

UNIVERSITY SENATE
UNIVERSITY AT ALBANY
STATE UNIVERSITY OF NEW YORK

Introduced by: Undergraduate Academic Council
University Planning & Policy Council

Date: April 21, 2014, 2014

**PROPOSAL TO ESTABLISH A BS IN INTERDISCIPLINARY STUDIES,
FACULTY-INITIATED INTERDISCIPLINARY CONCENTRATION IN BIO-
INSTRUMENTATION**

IT IS HEREBY PROPOSED THAT THE FOLLOWING BE ADOPTED:

1. That the University Senate approves the attached proposal to establish a BS in Interdisciplinary Studies: Faculty-Initiated Interdisciplinary Concentration in Bio-Instrumentation introduced by the Undergraduate Academic Council and University Planning & Policy Council.
2. That this proposal be forwarded to the President for approval.

PROPOSAL: BS IN INTERDISCIPLINARY STUDIES, WITH A FACULTY-INITIATED
INTERDISCIPLINARY
CONCENTRATION IN BIO-INSTRUMENTATION

Proposed Starting Date: Fall 2014

Introduction and Rationale

Bio-instrumentation refers to high-tech, often costly instrumentation used to conduct cutting edge research in the biological sciences. Biological research has been revolutionized in the last 15-20 years, in large part by advances in bio-instrumentation. These advances have provided the capacity to increase the scope and throughput of research activities. This expansion in scope has resulted in the development of new fields of study. For example, molecular biologists have long been interested in understanding the structure and function of genes and proteins, but due to technological limitations were restricted to studying one or at most a few genes or proteins during the course of their careers. Advances in instrumentation for techniques such as DNA sequencing, quantitative PCR, microarray analysis, 2D gel electrophoresis, and mass spectrometry now allow scientists to simultaneously study all of the genes and proteins of an organism, and have resulted in the new fields of genomics and proteomics. The continued evolution and refinement of this instrumentation now places the ability to perform such studies within the reach of most research laboratories, and thus individuals pursuing employment in technical research will likely be utilizing instrumentation of this type during their careers.

The University at Albany has made significant investments in bio-instrumentation through the creation of first the Center for Functional Genomics and then the Cancer Research Center (CRC). Core laboratories within the CRC are equipped with state-of-the-art instrumentation for molecular biology, genomics, proteomics, and cell analysis research. The laboratories include instrumentation for DNA sequencing, Next Generation sequencing, quantitative PCR, nucleic acid extraction, microarray analysis, 2D electrophoresis, mass spectrometry, flow cytometry, and laser capture microdissection. With this proposal to establish an undergraduate degree program in bio-instrumentation, we seek to maximize the University's investment in this research instrumentation by using these resources for the education of undergraduate students.

We propose to institute a BS in Interdisciplinary Studies, with a faculty-initiated interdisciplinary concentration in bio-instrumentation within the University's School of Public Health. This degree program will share a strong linkage with the School's Department of Biomedical Sciences, whose focus is on understanding the biomedical basis of public health, including the molecular basis of disease and implications for public health interventions. Biomedical Sciences have a fundamental role in public health, in particular in the detection, treatment and prevention of genetic, infectious, and other human diseases. Students who complete our proposed program will be well versed in the strengths and limitations of various laboratory methodologies and their application to public health problems.

There are four facets to our proposed program. The first will consist of an introduction to the core components of public health. The second will provide an in-depth understanding of the theory, operation, and application of instrumentation in molecular biology, genomics, proteomics, and cell analysis research. The third will provide practical, hands-on research experience with the use of instrumentation in molecular biology, genomics, proteomics, and cell analysis research through internships in University laboratories. The fourth will provide real-

world experience in the use of biotechnological instrumentation to address broader research questions, as well as an understanding of the expectations that come with a professional career in laboratory research, through cooperative training internships at local biotechnology companies or academic laboratories. This program will provide students with an educational focus that to our knowledge is unique, and will thus give these students a significant competitive advantage as they pursue careers in laboratory research, either by immediate entry into the workforce or through further graduate study.

In addition to this proposed undergraduate program, we are in the planning stages for the development of a proposal to institute a Professional Science Management (PSM) graduate certificate program in biotechnology within the School of Public Health. In addition to further study in biotechnology-related subject areas, this program will emphasize graduate level training in key business and communication skills, such that graduates will be prepared to pursue careers in scientific and technology management. Eventually this will be expanded into an MS degree in Professional Science Management. Both the certificate program and the eventual master's degree will be designed to complement the undergraduate concentration in bio-instrumentation, and thus provide a natural progression for those bio-instrumentation graduates interested in science management to pursue graduate study at the University in the PSM program.

One of the core values of SUNY as outlined in Chancellor Zimpher's Strategic Plan *2010 and Beyond* is that of collaboration, which is to include cooperation between different SUNY campuses. Our proposed degree program is designed as a 3rd and 4th year major, in large part to complement the already existing A.S. degrees in biotechnology and biology offered by Hudson Valley Community College (HVCC). HVCC has an outstanding degree program, but A.S. graduates are at a disadvantage when competing with B.S. graduates for technical careers in laboratory research. Based on significant discussions between our two institutions, we believe that our program will offer a natural and complementary pathway for HVCC graduates interested in continuing their educational pursuits. If our program is approved for implementation, we anticipate that an articulation agreement will be signed between UAlbany and HVCC that will facilitate a seamless transfer of HVCC biotechnology and biology students into the bio-instrumentation concentration. Such an articulation agreement will enhance efforts by HVCC to recruit students into their biotechnology programs. We anticipate that the majority of students entering the bio-instrumentation concentration will do so via this pathway. The proposed degree program is thus consistent with an important core SUNY value.

The University at Albany has always sought to enhance undergraduate education by increasing enrollment and improving the quality of undergraduate applicants. Offering an undergraduate bio-instrumentation concentration, and providing a pathway for HVCC students interested in this program, will enhance UAlbany's recruitment efforts by expanding the choices available to prospective students, thus resulting in higher caliber applicants. The addition of this new interdisciplinary studies concentration should not be viewed as competitive with existing majors, but should be considered as enhancing undergraduate program opportunities. In addition, although many program graduates may pursue employment immediately, the undergraduate concentration in bio-instrumentation should also serve as a pipeline into graduate programs within the University, thus potentially expanding graduate enrollment.

Vision Statement

The BS in Interdisciplinary Studies, with a faculty-initiated interdisciplinary concentration in bio-instrumentation, based at the School of Public Health will be recognized within and outside UAlbany for excellence in educational content and curricular design, and for its unique and outstanding contribution to the undergraduate experience at UAlbany.

Mission Statement

The Mission of the faculty-initiated interdisciplinary concentration in bio-instrumentation in the School of Public Health is to instill in a diverse group of educated individuals a foundation in public health coupled with a thorough knowledge of the theory, operation, and application of instrumentation in biomedical and biotechnology research.

Goals

- To provide extensive technical training to students who intend to pursue entry-level jobs as technical scientists in biomedical, biotechnology, pharmaceutical, or academic research, for which bachelor's training is appropriate.
- To provide a solid background in public health, biology, and biotechnology to students who are interested in pursuing graduate study in the biomedical or biological sciences.

The Interdisciplinary Studies major with a faculty-initiated interdisciplinary concentration in bio-instrumentation will lead to a Bachelor of Science degree. As such, it is intended to convey technical information and analytic skills, but within a broader public health base. It will have educational objectives of nurturing critical thinking, analysis, and synthesis of information in addition to its focus on both biotechnology and bio-instrumentation.

Market Analysis

- There are 61 colleges and universities nationwide that offer B.S. degrees in biotechnology, including UC Davis, UC San Diego, University of Connecticut, Purdue University, University of Georgia, Iowa State, Washington State, and the University of Rhode Island.
- There are 3 colleges and universities in New York State that offer B.S. degrees in biotechnology: Rochester Institute of Technology, University at Buffalo, and York College CUNY. RIT has a total enrollment of approximately 165 students, while UBuffalo enrolls 25-30 students per year. Enrollment data for York College CUNY is not available.
- None of the above mentioned biotechnology programs have an intensive focus on bio-instrumentation. Biotechnology is broadly defined as the use of organisms or biological systems to make or develop useful products. Biotechnology research is often multidisciplinary, and can include aspects of biology, chemistry, physics, and engineering. Degrees in biotechnology generally focus on biology-related applications, particularly molecular biology and genetic engineering. With technological advancements, more and more biotechnology research is reliant on high-tech, high-cost

instrumentation systems. This is especially true in the “omics” fields of genomics and proteomics. As more and more research relies on this instrumentation, it requires a significant investment in training of staff on the part of laboratories that perform this type of research. By providing a focus on intensified instrumentation training as part of the undergraduate degree, we will minimize the training that graduates will require in the laboratory environment and thus significantly enhance their marketability compared to graduates with conventional biology or biotechnology degrees.

- Fifteen local biotechnology companies and academic institutions have expressed strong support for our proposed program, have expressed an interest in participating in our cooperative research internship program, and recognize the potential of our program to increase the quality of the applicant pool for jobs in technical research and biotechnology.

Letters of support from these companies and institutions are included in Appendix C.

Market for Graduates

Graduates with a degree concentration in bio-instrumentation will be immediately qualified for entry level positions as technical scientists in biomedical, biotechnology, pharmaceutical, and academic laboratories. In fact, the focus on instrumentation, which requires extensive training, will provide graduates with a significant competitive advantage over individuals who obtain conventional degrees in the biological sciences. In addition, the exposure to potential employers through the internships and cooperative training courses that are a key feature of this program should also serve as a benefit to students.

An Bachelor’s degree with a concentration in bio-instrumentation will also provide a useful foundation for further graduate-level study in the biological or biomedical sciences. It will provide relevant background and skills required to perform effectively in an advanced degree setting.

Addressing a Need

Research in the biomedical and biological sciences is increasingly driven by technological advances, including advances in instrumentation that expand the depth and breadth of studies that can be performed. Significant effort must be invested by laboratories to train technical staff to utilize this instrumentation. The ability to obtain extensive training in the theory, operation, and application of this instrumentation as part of an undergraduate degree will provide a significant competitive advantage to graduates of such a program.

