology. Johns Hopkins University offers one of the nation’s first joint graduate degree programs in biotechnology and business. Graduates earn two Johns Hopkins degrees. The program allows students to master areas such as biochemistry, biostatistics, and bioinformatics while developing critical business skills in areas such as accounting, finance, negotiation, and regulatory and legal matters.

FLEXIBILITY
Designed for working adults, the Master of Science in Biotechnology / MBA graduate degree program offers a part-time program of study. Courses are taught during evenings or weekends at the university's Montgomery County Campus in Rockville, MD.

STRENGTHS
The joint degree program allows students to earn two advanced degrees in less time than it takes to earn them separately. Students complete 10 courses for the MS in Biotechnology and 14 for the MBA. Students follow a curriculum sequence allowing them to complete both degrees in three years.

As one of the largest biotechnology and business programs, and ideally situated both in the Shady Grove Life Sciences Center and near federal research and regulatory agencies, the program capitalizes on the strengths of leading experts, Johns Hopkins academics, and a diverse student body.

5.) JOHNS HOPKINS UNIVERSITY CAREY BUSINESS SCHOOL INNOVATE TECHNOLOGY COMMERCIALIZATION PROGRAM – NON-CREDIT

Starting in February 2010, the Carey Business School will offer a technology commercialization program, titled Innovate!, at the Johns Hopkins University Montgomery County Campus.

Innovate!, which is funded by a National Science Foundation grant to the Johns Hopkins University and the University of Maryland, Baltimore County, is a 12-month program led by successful serial entrepreneurs that will take a class of 15 business professionals and 15 postdocs through evaluation of a technology's commercial viability, preparation of a business case based on the technology, and launch of the business. The businesses will be based on technology from NIH, Johns Hopkins University, the University System of Maryland, and other research institutions and federal agencies.

"The Innovate! program is perfect for professionals who have thought about starting their own technology company and are looking for a supportive, structured environment to help make it happen," said Yash Gupta, Dean, Johns Hopkins Carey Business School.

"We're extremely excited to have the Innovate! program on our campus because it fits so well with the county's economic development goals," said Elaine Amir, Executive Director, Johns Hopkins Montgomery County. "The county recently released its Biosciences Task Force report, and one of the report's five key objectives was to 'enhance the environment for entrepreneurship and the creation of new life sciences companies.' It's great that Johns Hopkins can help advance that goal."

The Innovate! program is based on the highly successful ACTiVATE® program at the University of Maryland, Baltimore County, which has led to the formation of more than 25 companies since its inception in 2005.

Partners for the Innovate! program include Rockville Economic Development, the Montgomery County Department of Economic Development, and the National Institutes of Health.

Professional Science Masters (PSM) at UMBC

The Professional Science Master's (PSM) degree is an innovative two-year graduate degree designed to allow students to pursue advanced training and excel in science while simultaneously developing highly-valued business skills. PSM programs prepare students for science careers in business,

government, or nonprofit organizations, where workforce needs are increasing. Programs are characterized by "science-plus," combining rigorous study in science or mathematics with skills-based coursework in management, policy, or law. PSM programs emphasize writing and communication skills, and most require a final project or team experience, as well as a "real-world" internship in a business or public sector enterprise.

The PSM programs now recruiting are of three kinds:

- Those that deepen a student's knowledge beyond what can be learned in a four-year course of study, but stay within a disciplinary domain;
- Those that fuse scientific fields at a level of depth and complexity hard for undergraduates to achieve; in many cases, the fusion may be with computer or information sciences; and
- Those that integrate study in the natural sciences and mathematics with knowledge and training in management, law, or other professional domains.

Programs are developed in concert with industry and are designed to dovetail into present and future professional career opportunities. Graduates are equipped to manage the breakthroughs that are created by the research teams. They can interact between researchers and managers, especially in the marketing, finance, and legal departments.

The PSM began in 1997 with a series of grants from the Alfred P. Sloan Foundation to selected research universities. (Background on the PSM initiative.)