The ultimate goals of the UAlbany Interdisciplinary Studies concentration in bio-instrumentation are two-fold. First, students will be well trained and able to successfully enter the workforce directly upon graduation. Second, the program will be of significant depth and breadth to provide a foundation for those students wishing to pursue graduate studies in the biomedical and biological sciences.

Local/Regional Competition

The University at Albany has an opportunity to stand out, not only from universities in the SUNY system and colleges and universities in Upstate New York and surrounding areas, but also nationwide by initiating an Interdisciplinary Studies degree with a concentration in bio-instrumentation. The bio-instrumentation concentration that we are proposing is unique. With internet searches, we can find no other undergraduate degree program in the U.S. that focuses on the theory, operation, and application of the instrumentation to conduct state-of-the-art biotechnology research. The most closely related degree would be in biotechnology. No other colleges/universities in the local area offer an undergraduate degree in biotechnology. There are only four colleges in New York State that offer an undergraduate major in biotechnology, including one college in the SUNY system, the University at Buffalo. Again, none of these programs contains a particular emphasis on the instrumentation required to conduct biotechnology research. An undergraduate interdisciplinary program with a concentration in bioinstrumentation will be a unique addition to the SUNY system.

Resources

The enrollment projections for the bio-instrumentation major are as follows:

AY14-15:	5-8 total undergraduate Bio-Instrumentation concentrators
AY15-16:	15-20 total undergraduate Bio-Instrumentation concentrators
AY16-17:	23-25 total undergraduate Bio-Instrumentation concentrators
AY17-18:	30 total undergraduate Bio-Instrumentation concentrators
AY18-19:	30 total undergraduate Bio-Instrumentation concentrators

With currently existing resources, the School of Public Health can mount a high quality undergraduate major to meet these projections. We estimate that the number of students entering the major each year will grow over the first 3 years to 15. Ultimately, the number of students declaring an Interdisciplinary Studies major with a faculty-initiated concentration in bio-instrumentation will be limited to a maximum of approximately 15 new students each year, up to a total of 30 students in the major.

Enrollment in the concentration will be limited, by necessity, to ensure a high quality educational experience in which all students have adequate access to the laboratories, instrumentation, and internship opportunities to fulfill the program's goals for on hands-on training. This restricted admission is consistent with the criteria for restricting a major specified in the University at Albany Senate Bill 1213-05. That legislation indicates that majors may be restricted for "quantitative considerations" if there are a "finite number of student spaces in the program." The bio-instrumentation concentration must be restricted because the hands-on educational experience is completely dependent on the available laboratory space and instrumentation; in addition, there are a finite number of local research internship placement sites. At the present time, up to 15 new students per year can be accommodated in the existing laboratories.

As we expect the new enrollment in the concentration to grow to 15 over the first few years, the school will have the opportunity to successfully work out the logistics involved in mounting a brand new undergraduate major and delivering it partially on the East Campus. As the success of the program will be highly dependent on progress made in the initial years, it will be a priority to judiciously lay the appropriate foundation for a high-quality undergraduate program.

Instrumentation

The existing major instrumentation is currently located in the core laboratories of the Cancer Research Center (CRC) on the East Campus. All of this instrumentation will be utilized in the degree program, although hands-on availability for students will be restricted to a subset of the available instruments. Instruments that will be utilized to a significant extent by students will be moved, where possible, to designated undergraduate teaching laboratories in the Cancer Research Center to facilitate their usage

The major instrumentation that will be used for hands-on instruction includes:

- Applied Biosystems 7900HT Sequence Detection System (2)
- Applied Biosystems 3730XL DNA Sequencing System
- Qiagen QiaCube Automated Nucleic Acid Extraction System
- Agilent Bioanalyser
- Affymetrix GeneChip Microarray System
- Agilent Microarray System
- Nimblegen Microarray Hybridization System
- Micromass Q-TOF 2 mass spectrometer
- Bruker Autoflex MALDI-TOF mass spectrometer
- Agilent 1100 HPLC
- Akta FPLC
- MicroCalorimeter
- UV/vis spectrometer
- Spectrofluorometer
- 2D electrophoresis system
- 2D imaging system
- Progenesis workstation
- Arcturus Veritas Laser Capture Microdissection System
- Guava Easycyte Flow Cytometer
- Becton Dickinson LSR II Flow Cytometer
- Becton Dickinson FACSAria Flow Sorter
- GE InCell 1000 Cellular and Subcellular Imaging System

In addition to our existing instrumentation, we have successfully pursued and obtained funding through the NYS Regional Economic Development grant program that will directly impact the proposed degree program. With the success of our proposal *Building a Pioneering Biotech Corridor*, the University was awarded \$1 M for the purchase of new cutting edge instrumentation to expand the state-of-the-art facilities in genomics, proteomics, and cell analysis that reside within the core and academic laboratories of the CRC. This instrumentation, purchased during the fall of 2012, expands the technologies to which we can expose students in the undergraduate program, and is listed below:

- Ion PGM NextGeneration Sequencer
- Applied Biosystems QuantStudio 12K Flex Digital PCR System
- ABSciex QTRAP 5500 Pro Mass Spectrometry System
- GE InCell 2000 Automated Cellular and Subcellular Imaging System

Personnel - Faculty

Existing personnel resources within the School of Public Health and the Cancer Research Center are sufficient to meet the needs required by our current student projections.

This degree concentration will fall under the auspices of the SPH Undergraduate Program Director, who will manage the program on a day-to-day basis, field questions from prospective students, and provide initial advisement to students in the concentration. Students will transition to a faculty advisor for more detailed academic advisement. The Director will assist in identifying an appropriate faculty member to serve as advisor to each student, and will continue to provide administrative support to both the faculty and the students. The Associate Dean for Academic Affairs at the School of Public Health will provide general oversight of the program.

The faculty that will deliver the public health portion of the curriculum will be the same existing faculty that are currently involved in the BS in Interdisciplinary Studies faculty –initiated interdisciplinary concentration in public health.

The bio-instrumentation portion of the curriculum includes both laboratory-based and lecture-based components, and will be delivered by existing faculty of the Cancer Research Center. The laboratory portion of the curriculum will be delivered, as indicated in the table below, by full-time research faculty who are based in the CRC core laboratories. These faculty members will deliver the laboratory-based courses, train students in the use of the instrumentation in their laboratories, and host student interns in their laboratories. In addition, a number of other faculty members at the CRC, who hold tenured faculty appointments with the departments of Biomedical Sciences and Environmental Health Sciences, will be extensively engaged in the lecture portion of the courses. These include Professors Martin Tenniswood, JoEllen Welsh, Douglas Conklin, and Jason Herschkowitz.

<i>Course/Laboratory Faculty for Bio-Instrumentation Program</i>		
Faculty	Courses	Laboratory
John Tine, Ph.D.	Molecular Biology/Genomics	Molecular Biology
Sridar Chittur, Ph.D.	Genomics	Microarray
Qishan Lin, Ph.D.	Proteomics	Proteomics
Brian Parr, Ph.D.	Animal/Cell Culture Models	Mouse Transgenics

Personnel - Technical Support Specialists/Teaching Assistants

Full implementation of this program will require the participation of technical support specialists/teaching assistants. Technical support specialists/TAs will participate in the laboratory components of the Bio-instrumentation courses, including laboratory set-up and assistance with student instruction during laboratory periods. As this program is based on training students in advanced state-of-the-art instrumentation and technologies,

the technical support specialist positions require highly trained personnel who are fully conversant with the operation, capabilities, and limitations of the equipment. Current laboratory staff in the CRC core laboratories will serve in these roles. In addition, the School of Public Health will provide the funding for an additional technical support specialist when this program commences, and the SPH will support additional technical support specialists/TAs as the need arises. CRC core laboratory staff will also have a significant role in supervising the day-to-day activities of students during their internship experiences in the core labs.

It is expected that current graduate students with training and laboratory experience in the appropriate technologies will provide the pool of potential TAs who will assist with laboratory courses.

Courses

The public health core courses in the curriculum are existing courses in the School and in various programs across the University. The bio-instrumentation courses in the curriculum will be new courses in the School's Department of Biomedical Sciences. These courses will be part of the normal teaching load for faculty members. Adjunct faculty members may also teach on the undergraduate-level.

Course Locations and Scheduling

Students who choose to participate in this program will be required to attend classes on both the University's Main and East Campuses. We recognize that this is not ideal, but it is a necessity as the instrumentation around which this program is based is located in the Cancer Research Center on the East Campus.

We will minimize any inconvenience to students by scheduling the bio-instrumentation courses such that students will not have to attend classes during the same day on different campuses, if at all possible. There is ample parking at the East Campus for students who have their own cars. We also recognize that many students do not have their own cars while at school, and thus will need to rely on the regularly scheduled University shuttle bus service to commute between the Main and East Campuses. Classes are scheduled with the timing of the bus schedule taken into consideration. The public transit system also links the East Campus to Albany and Troy, and students who commute to the East Campus can ride these buses without charge.

Office, Classroom, and Student Study Space

Office and classroom space will be provided on the East Campus at the School of Public Health and the Cancer Research Center.

The existing undergraduate public health core courses are delivered in classroom space on the University's Main Campus. The remainder of the undergraduate concentration in Bio-Instrumentation will be delivered in dedicated space in the Cancer Research Center on the University's East Campus in Rensselaer. This space includes three offices and five laboratories located on the second floor of the Cancer Research Center. The teaching laboratories will house several large instruments that will be integral to the training program. The space is also close to, or contiguous with, the CRC Core Laboratories

where additional major equipment is housed and where *Instrumentation in Biotechnology Research Internships* will be conducted. Lectures will be held in the Massry Conference Center Auditorium in the Cancer Research Center.