PSM Reports and Statistics

Enrollment and Degrees in Professional Science Master's (PSM) Programs: 2010

The *2010 Professional Science Master's Enrollment and Degrees Survey* is an annual survey of enrollment and degrees in Professional Science Master's (PSM) programs. Previous PSM enrollment and degrees surveys were conducted for academic years 2008 and 2009 by NPSMA, the National Professional Science Master's Association. The revamped 2010 survey was carried out by CGS with a grant from the Alfred P. Sloan Foundation. It collected data regarding applications, first-time enrollment, total enrollment, and degrees awarded.

Outcomes for PSM Alumni: 2010/11

The *2011 Professional Science Master's (PSM) Student Outcomes Survey* was conducted by the Council of Graduate Schools with a grant from the Alfred P. Sloan Foundation. The survey was designed to capture initial hiring outcomes of PSM graduates and follow them for up to five years after graduation. The design was based upon a review of more than 40 outcomes-related data collection efforts from more than 30 governmental agencies, non-profit organizations, and educational institutions. A draft version of the questionnaire was reviewed by numerous individuals affiliated with the PSM initiative, including members of the Board of Directors of the National Professional Science Master's Association (NPSMA) and members of the Council of Graduate Schools PSM Advisory Board.

Companies That Have Hired PSM Graduates

Applied Physics and Health Physics

Argonne National Lab
Boeing
Entergy
Geisinger Health System
Illinois Department of Nuclear Safety
Lockheed Martin, thermo-analysis of small satellites
Mayo Clinic
Raytheon, various
Spectrum Astro
Thomas Jefferson Accelerator

Environmental

Alameda County Water District, GIS water analyst
Cold Regions Research and Engineering Laboratory
Conservation Biology Institute
Institute of Pollution Control, Tech. Development
Minerals Management Service, Leasing & Environment Mapping and Automation
MODIS Rapid Response Team, NASA
Natural Resources Conservation Service, cartographic technician
Patrick Engineering, GIS Analyst
STS Consultants Ltd in Wisconsin; graduate is doing GIS analysis
U.S. Department of Natural Resources, Storm Water Manager
U.S. Environmental Protection Agency
Vestra Inc. GIS Analyst

Financial, Industrial Mathematics, Statistics

American Automobile Assoc.
Chevron
Digital Credit Co.
First Federal Bank
G.E. Capital
Guidant
Lockheed-Martin
Minitab Inc.
Putnam Investments
Roche Diagnostics
Southeastern Michigan Council of Government
U.S. Department of Agriculture
Watson-Wyatt

<u>Companies That Have Hired PSM Graduates and Supported PSM Students</u>

Applied Biosciences/Biotech

ActivX Bioscience Inc.
Affymetrix
Allergan

Alltech Inc.
Amgen
Avery Point Marine Sciences
Bear Stearns
BIOCOM
Boehringer-Ingelheim
Catalyst Pharmaceuticals
Ceres Inc.
Cisco Systems
CombinatoRx Inc.
Department of Homeland Security
Eli Lilly
Florida Department of Law Enforcement
Genomatica
Glaxo SmithKline
Health Sciences Inc.
Informax
Johnson & Johnson
Kyroten
Life Sciences, Inc.
Neurogen
Northrup Grumman
Novartis
Performant
Pfizer Labs
Pregrine Pharmaceuticals
Purdue Pharma
Quintiles
Roche Molecular Systems
Sanger Institute
Texas Department of Public Safety
The Institute for Human Genome Therapy
Thermo -Electron
3-Dimension Pharmaceuticals (Johnson & Johnson)
Toronto Children's Hospital
UCLA Office of Intellectual Property
United Devices
Zuyder Pharmaceuticals

Applied Physics and Health Physics

Mallinckrodt Inc.
State of Michigan
U.S. Army
Wake Forest Hospital

Financial Math, Industrial Math, Applied Statistics

American Automobile Association
Blue Cross Blue Shield

Boeing (St. Louis)
Census Bureau
Deloitte Touche Tohmatsu
Essayons Consulting (Tacoma)
Hershey Medical Center
Jackson Life
Johns Hopkins Quality and Safety Research Group
Lockheed-Martin
Keykert USA
Progress Energy
Watson-Wyatt

Materials and Chemical Synthesis

Henkel Technologies
Northview Laboratories

Other

Control Delta Institute (Env.)
Convers (Carlsbad CA)Dallas Zoo
EarthIT (Madison WI)
General Dynamics Network System
NASA
Shriner's Children's Hospital
South Carolina Department of Health and Environmental
SYSTRAN

Employer Testimonials

"We found … [his] level of productivity was at a much higher level, equivalent to that of a senior scientist. In fact his ability to work unsupervised allowed us to send him on international assignments that required him to be, self sufficient, scientifically competent and knowledgeable about proper business etiquette. In addition, the University facilitated the process to the point where things were taken care of in a swift and effortless manor."