In anticipation that students will be spending significant time on the East Campus, we will create a designated study area at the CRC for use by students in the program. In addition, students will have access to the student computer lab and student areas within the adjacent SPH. Students will also have access to the cafeteria facilities of the East Campus, located on the main research building adjacent to the SPH. In addition to the University at Albany libraries, students will also use the resources of the Dickerman Library of the NYS Department of Health Wadsworth Laboratory, which they can access from the student computer lab in the School of Public Health.

Sustainability

We anticipate that this program will be sustainable beyond the initial period described here. As a first step toward that end, we have pursued and obtained funding through the NYS Regional Economic Development grant program that will directly impact the proposed degree concentration. The two main aims of our proposal *Building a Pioneering Biotech Corridor* were first to develop the undergraduate degree program in cooperation with institutions like HVCC and local biotechnology companies, and second to maintain and expand the state-of-the-art facilities in genomics and proteomics that reside within the core laboratories of the CRC. With the success of this proposal, we were awarded \$1M for the purchase of new cutting edge instrumentation that is housed in CRC core and academic laboratories. The instrumentation that was recently purchased expanded the technologies to which we can expose students in the undergraduate program, including digital PCR, Next Generation sequencing, QTRAP mass spectrometry, and automated cellular and subcellular imaging.

Program Administration

In addition to the Undergraduate Program Director, with oversight from the Associate Dean for Academic Affairs, the program will also be managed by the existing Undergraduate Steering Committee with additional committee members from the CRC. The Committee will be comprised of representatives from academic departments within the School of Public Health and will regularly review the curriculum, evaluate the program, and assist in all policy-related issues that may arise as part of this interdisciplinary studies concentration.

Advisement

Advisement for the bio-instrumentation concentration will be based on a tiered system:

- 1) Upon acceptance to the University at Albany, and prior to declaring a major, students are advised through the University at Albany Academic Advisement Center. The School of Public Health will work closely with the staff of this office to educate them about the bioinstrumentation concentration so they will be well-informed when speaking with potential bio-instrumentation students. The intent is to prepare these advisors to answer general questions students may have about the opportunities in bio-instrumentation within the School of Public Health.

- 2) As per University policy, once students declare the interdisciplinary studies bio-instrumentation concentration, the School of Public Health will be responsible for advisement. The Undergraduate Program Coordinator will provide initial advisement to all enrolled students. Students will follow a M.A.P. (Major Academic Pathway) which lays out a route for completing the required courses within four years.
- 3) All declared bio-instrumentation concentrators will also be assigned a faculty advisor at the School of Public Health who will oversee their academic progress, provide ongoing advisement, and assist them in identifying appropriate electives to match their interests. Initially, there will be a small number of designated faculty advisors (2-4 advisors) within the School to provide this advisement. Keeping the advisement centralized in the first few years of the bio-instrumentation concentration will assist in its management as well as ensure that students receive proper advisement from a core set of individuals who are very familiar with the requirements.

Outcomes

Graduates of the bio-instrumentation concentration will be able to:

- Explain the historical perspective of the contributions and roles of public health
- Apply epidemiological and biostatistical principles to appropriately analyze and interpret data
- Be conversant with the theory and operation of high technology instrumentation used to carry out research in molecular biology, genomics, proteomics, and cell analysis
- Understand the applications that are facilitated by use of instrumentation in these disciplines
- Demonstrate operational competence with instrumentation in molecular biology, genomics, proteomics, and cell analysis research

The academically rigorous nature of the concentration in bio-instrumentation will have many additional positive outcomes. Some of these include:

- Attract high caliber student applicants who may not have otherwise applied to the University at Albany
- Encourage the applications of high caliber transfer students who are attracted by the academic and career pathway provided by the major
- Enhance the quality of the student population in each of the courses taken by students in the major
- Provide students with a solid knowledge base that can carry across a variety of disciplines in biotechnology/biomedicine/biology
- Assist in developing a workforce that is better prepared to immediately contribute to their employers based on their training in the major

There are a variety of careers that would benefit from the knowledge and skills obtained from the completion of the interdisciplinary bio-instrumentation concentration, with technical/research assistant positions most immediately relevant. Possible career paths include:

- Academic laboratory research
- Biomedical laboratory research
- Biotechnology/pharmaceutical company laboratory research
- Clinical laboratory research
- Instrumentation service technician

The bio-instrumentation concentration would also be relevant preparation for graduate study in the biomedical and biological sciences. Among the possible fields of study for which this degree would be relevant preparation are:

- Cell, Molecular, and Developmental Biol.
- Genetics, Genomics, and Bioinformatics
- Physiology
- Cancer Biology
- Neuroscience and Behavior
- Immunology
- Parasitology and Infectious Diseases
- Microbial Pathogenesis
- Plant Genetics and Genomics
- Ecology, Evolution, and Population Biology

Letters of support from local bio-technology companies, indicating the attractiveness of graduates from such a program for employment, as well as letters of support from sample graduate program directors, are included in Appendix C Part 2.

Relevant Minors

The bio-instrumentation concentration is complemented by a variety of other disciplinary fields. Therefore, although a separate minor will not be required for students pursuing this combined major/minor, possible minors that might be particularly appropriate for students majoring in bio-instrumentation include:

- Bioethics
- Business
- Chemistry
- Computer Science
- Mathematics
- Statistics

Evaluation

The Undergraduate Steering Committee will be responsible for the ongoing evaluation of the program. This ongoing evaluation will be based on periodic surveys administered to enrolled

students and graduates of the major, interviews with students and faculty, and assessment of student progress.

Special Notes

Accreditation: The proposed undergraduate bio-instrumentation major will enjoy the established accrediting privileges of UAlbany.

General Education Requirements

The School of Public Health will work with the University's Office of Undergraduate Studies to identify bio-instrumentation courses which can fulfill general education requirements.

Entry into the BS in Interdisciplinary Studies, Faculty-initiated Interdisciplinary Concentration in Bio-Instrumentation

An application will be required for students interested in declaring the bio-instrumentation major. The application will serve as the mechanism to limit the number of enrolled students, due to the limited number of spaces available in the program. Students must submit a transcript release form allowing the School of Public Health to obtain copies of all transcripts filed with the University's Office of the Registrar. Applications to the major will be reviewed by the School of Public Health's Undergraduate Committee.

Applications will be accepted after students complete all of the following: Bio 120, 121, 201 and 212 or 217; Chm 120, 121, 124, 125, 220, 222; Mat 108, 112; Physics 140, 145. An overall GPA of 2.5 will be required for admission. In addition, GPA in the introductory science courses will be used as the selection criterion if there are more applicants than space available in the program.

Admission to the concentration will be conditional upon successful completion of the remainder of the required introductory science courses (while maintaining the overall 2.5 GPA), and students will officially join the concentration at the beginning of their junior year.

Requirements for BS in Interdisciplinary Studies, Faculty-initiated Interdisciplinary Concentration in Bio-Instrumentation (75 credits) - Combined Major/Minor

The courses comprising the major/minor fall into five categories:

1. A group of introductory science and math courses that provide students with the science and math background necessary for the remainder of the curriculum.
2. A group of four courses that comprise the Public Health Core requirements for the degree. These courses provide students with an introduction to the core components of public health.

3. A group of four courses comprising the Bio-Instrumentation Core. These courses each have both lecture and laboratory components and provide students with an understanding of the theory, operation, and application of instrumentation in molecular biology, genomics, proteomics, and cell analysis research.
4. A group of five *Instrumentation in Biotechnology Research Internship* courses from which students will select two for their degree. These internship courses will provide students with research experiences in University Core or Academic laboratories where they will gain practical, hands-on experience with the use of instrumentation in molecular biology, genomics, proteomics, and cell analysis research in core or academic laboratory environments.
5. A *Cooperative Training Internship* at a local Biotechnology company or academic laboratory. In this training internship, students will gain real-world experience in the use of biotechnological instrumentation to address broader research questions as well as an understanding of the expectations that come with a professional career in laboratory research.

A. Introductory Science and Math courses (38 credits)

- a. A BIO 120 General Biology I (3 credits): First course in a two-semester sequence which offers a comprehensive survey of the structures and functions common to all living systems at the molecular, cellular, organismal, and population levels. This course emphasizes evolutionary principles, ecology, anatomy and physiology.
- b. A BIO 121 General Biology II (3 credits): Second course in a two-semester sequence which offers a comprehensive survey of the structures and functions common to all living systems at the molecular, cellular, organismal, and population levels. This course emphasizes molecular and cell biology, genetics and neurobiology.
- c. A BIO 201 General Biology I Lab (1 credit): First course in a two-semester lab sequence which explores fundamental concepts in biology and introduces common biology laboratory techniques. Techniques include microscopy, sterile technique, slide preparation and staining, scientific thinking and application of the scientific method, construction and interpretation of graphs and composition of lab reports. Living and preserved organisms are used to study concepts in Evolution, Ecology, Anatomy and Physiology. One laboratory period per week.
- d. A BIO 202Z General Biology II Lab (1 credit): Second course in a two-semester lab sequence which explores fundamental concepts in biology and introduces common biology laboratory techniques. Emphasis is placed on experimental design, interpretation of results and critical composition of lab reports. Topics covered include Biochemistry and Molecular Biology, Laboratory Math,

Genetics, Cell Biology, Neurobiology and Behavior. One laboratory period per week.