Enrico Picozza
President and CEO of HTS Biosystems and Entrepreneur
Comments on a University of Connecticut, Applied Genomics Intern

"Professional science masters (PSM) degree programs represent a significant revolution in graduate science education. They serve students, universities and employers in an almost ideal way -- business and industrial advisors help university faculty and staff prepare students for careers where scientific and mathematical depth, and personal development are in high demand. Typically, graduates earn "knowledge worker" careers that are stimulating and well-paid from the start and can lead to considerable advancement. I wish these programs existed when I was completing my education!"

"I work at the Ford Motor Company where teams of students from MSU's Industrial Mathematics PSM have done well with four projects Ford has sponsored. We also benefited from an internship

and just recently (in a time when the Ford staffs are shrinking) hired our first graduate from this PSM program. This PSM has the attention of several Ford executives -- we look forward to more involvement."

Phil Tuchinsky
Technical Expert, System Analytics and Environmental Sciences Dept.
Ford Research & Advanced Engineering
Ford Motor Company

"PSM programs graduate individuals with the technical skills of a regular master's graduate and added business acumen. Graduates have the marketing savvy and excellent written and verbal communication skills necessary to survive in business-centric technical positions, e.g. sales engineer, project manager, lead engineer, CTO, CEO, and other executive positions."

Kathleen Perkins
CEO, Breault Research
Tucson, Arizona

"Students in the Professional Master's Degree Program in Applied Biosciences should find advancement prospects significantly enhanced in the biotechnology industry, particularly relative to more traditional master's degreed students."

David Robinson
Chairman, President, and CEO, Ligand Pharmaceuticals, Inc.
Chairman of the Board and Director, Biotechnology Industry Organization

"The ... Professional Master's Degree Program serves a great and constantly growing need in industry to produce students who are technically savvy and have a high degree of knowledge in the applied sciences, as well as a comprehension of the fundamentals of business and professionalism. Industry needs employees who not only understand the technical nature of their projects, but the business and legal aspects as well, and are able to communicate their mission to broad audiences. Students in this unique program learn just that. The Professional Master's Degree Program produces students who understand science and business and the inherent connection between the two disciplines in industry. The success of science professionals is based on individuals who understand these connections, and the ... Professional Master's Degree Program gives its graduates the skills to excel in their careers."

Lois A. Dimpfel
Vice President, Global Services (Retired)
IBM Corporation

"Genomics is becoming an essential science for medical discovery. Genomics is in its infancy and needs scientists that are eager to explore new, evolving technologies. Graduates of the ... Professional Masters program have the skills, experience, and knowledge for successful, fulfilling careers in genomics."

Pamela M. Carroll, Ph.D.
Senior Research Investigator
Applied Genomics Pharmaceutical Research Institute
Bristol-Myers Squibb Company

"Individuals with an educational background in these interdisciplinary areas are very few in number. [The] idea of combining a rare and highly demanded technical education with a modest exposure to training in business will produce students who are truly unique, and these students will be highly recruited by industry."

Ken Smith
Co-founder of Carbon Nanotechnologies, Inc.

"Environmental consulting companies seek to hire motivated individuals with a solid background in applying quantitative skills to solve and prevent environmental problems. In addition, as consultants, these individuals need to be able to communicate effectively and have a keen sense of management and business practices. Graduates from [the] Professional Master's Program in Environmental Analysis and Decision Making will possess these qualities and be a tremendous asset to us and others in our field."

Chuck Newell
Vice President
Groundwater Services, Inc.

"Students in the Professional Master's Program benefit from ... well-recognized academic resources enhanced with professional components that together foster the development of essential science, communication, and management skills. The Subsurface Geoscience track creates a rare breed of well-prepared professionals possessing the wide range of abilities necessary to devise innovative and pragmatic approaches to tackle difficult industry problems."