- e. A BIO 212Y Introductory Genetics (4 credits): Genetics from the classical Mendelian Laws of inheritance to molecular genetics. Topics will include: DNA structure and replication; Mendelian genetics and recombination; population, fungal, somatic cell, and bacterial genetics; gene organization; the genetic code; mechanisms of gene expression and regulation; and applications of genetic technology. Three class periods and one discussion section.
- f. A BIO 217 Cell Biology (3 credits): An introduction to modern cell biology. This course will present the basic organization of eukaryotic cells while stressing their elaborate structural-functional integration. The cells fundamental properties conserved through evolution will be stressed.
- g. A CHM 120 General Chemistry I (3 credits): Atomic theory, quantitative relationships in chemical change, electronic structure of atoms and chemical periodicity, chemical bonding, and states of matter.
- h. A CHM 124 General Chemistry I Laboratory (1 credit): Introduction to laboratory techniques, experiments demonstrating chemical principles in General Chemistry I, including stoichiometry, calorimetry, and properties of some elements and compounds.
- i. A CHM 121 General Chemistry II (3 credits): Elementary principles of chemical equilibrium, thermodynamics, and kinetics; electrochemistry; descriptive chemistry of the elements and their compounds.
- j. A CHM 125 General Chemistry II Laboratory (1 credit): Application of laboratory techniques, experiments demonstrating chemical principles of General Chemistry II, including solution properties, kinetics, equilibrium, and qualitative analysis of some anions and cations.
- k. A CHM 220 Organic Chemistry I (3 credits): Structure, synthesis, and reactions of the principal classes of organic compounds, stressing the underlying principles of reaction mechanisms and stereochemistry techniques. Prerequisite(s): A CHM 121 or 131 and 125.
- l. A CHM 222 Organic Chemistry Laboratory I (1 credit): Basic techniques of organic chemistry including extraction, crystallization, distillation, and chromatography; physical properties of compounds. Prerequisite(s) or corequisite(s): A CHM 220.
- m. A MAT 108 Elementary Statistics (3 credits): Frequency distributions, measures of central tendency and dispersion, probability and sampling, estimation, testing of hypotheses, linear regression and correlation.

- n. A MAT 112 Calculus I (4 credits): Calculus of one variable. Limits, continuity, differentiation of algebraic functions, applications of differentiation, anti-derivatives, the definite integral, transcendental functions. Prerequisite(s): A MAT 100 or precalculus at the high school or college level.
- o. A PHY 140 Physics I: Mechanics (3 credits): An introduction to the fundamentals of physics: Classical Mechanics. Topics include the concepts of force, energy and work applied to the kinematics and dynamics of particles and rigid bodies and an introduction to special relativity. Prerequisite or corequisite: A MAT 111 or 112 or 118.
- p. A PHY 145 Physics Lab I (1 credit): Experiments in mechanics. One laboratory period each week. Prerequisite or corequisite: A PHY 140, A PHY 141 or T PHY 141.

Given the popularity of the Biology and Chemistry classes across the University undergraduate population, a meeting was held in late winter 2013 among SPH Dean Philip Nasca, SPH Associate Dean Diane Dewar, CAS Dean Edelgard Wulfert, and the Chairs of the Biology, Chemistry and Math departments to discuss the potential burden of the proposed concentration on these departments. Because most of the students intending to join this new program are expected to be attracted from the Community College level, or from the existing population of students who would otherwise be enrolling in these classes for similar majors, it was agreed that in its first few years, no undue burden would be experienced by these departments. It was further agreed that as the bio-instrumentation concentration grows, the Director of the Undergraduate Program at the SPH will coordinate with the relevant CAS department chairs to assess any capacity constraints associated with this major, and to evaluate what resources are needed for the ongoing delivery of the major.

Letters of support from Dean Wulfert and from the Biology, Chemistry and Math department chairs can be found in Appendix C.

Transfer students from HVCC will have completed equivalent introductory courses as part of their A.S. degrees in biology or biotechnology. For other transfer students, equivalency of courses at other institutions will be determined by use of the UAlbany Transfer Course Equivalency Database <<https://eapps.albany.edu/tas/>>.

B. Public Health Core Requirements (12 credits)

Note: It is suggested that students complete the above science course requirements prior to enrolling in the public health core courses.

These courses provide students with a solid introduction to the core components of public health, which include biostatistics, environmental health sciences and epidemiology.

Required Public Health Core courses (12 credits) <i>~Course descriptions can be found in Appendix A~</i>		
Course # (Credits)	Course Title	Course Frequency
H Sph 201 (3)	Introduction to Public Health	Once per year - Fall
H Sph/Epi 231 (3)	Concepts in Epidemiology (Pre-req: Mat 108)	Once per year - Spring
H Sph/Epi 332 (3)	Introduction to Biostatistics: Collection, Analysis & Interpretation of Public Health Data	Once per year - Fall
H Bms 505 (3)	Biological Basis of Public Health	Once per year - Fall

B. Bio-Instrumentation Requirements (25 credits)

Students must complete 25 credits in Bio-Instrumentation. These credits are divided between courses that include lecture and laboratory components and internship courses that will provide practical, hands-on experience with specific instrumentation. Students must complete 2 of 5 *Instrumentation in Biotechnology Research Internship* courses. Students will select among four University core laboratories and a number of UAlbany academic research laboratories. These internships will provide extensive hands-on experience with the use of instrumentation in working laboratories. All students will also complete a 3 credit *Bio-Instrumentation Cooperative Training Internship* with a local biotechnology company or academic laboratory. This co-operative training will provide students with real-world experience in the use of biotechnological instrumentation to address complex research questions.

1. Bio-Instrumentation Core Courses (16 credits)

Students will complete each of the listed courses.

Required Bio-Instrumentation Core courses (16 credits) <i>~Course descriptions can be found in Appendix B~</i> <i>~Course Action Proposals and syllabi can be found in Appendix D~</i>		
Course # (Credits)	Course Title	Course Frequency
H Bms 310 (4)	Molecular and Genomic Approaches in Biotechnology I	Fall semester
H Bms 311 (4)	Molecular and Genomic Approaches in	Spring semester

	Biotechnology II	
H Bms 312 (4)	Proteomic Methodologies in Biotechnology	Fall semester
H Bms 314 (4)	Animal and Cell Culture Model Systems	Spring semester

2. Instrumentation in Biotechnology Research Internship Courses (6 credits)

Students will complete 2 of the 5 Instrumentation in Biotechnology Research Internship courses.

<p><i>Required Instrumentation in Biotechnology Research Internship courses (6 credits)</i> <i>Note: Students will complete 2 of the 5 listed courses.</i> <i>~Course descriptions can be found in Appendix B~</i> <i>~Course Action Proposals and syllabi can be found in Appendix D~</i></p>		
Course # (Credits)	Course Title	Course Frequency
H Bms 410 (3)	Instrumentation in Biotechnology Research Internship, Molecular Core Lab	Fall, Spring, Summer
H Bms 411 (3)	Instrumentation in Biotechnology Research Internship, Proteomics Core Lab	Fall, Spring, Summer
H Bms 412 (3)	Instrumentation in Biotechnology Research Internship, Genomics Core Lab	Fall, Spring, Summer
H Bms 414 (3)	Instrumentation in Biotechnology Research Internship, Cell Analysis Core Lab	Fall, Spring, Summer
H Bms 415 (3)	Instrumentation in Biotechnology Research Internship, Academic Lab	Fall, Spring, Summer

3. Bio-Instrumentation Cooperative Training Internship (3 credits)

Students will complete a Cooperative Training Internship at a local biotechnology company or academic laboratory.

<p><i>Required Bio-Instrumentation Cooperative Training Internship (3 credits)</i> <i>~Course descriptions can be found in Appendix B~</i> <i>~Course Action Proposals and syllabi can be found in Appendix D~</i></p>		
Course # (Credits)	Course Title	Course Frequency
H Bms 420 (3)	Bio-Instrumentation Cooperative Training Internship (Biotechnology Company/Academic	Summer, Fall, Spring

	Lab)	
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Cooperative Training Internship

Cooperative Training Internships for students will be arranged with commercial Biotechnology entities that have expressed an interest in participating in our program. Each student will work under the supervision of a mentor at the host laboratory. Students will receive assistance in finding an appropriate placement from their advisor in consultation with the Coordinator of Undergraduate Programs at the School of Public Health and placements will be tailored to fit the needs of both the host organizations and the students.

Evaluations of the field placement will be submitted by the student and the mentor at the conclusion of the co-operative training period. The advisor and Coordinator of Undergraduate Programs will be readily accessible throughout the placement to intervene if the student experiences any difficulty. In addition, contact will be made between the advisor and both the student and mentor to assess progress.

Course Scheduling

Required courses for the major will be offered on a yearly or semester basis (as indicated in the tables above) in order for students to complete their undergraduate coursework on time. Priority will be given to bio-instrumentation majors for enrollment in these courses. Students will work closely with their academic advisor to keep on track.

APPENDIX A

Course Descriptions for Public Health Core Courses

SCHOOL OF PUBLIC HEALTH

Sph 201 Introduction to Public Health (3)

A general introduction to what public health is, its importance for everybody's health, and how it functions as a combination of science and politics. The role of the public health system will be illustrated by describing issues confronting New York State and what is being done about them.

Sph/Epi 231 Concepts in Epidemiology (3)

This course is designed to introduce students to the science of epidemiology. Specific subjects will include causal thinking, the epidemiologic framework, and study designs utilized in epidemiologic studies. Examples of famous studies will be discussed, including outbreak investigations and major studies that have identified risk factors for the more common diseases in the country and world today. Prerequisite: A Mat 108 or equivalent

Sph/Epi 332 Introduction to Biostatistics: Collection, Analysis & Interpretation of Public Health Data (3)

This course will be a basic introduction to statistics as used in the field of Public Health. Students will learn basic descriptive statistics, measures of central tendency and dispersion, basic rules of probability spaces, binomial and normal probability distributions, sampling distributions, estimation and hypothesis testing. In addition, students will learn how to use a computer program to analyze data.

BMS 505 (NNSE 503) Biological Basis of Public Health (3)

Introduction to field of biomedical sciences and public health, including infectious and transmissible vectors, genetic disease and chronic disorders. Explanation of laboratory based procedures for detection, monitoring, and treating such diseases. Concepts of basic, relevant laboratory methods and data interpretation introduced. Discussion of impacts of nanotechnology on biomedical sciences, medicine and public health. Prerequisite: College level biology or biochemistry or genetics or molecular biology or permission of instructor.

APPENDIX B

Course Descriptions for Proposed Bio-Instrumentation Core and Internship Courses

SCHOOL OF PUBLIC HEALTH

H Bms 310 Molecular and Genomic Approaches in Biotechnology I (4)

This course is the first of a two part sequence. Basic molecular biology techniques will be reviewed, such as the purification, enzymatic manipulation, and separation of nucleic acids, PCR, and hybridization. Subsequently the course will consider such technologies as DNA sequencing and quantitative PCR with a focus on both the instrumentation required to perform these technologies their research applications. Lecture topics will be partnered with laboratory exercises that provide hands-on experience so that students develop a more full understanding of these technologies, again focusing on the instrumentation required to perform them. While instrument operation and data analysis will be highlighted, there will be significant coverage of other key issues such as instrument design, maintenance, quality control calibrations, and troubleshooting.

H Bms 311 Molecular and Genomic Approaches in Biotechnology II (4)

This course is the second of a two part sequence. Next Generation Sequencing and microarray analysis will be covered with a focus on the instrumentation required to perform these technologies. Research applications of the technologies will be highlighted. Lecture topics will be partnered with laboratory exercises that provide hands-on experience so that students develop a more full understanding of these technologies, again focusing on the instrumentation required to perform them. While instrument operation and data analysis will be highlighted, there will be significant coverage of other key issues such as instrument design, maintenance, quality control calibrations, and troubleshooting.

H Bms 312 Proteomic Methodologies in Biotechnology (4)

The course will begin with a brief review of basic analytical techniques such as SDS-PAGE, chromatography and mass spectrometry. The main focus of the course will be on such technologies as 2D gel electrophoresis, high pressure liquid chromatography, mass spectrometry and the instrumentation required to perform these technologies. Applications of the technologies will be highlighted, including small molecular analysis, peptide and protein sequencing, protein expression analysis, and protein post-translational modifications. The lecture topics will be partnered with laboratory exercises that provide hands-on experience so that students develop a more full understanding of these technologies, again with a focus on the instrumentation required to perform them. While instrument operation and data analysis will be highlighted, there will be significant coverage of other key issues such as instrument design, maintenance, quality control calibrations, and troubleshooting.

H Bms 314 Animal and Cell Culture Model Systems (4)

The course will begin with a brief review of the most commonly used animal model systems. Techniques used to generate and analyze these models will be discussed in detail. The use of cell culture and in vitro differentiation systems as alternatives to animal models will be

considered. Applications of the technologies will include nucleic acid extraction from cells and tissues, histological examination of tissues, laser capture microdissection, flow cytometry, and in vitro cell differentiation assays. Lecture topics will be partnered with laboratory exercises that provide hands-on experience so that students develop a more complete understanding of these technologies, with a focus on the instrumentation required to perform them. While instrument operation and data analysis will be highlighted, there will be significant coverage of other key issues such as experimental design and troubleshooting.

H Bms 410 Instrumentation in Biotechnology Research Internship, Molecular Core Lab (3)

Students will acquire practical, hands-on experience with the use of instrumentation in molecular biology/genomics research in a core laboratory environment. Projects may include the usage of instrumentation for nucleic acid extraction, PCR, quantitative PCR, and DNA sequencing.

H Bms 411 Instrumentation in Biotechnology Research Internship, Proteomics Core Lab (3)

Students will acquire practical, hands-on experience with the use of instrumentation in proteomics research in a core laboratory environment. Projects may include the usage of instrumentation for 2D gel electrophoresis, high pressure liquid chromatography, and mass spectrometry.

H Bms 412 Instrumentation in Biotechnology Research Internship, Genomics Core Lab (3)

Students will acquire practical, hands-on experience with the use of instrumentation in genomics/microarray research in a core laboratory environment. Projects may include the usage of instrumentation for nucleic acid extraction, microarray analysis, and Next Generation DNA sequencing.

H Bms 414 Instrumentation in Biotechnology Research Internship, Cell Analysis Core Lab (3)

Students will acquire practical, hands-on experience with the use of instrumentation in cell analysis research in a core laboratory environment. Projects may include the usage of instrumentation for histological examination of cells and tissues, laser capture microdissection, and flow cytometry.

H Bms 415 Instrumentation in Biotechnology Research Internship, Academic Lab (3)

Students will acquire practical, hands-on experience with the use of instrumentation in an academic laboratory environment. Projects will include the use of instrumentation relevant to the research activities of the particular academic laboratory. Permission of the Principle Investigator of the laboratory is required.

H Bms 420 Bio-Instrumentation Co-operative Training Internship (Local Biotechnology Company or Academic Laboratory) (3)

Students will perform a research internship with a local biotechnology company or academic laboratory. Students will gain a more full understanding of how instrumentation is used in biotechnology to address complex research questions, as well as the expectations that come with a professional career in laboratory research.

Appendix C
Letters of Support

March 11, 2013

Philip C. Nasca, Ph.D.
Dean, School of Public Health
University at Albany
State University of New York
One University Place
Rensselaer, New York 12144

Dear Phil,

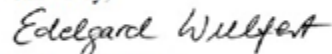
This letter serves to provide my enthusiastic support for your School's faculty-initiated interdisciplinary major in bio-instrumentation. This degree program will share a strong linkage with your Department of Biomedical Sciences and focus on the biomedical basis of public health, including the molecular foundation of disease and implications for public health interventions. I consider the proposed baccalaureate degree in bio-instrumentation an excellent idea. Through proper training in the application of cutting-edge technology students will be able to pursue entry-level jobs as technicians in scientific environments and will have acquired a highly marketable skill.

Implementation of the bio-instrumentation program in the School of Public Health will add to the richness and diversity of the University's undergraduate curriculum, while also providing a pathway for students to pursue other academic offerings at the University.

It is my understanding that the students you will recruit from Hudson Valley Community College will have taken the necessary and required basic science courses and not increase the pressure on the Departments of Biological Sciences and Chemistry in the College of Arts and Sciences. Should the program in bio-instrumentation become more popular and attract a larger number of majors, the College together with your School will evaluate what resources are needed (e.g., Mathematics and General Education courses provided by Arts and Sciences departments) to ensure that we deliver the optimal educational experience for students in these growing areas.

In conclusion, I am very supportive of this planned major in bio-instrumentation and I congratulate you and your faculty on this innovative endeavor.

Sincerely,



Edelgard Wulfert
Dean and Professor of Psychology
Collins Fellow

Letters of Support:

A. Letters from Academia

B. Letters from Industry partners (re-solicitations)

C. Letters from Industry partners (new)

Letters from Academia



Be bold. Be a Viking.

15 April 2014

Dr. Martin Tenniswood
Director, Cancer Research Center
University at Albany, SUNY
CRC 304
1 Discovery Drive
Rensselaer, NY 12144

Dear Dr. Tenniswood:

As the Chair of the Biology, Chemistry, & Physics Department at Hudson Valley Community College, I would like to express my continued support for the University at Albany's application for a New York State Regional Economic Development Grant. The development of an undergraduate training program in Biotechnology Instrumentation at the University is highly desirable in the Capital Region.

This program will complement initiatives here at HVCC like our Associate's Degree in Biotechnology as well as our advanced Certificate in Biotechnology and Biomanufacturing. It will also provide our students with a pathway to pursue their career aspirations in biotechnology and offer them additional training for the workforce. Ultimately, it will expand the pool of highly trained personnel in the region who are available to fill technologically demanding positions in research and industry. In turn, programs like this one will make the area more attractive as a location for new biotechnology ventures.

I look forward to the success of your application and the continued collaboration with HVCC.

Yours truly,

A handwritten signature in cursive script that reads "Peer A. Schaefer".

Peer A. Schaefer, PhD
Chair of Biology, Chemistry, & Physics

Cc: Sridar Chittur, PhD



BMS | Department of
Biomedical Sciences

April 14, 2014

Martin Tenniswood, PhD
Director, Cancer Research Center
Dept. of Biomedical Sciences
University at Albany
1 Discovery Drive
Rensselaer, NY 12144

Dear Martin,

In response to your request, I'm happy to affirm that in my opinion, the education and experience afforded by the new Bioinstrumentation program at the Cancer Research Center would make students from that program extremely attractive candidates for most graduate programs, including ours. (Assuming, of course, that GRE scores and GPAs met admissions criteria.) Even if the instruments and approaches needed in graduate school are not exactly what they have trained in, the fact of students training in a variety of methods, coupled to education in hypothesis testing, will provide them versatility and open-mindedness that will serve them well in research-oriented graduate programs. As Chair of the Admissions Committee for BMS for the past seven years, I can aver with confidence that we would look upon the experience that your program will provide very favorably.

Yours truly,

Randy Morse
Professor, Dept. of Biomedical Sciences, University at Albany School of Public Health and
Chair, Graduate Admissions Committee

Martin Tenniswood PhD,
Department of Biomedical Sciences,
University at Albany,
1 Discovery Drive,
Rensselaer, NY 12144

April 8, 2014

Dear Professor Tenniswood,

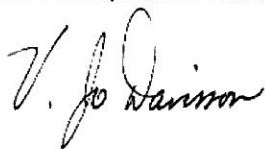
I am responding to your request for the review of the proposal to establish a BS degree program in Bioinstrumentation in the School of Public Health at SUNY Albany. It is a pleasure to be able to review the documentation and learn of this inspired faculty driven initiative. The vision and timing for such a program at the University and in the region is likely staged for significant positive impact on New York. The various opportunities afforded to students will certainly make it desired degree plan.

By way of credentials, I have been on faculty at Purdue for 25 years serving key roles in both BS, M.S., Pharm.D., and Ph.D education and training programs. I have been involved in mentoring students in three different graduate programs while at Purdue. I have served on Ph.D. advisory committees in six different programs at Purdue. I have also served as an independent reader of graduate theses for programs in India, France, and China. Over the years, I have played administrative roles in departmental and interdepartmental graduate programs. Finally, I chaired a task group that formulated the re-structuring of the Graduate School at Purdue to accommodate administration of multiple interdisciplinary graduate programs at Purdue.

My review of the proposal is with perspective of student qualifications for graduate programs in Medicinal Chemistry and Molecular Pharmacology as well as the Purdue University Life Science graduate program. I can say that without a doubt, the mix of practical and theoretical training in the using of instrumental technologies to address contemporary questions in biomedical and life science research is an excellent educational foundation.