André Erlich
Chief Information Officer
Schlumberger Ltd.

UMBC Biological Sciences Department Graduate Programs

UMBC's Department of Biological Sciences is one of the university's largest academic departments, encompassing a wide breadth of research and teaching with foci in the following areas:

- Cell Biology
- Computational Biology
- Developmental Biology & Immunology
- Evolutionary Biology
- Molecular Biology & Genetics
- Neuroscience
- Plant Biology

With 27 tenured and tenure-track faculty members and seven instructors and lecturers, the department offers a full complement of baccalaureate and graduate programs leading to B.A., B.S., M.S., and Ph.D. degrees, which are recognized for their emphasis on research, scientific approach, faculty contact, and extensive lab offerings. These programs serve to train a broad spectrum of future biologists and researchers and to prepare students for graduate and professional schools.

UMBC's Department of Biological Sciences also sponsors a PSM program in biotechnology. The curriculum provides advanced instruction in the life sciences, along with coursework in regulatory

affairs, leadership, management, and financial management in a life science-oriented business. Eight active industry professionals are engaged as instructors to provide state-of-the-art learning experiences to the students.

The department also offers the M.S. in Applied Molecular Biology, started in 1983 as the first program of its kind in the country. During two semesters, the students learn the science underlying biotechnology by taking two lecture courses each semester. The hands-on methods of molecular biology are learn via two semesters of a 7-credit, 20 hr./wk. project-oriented lab course. The primary purpose of the program has been and is to train students to take middle level positions as research scientists in the biotechnology industry. Others, continue their education by joining Ph.D. programs, often at UMBC, or go to medical, dental and veterinary medicine schools. Several have gone to law school to become patent attorneys. And, some of the students accepted into medical school enter MD-Ph.D. programs.

V. Community College's Role in Training the Bioeconomy Workforce

- RFI Outline No. 10

  (10) What roles should community colleges play in training the bioeconomy workforce of the future?

Examples: **Chief Science Officer Program at Montgomery College, Maryland**
Biotechnology Program, Montgomery College

State Partners:

Steve Greenfield
Instructional Dean
Montgomery College
Business, Information Technology, & Safety
Workforce Development & Continuing Education
240-567-2583 -- office
240-567-1893 -- fax
301-512-9947 - mobile
steve.greenfield@montgomerycollege.edu
http://www.montgomerycollege.edu

Chief Science Officer Program at Montgomery College, Maryland

Dr. Collins Jones
Associate Professor
Montgomery College
Biotechnology Coordinator of Business
Tel: 240-567-1910
Collins.jones@montgomerycollege.edu

Biotechnology Program, Montgomery College

Chief Science Officer Program at Montgomery College, Maryland

The course will provide tools, knowledge, and skills needed to move up the career ladder from research into scientific management and leadership in the federal, academic, or commercial sectors. Send a signal to hiring managers that you are prepared for a scientific management career by adding this 36-hour course and certificate of completion to your resume.

The CSO Program at Montgomery College is designed for students, postdocs, and other technical professionals making the transition to business and industry and seeking preparation for leadership and management positions. It will show you the skills that are required, guide you in assessing your current skill levels, and provide the training to address your weaknesses to become not only competitive in landing an industry job, but successful in that job as well.

One of the most effective and unique features of this program is how the instructors relate "business" concepts to activities and behaviors commonly experienced by academic scientists. This approach helps students gain a deeper understanding of how their own experiences can strengthen their competitiveness for industry positions. The course also provides a self-assessment tool that introduces students to each of the 24 competencies, has them rank their own skill levels, and helps them develop "experience statements" from their own careers that support these rankings. A detailed report generated by the assessment tool then maps the student's capabilities to those that are critical to different kinds of jobs in different industries. The instructors will then show how to use this information to develop powerful targeted resumes and to prepare for effective interviews.

Jump Start Your Career!

- Individualized leadership assessment of your knowledge and skills
- Leadership Training
- Substantive topics: negotiation, project management, first-line supervision and finance, and a full set of elective offerings
- Individualized leadership inventory of knowledge and skills gained during the course
- Customized career plan for your career

A Focus on Core Concepts for CSOs

Success as a Chief Science Officer in industry is dependent upon appreciating and understanding five key management concepts. It is no longer just about the science, but how well you can utilize the scientific capital (in all its forms) at your disposal. The needed skill sets are the same regardless of whether you are coming from a physical sciences or life sciences background—it is really about interpersonal skills and fully appreciating the goals and functions of a business organization that will lead to long-term career success.

To ensure this, the CSO boot camp will focus on five “fundamental” topics—essential skills that no seasoned corporate scientific leader can be without! These key concepts are:

- Leadership Training—How can you be a successful “boss” on a personal level as well as an organizational level?
- Project Management—In industry it’s all about meeting the corporate deliverables on time and on budget. Can you deliver the goods?

- First-line Supervision—Successful companies get things done through teams, and interpersonal skills are the key to getting things done through people.
- Negotiation—The success of your company and your career will depend on how well you negotiate tasks and rewards. How prepared are you for this?
- Finance—A company is ultimately graded on its financial success rather than specific scientific accomplishments. Do you understand and appreciate it?

Introduction to a Variety of Electives

During the CSO boot camp, participants will also have the opportunity to attend introductory lectures in a variety of relevant areas that they choose. These include:

- Business Development for Scientists—as a scientist, learn how to take a practical hands-on approach to business plan development, venture capital and technology transactions.
- Marketing Strategies—See how science-based firms can use marketing to help reach their goals in technology development, product commercialization or other organizational needs.
- Law and Contracts in the Pursuit of Science—Explore how basic business, legal and regulatory concepts impact the work of scientific organizations and apply across the scientific landscape.
- Technology Transfer—Even the best scientists can no longer "do it alone," particularly in terms of commercialization. Learn the key concepts of accessing discoveries, collaborations and other resources at outside organizations, including university and federal labs.

Montgomery College—Workforce Development & Continuing Education (WD&CE) conducted exit interviews for each of the four scholarship students in an effort to thoroughly understand the impact of the course as well as the scholarship. Students also completed course evaluation forms which can be made available if FLC would like to review them.

Based on the exit interviews, the course had the intended outcomes, including having a significant impact on students' ability to enter into management and leadership careers and/or pursue successful career progression in the bio-tech industry. Scholarship students identified the following themes and competencies gained:

- Learned new aspects of leadership/management;
- Learned how to identify latent or already-existing leadership skills;
- Learned how to re-construct the resume based on leadership skills learned;
- Learned how businesses are designed and how they run;
- Learned the difference between leadership and management;
- Learned to be aware of the leadership in their current organizations;
- Learned self-awareness and how to identify gaps in personal leadership skills and how to address those gaps; and
- Learned how to enhance career development.

Steve Greenfield, Instructional Dean, Montgomery College-WDCE, and
Transcie Almonte, Acting Director, Montgomery College-WDCE Management Programs.

Scholarship Recipients

Diana Huestis: A post-doc for three and half years, (one at Kansas State University and now two and half here), Diana currently works at Laboratory of Malaria and Vector Research (LMVR), National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH). The course helped her learn how to translate leadership/communications skills that have already been in practice into descriptions for CVs/resumes for job seeking and learning new aspects of leadership/management that she hadn't already learned in a classroom or thought much about. She already updated her CV to reflect what she learned in the course, and hope it will help with her ongoing job search.
Clarisa Buckner: A post-doc for two and half years and currently works at the National Institutes of Health, NIAID. CSO Module 1 was an eye-opening experience for her. In this module she learned about how to be a leader versus a manager. In defining the roles and distinguishing the two, she is now more aware of the players in her organization. She is also now aware of how businesses and organizations are designed and run. According to Clarisa, this class taught her proper etiquette in the workplace and she is now more in tune with what role she would like to play in an organization. Clarisa looks forward to Module 2 where she will learn more of the business terminology, as well as such topics as Project Management and Finance. She truly believe this course prepare scientists to enter industry because they are unaware of the business aspects and environment.
Khadija Ben-Aissa: A post-doc for six years and currently works at the NIH. The course helped him know how to leverage his qualifications as a scientist in academia to match qualifications needed to work in Industry. It also helped him identify gaps he can work on to successfully meet requirements to find a job in the Industry.
Heather Lucas: This is her fourth year as a post-doc and she is currently working at the National Institute on Aging, Baltimore, MD. The course helped her to gain a different perspective from what is typically available to a postdoctoral fellow or research scientist in a traditional laboratory setting. Throughout her career, she has taken on many leadership roles and the structure of the class has allowed her to put that into perspective, from creating a vision to developing a performance plan. By discussing the attributes that make a great leader within the class, she learned about herself and others in a way that will enhance her career development and benefit her long into the future. Furthermore, the opportunities to network within the class have helped her to shape her personal goals. After completion of the final module and as she progresses towards her future career, she looks forward to corresponding with Randy Ribaudo (Human Workflows) and receiving feedback from him. Heather feels this will be a valuable asset that she finds advantageous as she competes in a tough job market. Darlene Floyd (leadership instructor) was the highlight of this course!