There are not many (if any) BS programs in the US currently that can lay claims to having such a focus. Of course, the motivated students at Tier 1 research universities who take advantage of the environment are exposed to many of these tools. What will be distinctive would be BS students who are well grounded in fundamental principles governing the design, operations, and implementation of instrumentation used in the bioscience/biomedical laboratories. Pedagogy for practical training in these areas are generally lacking in most modern discipline-oriented BS degree programs. It is a major hurdle for our incoming students and those who are adept with research tools make more rapid progress. Thus, I would anticipate that the motivated and talented students from the BS Bioinstrumentation degree plan to be excellent candidates for laboratory-based graduate programs. Election of minors in areas that are complementary to those established programs at the University will make these students even more competitive candidates.

Sincerely,



Professor V. Jo Davisson, Ph.D.



connecting for life

Elm & Carlton Streets
Buffalo, NY 14263
716-845-2300
www.roswellpark.org
E-mail: askrpci@roswellpark.org

Martin Tenniswood, PhD
Empire Innovations Professor
Department of Biomedical Sciences
Director, Cancer Research Center,
University at Albany,
1 Discovery Place,
Rensselaer NY 12144

Saturday, April 12, 2014

Dear Martin

I've read the proposal for the new BioInstrumentation program at the University of Albany with very great interest. I wish to endorse, unequivocally, your innovative program design and also to underline how useful I believe this training program will be for the students. For example, applications from graduates of the program would be very welcomed at RPCI, as it is clear they will receive precisely the education needed to pursue cutting edge graduate training in cancer research.

By way of background I will describe my experience in designing and assessing scientific training programs. I have an h index of 30 and have authored over 80 papers, reviews and book chapters with key studies focusing on both basic mechanisms and translational studies in prostate cancer research. I have personally trained 12 graduate students, including 4 MD students undertaking research degrees, 4 post-doctoral fellows, 2 of who are now transitioning to roles as independent researchers and 6 MS students. I frequently work as a reviewer for high impact cancer journals and undertake grant review work for several international grant agencies and NIH study sections. Importantly, I am a full member of NIH/NCI (F), Manpower and Training Review Committee, which deals with scientist career development and institutional training grant applications.

Furthermore, I have significant leadership experience in catalyzing and establishing novel graduate training programs in the biomedical arena from serving as Co-Director and Director respectively on two international multi-center programs; *NucSys* (2006-2010, for PhD students) and *CanSys* (2009-2014, for MSc students). These training programs have been fully externally funded, for example by the European Community and US Department of Education, and designed to fulfill trans-disciplinary training needs by the application of systems biology approaches to biomedical research. To date, collectively, these programs have trained over 40 graduate students.

At Roswell Park Cancer Inst. I have held various leadership positions and within the Graduate School and I am currently an Associate Dean responsible for designing graduate curricula. Therefore, as part of the process of assessment of graduate training at RPCI, I was the lead on the quinquennial external review of the graduate school. Specifically, in 2012, I coordinated the external review of all graduate programs by an EAB. Subsequently, I was also the lead author on the Division's response to the recommendations from the EAB and I now chair the

curriculum committee that is designing a new integrated umbrella program. I will take the lead role in development of the written proposal to establish an integrated cancer biology PhD and MS program at RPCI, which will be submitted to the NYS Department of Education in late 2014. The goal is to offer this new program structure to Ph.D. and M.S. students enrolling in August 2015.

Therefore I have strong expertise in designing and assessing cutting-edge scientific training programs, and judging their relevance for biomedical trainees.

This is of relevance to your proposal, as the training program proposed in the BioInstrumentation program is precisely in line with developing the skill set, insight, and scientific understanding that we would wish to find in applicants to the graduate programs offered at RPCI. That is, clearly you, and the curriculum design committee, have worked very hard to develop a curriculum that has the correct balance between rigorous scientific training and developing cutting edge biomedical insight. Clearly, the trainees will develop the core building blocks of science knowledge such as hypothesis testing, scientific paradigms and the essence of biomedical research. This is complemented by a very contemporary overview and practical understanding of bioinstrumentation, which lies at the center of the required knowledge base for scientists operating across the academic and industrial spectrum.

I wish you luck with the submission of your proposal and I genuinely look forward to welcoming its graduates to Roswell Park Cancer Institute.

Yours Sincerely,

A handwritten signature in blue ink, appearing to read 'Moray J. Campbell', is centered on a light blue rectangular background.

Moray J. Campbell, PhD
Associate Prof of Oncology,
Roswell Park Cancer Inst.,
Program Director, CanSys
Associate Dean,
Roswell Park Graduate Division, University at Buffalo
http://scholar.google.com/citations?user=_skYTnUAAAAJ

Moray.campbell@roswellpark.org

Letters from Industrial Partners (re-solicitations)



April 10 2014

Martin Tenniswood, PhD Empire
Innovations Professor Department
of Biomedical Sciences Director,
Cancer Research Center University
at Albany
One Discovery Place,
Rensselaer NY 12144

Dear Martin,

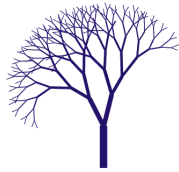
I would like to congratulate you on the successful funding of the BS in Bioinstrumentation. The need for trainees who are familiar with high tech bioinstrumentation has never been higher. I am excited to learn that this degree program is now being put in place. On behalf of all the Neural Stem Cell Institute's scientists, I would like to reiterate that we are very excited by your invitation to join the founding IHHS membership and participate in the IHHS research and training programs.

The Neural Stem Cell Institute is focused on both basic and translational stem cell research, with the aim to develop new therapies for neurodegenerative disease. Our studies require substantial technological expertise, including high-content imaging, cell surface molecule definition, fluorescent activated cell sorting and RNA-sequencing down to the single cell level. We are constantly looking for individuals who are well-trained and who can adapt their knowledge to the new instruments that emerge every year.

We are delighted to continue our collaborative efforts here on the University at Albany East Campus, to develop a high profile and innovative interdisciplinary research environment dedicated to understanding, preventing and developing treatments for neurodegenerative diseases, cancer and infectious diseases, all of which are significant health problems. Should we need to expand our workforce, we would look for trainees from this program, both for NSCI and our affiliated biotechnology company, Stem Culture Inc.

Yours sincerely,

Sally Temple, PhD
Professor and Scientific Director
Neural Stem Cell Institute



Pulmokine

7 University Place, B127B
Rensselaer, NY 12144
Phone: 518-573-8315
Fax: 518-375-7025
Email: lz@pulmokine.net

April 11, 2014

Dr. Martin Tenniswood,
Director,
Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

Dear Martin,

I enthusiastically support the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am the founder and CEO of Pulmokine[®], a biotechnology company that is located on the UAlbany East Campus in Rensselaer. The Center for Functional Genomics' Core facilities at the University at Albany has been important in the growth and development of startup biotechnology companies such as ours on the East Campus.

Developing a program to generate a pool of highly trained personnel that is readily available to fill new technologically demanding positions will be an important growth stimulus for the campus and the region. Our collaborations with CFG have led to significant translational research in the area of pulmonary vascular disorders, including the development of particular kinase inhibitors for the treatment of these diseases. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force.

Having now seen the full program description I wish to affirm Pulmokine's ongoing interest. We look forward to participating in the Training program and witnessing the continued expansion of Biotechnology Infrastructure in the Capital Region. We will be happy to consider Program Graduates to meet Pulmokine's personnel needs in the future.

Yours sincerely,

Lawrence S. Zisman, MD FACC
CEO, Pulmokine[®]



StemCulture

April 4 2014

Dr. Martin Tenniswood,
Director, Cancer Research Center,
One Discovery Drive,
Rensselaer, NY 12144

Dear Martin,

On behalf of Stem Culture Inc., a biotechnology company affiliated with the Regenerative Research Foundation – Neural Stem Cell Institute, I would like to express our whole hearted support for the implementation of the undergraduate training program in Biotechnology Instrumentation at the University at Albany. We recognize that the Center for Functional Genomics' Core facilities at the University at Albany have been an important component for the growth and development of startup biotechnology companies on the university's East Campus.

Regional and national economic growth and development will require a readily available pool of highly trained individuals to assume the technologically demanding positions needed in the biotechnology arena. We anticipate that our collaborations with CFG will provide the impetus to develop new products and services.

StemCulture generates high technology bioengineered products for stem cell research. Currently, we export these specialized reagents to over 10 different countries worldwide. Our company is growing, and we are grateful for the support of the local academic environment which has helped provide a fertile environment for our growth.

We look forward to participating in the training program and the continued expansion of the Capital Region's biotechnology infrastructure. Most importantly, we do anticipate hiring new skilled personnel in the future, and the graduates of this program would be highly competitive to grow our workforce.

Sincerely,

Jeffrey Stern, PhD
Stem Culture Inc.

cc: Dr John Tine
Co-ordinator, Biotechnology Instrumentation Training Program

One Discovery Drive, Rensselaer NY 12144

14 April 2014

Dr. Martin Tenniswood
Director, Cancer Research Center
1 Discovery Drive,
Rensselaer, NY 12144

Dear Martin:

We would like to express our support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am the founder and CEO of Integrated Tissue Dynamics LLC, a biotechnology company that is located in the Capital Region. The Center for Functional Genomics' Core facilities at the University at Albany has been important in the growth and development of the startup biotechnology companies on the East Campus of the university. Developing a program that ensures that a pool of highly trained personnel is readily available to fill new technologically demanding positions will be an important growth stimulus.

Our collaborations with CFG have led to successful publication of a translational research study in the journal PAIN (Hou et al., 2011), successful funding of an NIH Phase 1 STTR (R41NS070387), and the submission of other proposals including the successful funding of one of the flagship NYCAP grants in 2013. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our company and network of national and international collaborators. We look forward to participating in the Training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Sincerely yours,



President, CEO, and Chief Scientist



April 15, 2014

Dr. Martin Tenniswood
Director
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144

Dear Martin,

As president and founder of Next Advance, Inc., I would like to express my support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. Next Advance develops and manufactures laboratory instruments for molecular biologists. We started in the East Campus Incubator in 2003, and have grown from just me to over a dozen employees and sales to customers in over 50 countries worldwide. Support from the incubator program and access to the Center for Functional Genomics core facilities at the University of Albany have been instrumental in our success. We would be very interested in coop training or interns from an instrumentation training program. Students graduating with a degree in Bioinstrumentation and expertise from the program would be of great interest to us, especially with the hands-on approach of the program. In fact, we have been very happy with the student interns (from other colleges) that have worked for us, so we would be greatly interested in hiring Bioinstrumentation students from this program at SUNY. Our invaluable collaborations with CFG have led to one of our product lines, real-world product testing, and development of manufacturing protocols.

We look forward to participating in the training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Sincerely,

A handwritten signature in blue ink that reads "Ian Glasgow". The signature is fluid and cursive, with the first name "Ian" being particularly prominent.

Ian Glasgow, PhD, PE
President

cc. Dr. John Tine
Coordinator, Biotechnology Instrumentation Training Program



Tools to Analyze Cellular Function

Dr. Martin Tenniswood
Director
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144

Dear Martin,

On behalf of Active Motif Inc., I would like to re-affirm our support and interest in being involved in the co-op portion of the undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am a co-founder of Lake Placid Biologicals, now part of Active Motif, Inc., a biotechnology company located north of the Capital Region.

As a growing small biotechnology business that is focused on the development of innovative kits and assay systems for accelerating epigenetic research, we are challenged by our ability to locally recruit qualified and trained personnel for scientific positions. Students graduating with a Bioinstrumentation degree, with the expertise developed in the program would definitely be of interest as employment candidates. We look forward to participating in the Training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Sincerely,

A handwritten signature in cursive script, appearing to read "M. A. Jelinek".

Mary Anne Jelinek, Ph.D.
Senior Scientist
Active Motif, Inc-Lake Placid
1915 Saranac Ave, Suite 2
Lake Placid, NY 12946
(T) 518-523-7025, ext. 204
mjelinek@activemotif.com

cc. Dr John Tine,
Coordinator, Biotechnology Instrumentation Training Program

Letters from Industrial Partners (new)



April 15, 2014

Martin Tenniswood, Ph.D.
Director, Cancer Research Center
Department of Biomedical Sciences
University at Albany
1 Discovery Drive
Rensselaer, NY 12144

Dear Drs. Tenniswood and Chittur,

RE: Support for the Contemplated BioInstrumentation Program

Errant Gene Therapeutics, LLC (“EGT”), is a leader in the development of rare-disease therapies utilizing genomic and epigenetic interventional therapies. Examples of our activities include our development of a genetic therapy for β -Thalassemia Major with autologous CD34+ Hematopoietic Progenitor Cells Transduced with TNS9.3.55, a lentiviral vector encoding the normal human β -globin gene first developed by EGT and Memorial Sloan Kettering Cancer Center (“MSKCC”) in 2005. It is currently subject to a clinical trial at MSKCC, one of the few centers in the East Coast with trained bio-technicians capable of assessing the performance of the vector using state-of-the-art instrumentation and analysis tools.

In addition to our genomic program, EGT has been collaborating with The Gen*NY*Sis Center for Excellence in Cancer Genomics on the East Campus in the investigation of our histone deacetylase inhibitors. EGT is planning on submitting a FDA IND application for a human Phase I clinical trial of our lead molecule, CG-1521, for the mono-therapeutic and combinatorial treatment of hormone refractory cancers. Such current incurable cancers include, hormone refractory prostate cancer, as well as triple-negative and inflammatory breast cancers. Our collaboration with the East Campus under the auspices of Drs. Tenniswood, Chittur and Chatterjee is largely as a result of the availability of trained bio-technicians who are able to operate the state-of-the-art instrumentation necessary in assessing molecular activity of our formulations in diseases models. EGT’s ability to commercialize its histone deacetylase inhibitors portfolio is materially impacted by the quality and availability of trained bio-instrumentation operators. These skills are essential for life-sciences entities that depend on the highest quality of pre and post-clinical analytics derived from the investigation of cell samples.

We cannot imagine a more apropos program at the University at Albany than one focused on its core competency of utilizing state-of-the-art bio-instrumentation to further life-saving research.



We are highly supportive of this initiative and commend the vision of the University in correctly positioning itself, with this program, as a leading supplier of tomorrow's skilled professionals.

Please do not hesitate to contact us for a more comprehensive assessment of the importance of this program to EGT and or industry peers.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "S. Salman", written over a horizontal line.

Sam Salman
President

April 15, 2014

Martin Tenniswood, Ph.D.
Director, Cancer Research Center
Department of Biomedical Sciences
University at Albany
1 Discovery Drive
Rensselaer, NY 12144

Dear Martin,

We are writing to confirm our support for the launch of the new BioInstrumentation degree program under consideration at the University at Albany. BioHarvest Ltd is a pioneer in the discovery, development and commercialization of highly impactful health products created entirely from the cells of functional foods.

BioHarvest products utilize state-of-the-art bioreactors which mimic the microenvironmental conditions considered as optimal for the growth of cell cultures into a final form product. The Company is also committed to conducting pre-clinical, clinical and meta-analyses studies on the effects of its products in human and disease models.

These requirements attracted us to the the East Campus where after much consideration and pursuant to our comprehensive review of alternative sites, we launched a Center of Innovation for Functional Foods with the University at Albany. A key decision point for us was the availability of trained technicians able to use sophisticated bio-instrumentation tools to support our needs. The University at Albany's proximity to some of the world's most advanced bio-instrumentation manufacturers makes it an ideal place for a program that will guarantee industry access to the types of job skills vital for the future of bio-engineering and instrumentation.

We therefore submit our enthusiastic support for the launch of this program.

Sincerely,



Eli Mor, CFO & Senior VP of BD



ANAPOLE

15 April 2014

Dr. Martin Tenniswood, Director
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144

Subject: Development of Undergraduate Training Program in Biotechnology Instrumentation

Dear Dr. Tenniswood:

I am in receipt of the documentation describing the above referenced BioInstrumentation Undergraduate Degree Program and whole heartedly support its implementation.

As president of an advanced technology Company, it has been my responsibility to evaluate capabilities of numerous academic institutions in the United States to determine those that are best suited to support our commercial growth. As a result of this search, we have chosen to collaborate with the Cancer Research Center (CRC) for a number of reasons which include, but are not limited to the following:

- i) high quality personnel;
- ii) advanced analytical techniques; and,
- iii) CRC's ability to integrate these advanced techniques with emerging technologies.

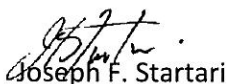
We are very interested in a program that could develop a cohort of highly qualified personnel with hands on experience who are trained in hypothesis testing experimental design and data collection/interpretation using the state-of-the-art instrumentation in the Core Facilities in the Center for Functional Genomics.

Our Company would be willing to participate in the training program and clearly see a need in our future to hire undergraduate students with a BioInstrumentation degree using expertise described in this.

We strongly support the Undergraduate Training Program in Biotechnology Instrumentation at the University of Albany as described in the documentation provided.

If anyone has questions; or, is in need of further information, please feel free to have them contact me at their convenience.

Sincerely,



Joseph F. Startari
President, Anapole Technologies Inc.

cc: Dr. John Tine
Co-ordinator, Biotechnology Instrumentation Training Program



NEW YORK

LONDON

PARIS

ZURICH

SÃO PAULO

DUBAI

Lawrence M. Shindell, Chairman
ARIS Title Insurance Corporation
lshindell@aristitle.com

April 15, 2014

Confidential & Via Email: mtenniswood@albany.edu

Martin Tenniswood Ph.D.
Director, Cancer Research Center
Department of Biomedical Sciences
University at Albany
1 Discovery Drive
Rensselaer, NY 12144

Re: Support for the BioInstrumentation Program

Dear Dr. Tenniswood:

Please accept this letter in our support of the BioInstrumentation Program at your facility.

As you know, ARIS Title Insurance Corporation, a member of Argo Group International Holdings, Ltd. (NasdaqGS: AGII), recently announced a ground-breaking partnership with the State University of New York (SUNY) at Albany on an initiative which will revolutionize the global arts and collectibles industry by developing industry-accepted, scientific-legal-market-efficacy object identification (or authenticity) standards.

The University at Albany will serve as the international location for the “SUNY Center of Innovation on Standards and Solutions for Object Identification Technologies in the Global Art and Collectibles Industry.” We hope to utilize the full resources of the university and to provide intern and permanent employment opportunities to qualified members of the SUNY Albany community. We expect that the Center’s industry partners will also reach-out to your qualified research community in support of the Center’s work to be conducted on campus and the likely industrial and scientific cluster to form in support of the economic opportunities created and promoted by the Center’s leadership.

The Center will bring together academic and private sector stakeholders from around the world to collaboratively establish definitive, third-party, peer-reviewed industry standards and solutions for object-identification and authentication of art and collectibles. The goal of this initiative is to create a platform on which all market stakeholders – from international trade regulators, the financial services and property insurance sectors, to the not-for-profit museum

Dr. Martin Tenniswood
April 15, 2014
Page 2

community, artist estates, foundations and today's living artists – can engage and protect both their legacies and the art industry as a whole through new solutions. Such a goal can only be achievable if the Center of Innovation is housed and supported by a world-class institution such as the University at Albany, which has long made and continues to make this commitment to leading research and provides its community with the sophisticated tools to support the needs of a changing environment.

Our collaboration would not have been possible but for the University at Albany's commitment to provide and its proficiency in cutting-edge research in the biological sciences along with its state-of-the-art facilities in bio-instrumentation. The rollout of the technologies being developed on the University at Albany East Campus to serve industry as a whole and those germane in particular to the Center of Innovation's initiative will require a workforce of highly trained personnel with skills in genomic and nano-based technologies. The graduates of the BS BioInstrumentation program have precisely the kind of technical expertise that will be needed for the successful implementation of the authentication protocols that are part of this ARIS-sponsored Center of Innovation.