Biotechnology Program, Montgomery College

The Biotechnology Program trains students for jobs in the biotech industry. Entry-level workers are involved in laboratory work such as:

- Cell culture and upstream processing
- Antibody production and isolation
- DNA isolation, PCR, RT-PCR and qPCR
- Toxicology or vaccine sterility testing
- Testing and developing diagnostic and therapeutic agents

Courses toward a degree or certificate are designed to prepare students for both academic achievement and successful employment in the biotechnology industry.

VI. Encouraging Successful Entrepreneurship

- RFI Outline No. 12

  (12) What role might government, industry, and academia play in encouraging successful entrepreneurship by faculty, graduate students, and postdocs?

Examples: **Maryland Technology Enterprise Institute (MTECH)**

State Partner: **Martha J. Connolly, Ph.D.**
Director of the Maryland Industrial Partnerships
University of Maryland
marthac@umd.edu

Maryland Technology Enterprise Institute (MTECH)

MTECH

At the Maryland Technology Enterprise Institute (Mtech),we focus on two things: possibilities and results. We offer programs, courses, workshops and competitions to help aspiring entrepreneurs learn how to bring their ideas and products to the world. We help faculty, student, and regional entrepreneurs create successful ventures. We help companies solve vital challenges and develop top-selling products that improve and save lives by connecting them with resources to succeed.

Our results: among our core programs, we have had a $25.7 billion impact on the Maryland economy since 1983. Top-selling products such as MedImmune's Synagis®, which protects infants from a deadly respiratory disease, and Hughes Communications' HughesNet®, which brings satellite-based, high-speed Internet access to the world, were developed through or enhanced by our programs. Billion dollar companies such as Martek Biosciences and Digene Corporation graduated from our incubator.

MTECH Entrepreneurship Education

At Mtech, we believe that a firm grasp of the entrepreneurial process and mind-set benefits every person engaged in developing technology. Our goal is to infuse technology-creating students, faculty members and professionals with that

knowledge and its accompanying skills. Armed with an entrepreneurial mind-set, technology creators drive economic growth by launching successful ventures and bringing life-changing products and services to market.

Hinman CEOs (www.hinmanceos.umd.edu)
Living-Learning Undergraduate Entrepreneurship Program

Featured on CNN and the recipient of numerous awards, Hinman CEOs is the nation's first living-learning entrepreneurship program, placing entrepreneurially minded students from all disciplines into a unique community in which students live together, learn about entrepreneurship through courses and an exclusive speaker series, and can launch new ventures. The program's on-site business coaching services, entrepreneurs-in-residence, $250,000 Impact Pre-Seed Fund and Hinman Alumni Fund provide a rich environment for launching new ventures. Incoming juniors are invited to apply for this competitive program. The mission of Hinman CEOs is to foster an entrepreneurial spirit, create a sense of community and cooperation, and develop ethical leaders. University alumnus and successful entrepreneur Brian Hinman provided $2.5 million to initiate and support the Program. More»

Hillman Entrepreneurs (www.hillman.umd.edu)
Four-Year Transfer Program to Create Entrepreneurial Leaders

The Hillman Entrepreneurs Program is an innovative educational initiative for transfer students who begin their study at the Prince George's Community College and complete their bachelor's degrees at the University of Maryland. This four-year scholarship program is targeted at students driven to be successful entrepreneurs and leaders in their communities. Hillman Entrepreneurs features a series of entrepreneurship and leadership courses, mentoring from full-time directors, networking opportunities and community-building activities. The program was established through a generous $1.7 million gift from the David H. and Suzanne D. Hillman Family Foundation. More»

Entrepreneurship and Innovation Program (www.mtech.umd.edu/educate/eip.html)
Living-Learning Entrepreneurship Program for Academically Talented Freshman and Sophomore Students

The Entrepreneurship and Innovation Program provides freshmen and sophomores from all majors the opportunity to learn and live entrepreneurship and innovation. Students develop the entrepreneurial mindsets, skill sets, and relationships to launch successful concepts with startup

companies and corporate ventures. This new Honors College program will launch fall 2010. Through experiential learning, dynamic courses, seminars, workshops, competitions, and volunteerism, students receive a world-class education in entrepreneurship and innovation. In collaboration with faculty and mentors who have successfully launched new ventures, all student teams develop an innovative idea and write a product plan. More»

Young Scholars Discovery (oes.umd.edu/index.php?slab=entrepreneurship)
Summer Course for Current Seventh or Eighth Grade Students Interested Entrepreneurship

Young Scholars Discovery welcomes rising eighth and ninth grade middle school students to an exceptional learning opportunity at the University of Maryland. For two challenging weeks, Discovery nurtures academically talented students who share similar interests, abilities, and goals. Discovery scholars explore new ideas, acquire skills and knowledge, and learn about career opportunities. Innovative faculty provide dynamic instruction and encourage interactive problem solving. This summer, discover, explore, grow, and learn about university life at Maryland with Young Scholars Discovery! Mtech's Young Scholars Discovery course is EXST 011, Designing Your Own Business, which teaches students the basic business, strategy, and leadership skills needed to launch new ventures. More»

Young Scholars Program (www.mtech.umd.edu/educate/ysp/)
Summer Courses for High School Students Interested in Entrepreneurship, High-Tech Marketing and Biopharmaceutical Production

The Young Scholars Program invites high school students from throughout the U.S. and the world to an amazing pre-college experience at the University of Maryland. Rising high school sophomores, juniors, and seniors with exceptional ability and promise pursue academic interests, discover career opportunities, and earn three university credits. This summer, be part of an international, multicultural community and experience university life at Maryland. Mtech's summer 2011 Young Scholars courses include: ENES 140, Discovering New Ventures - Foundations in Entrepreneurship; ENES 141, Introduction to High-Tech Product Development and Marketing; and BIOE 160, Biopharmaceutical Production. More»

Entrepreneurship Courses (www.mtech.umd.edu/educate/courses/index.html)

Whether you're in middle school, high school, an undergraduate, a graduate student, or a corporate executive, Mtech offers a broad array of entrepreneurship and innovation courses tailored for you.

Mtech is hosting free office hours to help aspiring and current entrepreneurs with tech-based startups or ideas get advice on how to:

- build and finance a startup company
- develop and protect intellectual property
- navigate the technology transfer process
- refine your business strategy for rapid growth
- tap into other entrepreneurial resources

Representatives from the following organizations and groups are typically on hand to speak with you one-on-one regarding any questions you might have about starting a company:

- Mtech VentureAccelerator Program
- Mtech Technology Advancement Program
- Office of Technology Commercialization
- Dingman Center for Entrepreneurship
- Maryland Intellectual Property Legal Resource Center
- Maryland Biotechnology Center
- Experienced Entrepreneurs
- Representatives from the following investment and grant organizations are also often on campus to participate in Entrepreneur Office Hours or other Mtech events for new ventures: CNF Investment, New Markets Growth Fund, Amplifier Venture Partners, LP, Novak Biddle Venture Partners, HIG Ventures, Grotech, Maryland Venture Fund, and TEDCO.

Mtech hosts Entrepreneur Office Hours on the second Tuesday of every month, from 10:00 a.m. to noon, in room 1103 of the Technology Advancement Program building.

Entrepreneur Office Hours was started in 2005 by The Office of Technology Commercialization in the College of Chemical and Life Sciences (CLS). In 2007, Mtech partnered with OTC to expand Entrepreneur Office Hours to all colleges within the university as well as entrepreneurs from the DC/Baltimore region.