We therefore submit our enthusiastic support for the launch of your program and strongly note the many important synergies between these two initiatives.

Yours truly,



Lawrence M. Shindell
Chairman, ARIS Title Insurance Corporation

C: Sam Salman, Chairman & CEO, NRS Associates, LLC

PROPOSAL FOR A FACULTY-INITIATED INTERDISCIPLINARY
UNDERGRADUATE MAJOR IN BIO-INSTRUMENTATION

Appendix C

Letters of Support

March 11, 2013

Philip C. Nasca, Ph.D.
Dean, School of Public Health
University at Albany
State University of New York
One University Place
Rensselaer, New York 12144

Dear Phil,

This letter serves to provide my enthusiastic support for your School's faculty-initiated interdisciplinary major in bio-instrumentation. This degree program will share a strong linkage with your Department of Biomedical Sciences and focus on the biomedical basis of public health, including the molecular foundation of disease and implications for public health interventions. I consider the proposed baccalaureate degree in bio-instrumentation an excellent idea. Through proper training in the application of cutting-edge technology students will be able to pursue entry-level jobs as technicians in scientific environments and will have acquired a highly marketable skill.

Implementation of the bio-instrumentation program in the School of Public Health will add to the richness and diversity of the University's undergraduate curriculum, while also providing a pathway for students to pursue other academic offerings at the University.

It is my understanding that the students you will recruit from Hudson Valley Community College will have taken the necessary and required basic science courses and not increase the pressure on the Departments of Biological Sciences and Chemistry in the College of Arts and Sciences. Should the program in bio-instrumentation become more popular and attract a larger number of majors, the College together with your School will evaluate what resources are needed (e.g., Mathematics and General Education courses provided by Arts and Sciences departments) to ensure that we deliver the optimal educational experience for students in these growing areas.

In conclusion, I am very supportive of this planned major in bio-instrumentation and I congratulate you and your faculty on this innovative endeavor.

Sincerely,



Edelgard Wulfert
Dean and Professor of Psychology
Collins Fellow



To: Philip C Nasca, Dean of the School of Public Health

From: Richard S. Zitomer, Chair of Biological Sciences

A handwritten signature in black ink, appearing to read "Richard S. Zitomer", written in a cursive style.

Date: December 30, 2013

Subject: Bio-Instrumentation Major

I have reviewed the proposed joint School of Public Health- Hudson Valley Community College Bio-Instrumentation major. Since the number of students that will be enrolled in the major will be limited and since much of the introductory courses will be taken at Hudson Valley Community College or other Community College as the program expands, the Department of Biological Sciences will not be significantly impacted.

Should the program grow larger than anticipated, which I realize is unlikely given the sophisticated instrumentation training that students will require, we can discuss the need for additional resources at that time.



To: Philip C Nasca, Dean of the School of Public
From: Li Niu, Chair, Department of Chemistry
Re: Bio-Instrumentation Major
Date: January 14, 2014

A handwritten signature in blue ink, likely belonging to Li Niu, the Chair of the Department of Chemistry.

I have reviewed the joint proposal of the Bio-Instrumentation major by the School of Public Health and the Hudson Valley Community College. I do not foresee any significant impact of the enrollment of the students in this program on the curriculum delivery by the Department of Chemistry. However, if the program expands in the future to a point that the impact on Chemistry becomes substantial, we can discuss a solution to address the need of additional effort and resources.

I therefore support the proposal.

From: "Zhu, Kehe" <kzhu@albany.edu>
Date: January 6, 2014 at 10:19:42 AM EST
To: "Nasca, Philip C" <pnasca@albany.edu>
Cc: "Wulfert, Edelgard" <ewulfert@albany.edu>
Subject: **your proposed new major in Bio-instrumentation**

Dear Phil,

The Department of Mathematics and Statistics supports your proposal for a new major in Bio-Instrumentation. From the discussions we had with you some time ago, I am convinced that the impact on my department, in the form of a Statistics requirement, will be minimal in the next few years, and we should be able to provide the few extra seats in AMAT 108 for your students without additional resources. Of course, if this new major eventually turns into a blockbuster and attracts a much larger number of students than you currently predict (let me congratulate you in advance if that is the case), we may have to take another look at how you can help us with the resources necessary to support the instructional needs in AMAT 108.

Happy New Year!

Kehe Zhu
Professor and Chair
Department of Mathematics and Statistics



27 October 2011

Dr. Martin Tenniswood
Director, Cancer Research Center
University at Albany, SUNY
CRC 304
1 Discovery Drive
Rensselaer, NY 12144

Dear Dr. Tenniswood,

As the Chair of the Biology, Chemistry, & Physics Department at Hudson Valley Community College, I would like to express my support for the University at Albany's application for a New York State Regional Economic Development Grant. I enthusiastically support the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. This program will complement initiatives here at HVCC, like our Associate's Degree in Biotechnology as well as our advanced Certificate in Biotechnology and Biomanufacturing, and provide our students here with a pathway to pursue their career aspirations in biotechnology. Ultimately, it will expand the pool of highly trained personnel in the region available to fill technologically demanding positions in biotechnology research and industry. This should in turn make this area more attractive as a location for new biotechnology ventures, and thus this project will be an important stimulus for growth of this sector.

I look forward to the success of your application and the continued expansion of opportunities for those interested in pursuing careers in biotechnology research in the Capital Region.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Peter A. Schaefer". The signature is fluid and cursive, with a large initial "P" and "S".

Peter A. Schaefer, Ph.D.

Chair of Biology, Chemistry, & Physics

cc. Dr. John Tine
Coordinator, Biotechnology Instrumentation Training Program



October 27, 2011

Martin Tenniswood, PhD
Empire Innovations Professor
Department of Biomedical Sciences
Director, Cancer Research Center
University at Albany
1 Discovery Place,
Rensselaer NY 12144

Dear Martin,

You have my whole hearted support for your proposal to create an Institute for Human Health Sciences (IHHS). On behalf of all the Neural Stem Cell Institute's scientists, I want to inform you that we are very excited by your invitation to join the founding IHHS membership and participate in the IHHS research and graduate training programs. The formation of the IHHS will provide opportunities to expand federal, state and local research funding and initiatives, and an interdisciplinary post graduate training environment to provide these students with the skills required to become the scientist and innovators of the future.

In collaboration with the University at Albany Cancer Research Center and the Trudeau Institute we look forward to the development of a high profile and innovative interdisciplinary research environment dedicated to understanding, preventing and developing treatments for neurodegenerative diseases, cancer and infectious diseases. All of which are goals that will have a significant impact on human health.

We are also very excited about the concurrent development of the articulation agreement with the community colleges in the Capital Region. The opportunity to host trainees during their co-op rotations will be extremely beneficial for both NSCI and our affiliated biotechnology company, Stem Culture Inc.

I wish you good fortune and success in this exciting endeavor.

Yours sincerely,

Sally Temple, PhD
Professor and Scientific Director
Neural Stem Cell Institute



Pharmaceutical
Research Institute

ALBANY COLLEGE OF PHARMACY AND HEALTH SCIENCES

October 31, 2011

Dr. Martin Tenniswood,
Director
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144

Dear Martin,

The Pharmaceutical Research Institute (PRI) of Albany College of Pharmacy and Health Sciences would like to express our support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. As the Executive Vice President of PRI, a research institute located in the Capital Region, I am aware that the Center for Functional Genomics' Core facilities at the University at Albany has been important in the growth and development of the startup biotechnology companies on the East Campus of the university. Developing a program that ensures that a pool of highly trained personnel is readily available to fill new technologically demanding positions will be an important growth stimulus. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force.

We look forward to participating in the Training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Yours sincerely,

Shaker A. Mousa, PhD, MBA, FACC, FACB
Vice Provost for Research & Professor of Pharmacology
Albany College of Pharmacy and Health Sciences

Chairman and Executive Vice President
The Pharmaceutical Research Institute

cc. Dr. John Tine, Coordinator
Biotechnology Instrumentation Training Program

22 October 2011

Dr. Martin Tenniswood,
Director,
Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

Dear Martin,

We would like to express our support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am the founder and CEO of Integrated Tissue Dynamics LLC, a biotechnology company that is located in the Capital Region. The Center for Functional Genomics' Core facilities at the University at Albany has been important in the growth and development of the startup biotechnology companies on the East Campus of the university. Developing a program that ensures that a pool of highly trained personnel is readily available to fill new technologically demanding positions will be an important growth stimulus. Our collaborations with CFG have led to successful publication of a translational research study in the journal PAIN (Hou et al., 2011), successful funding of an NIH Phase 1 STTR (R41NS070387), the submission of a multi-center NIH R01 proposal (R01NS078139) and the preparation of a Phase 2 STTR proposal. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force. We look forward to participating in the Training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Yours sincerely,



Frank L. Rice, PhD
President and CEO

c.c. Dr John Tine,
Co-ordinator, Biotechnology Instrumentation Training Program



Tools to Analyze Cellular Function

October 26, 2011

Dr. Martin Tenniswood,
Director,
Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

Dear Martin,

On behalf of Active Motif Inc., I would like to express our support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am a co-founder of Lake Placid Biologicals, now part of Active Motif, Inc., a biotechnology company located north of the Capital Region that is focused on the development of innovative kits and assay systems for accelerating epigenetic research. The Center for Functional Genomics' Core facilities at the University at Albany has been important in the growth and development of the startup biotechnology companies on the East Campus of the university and beyond. Developing a program that ensures that a pool of highly trained personnel is readily available to fill new technologically demanding positions will be an important growth stimulus. Our collaborations with CFG have led to the submission of a series of Small Business Innovative Research (SBIR) grant proposals to the National Institutes of Health (NIH) that if successful will result in significant technological advances in the field of epigenetic research that will have a tremendous impact on the future growth potential and commercial success of Active Motif.

As a growing small business, we are challenged by our ability to locally recruit qualified and trained personnel for scientific position. Thus, we are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force. We look forward to participating in the Training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Yours sincerely,

A handwritten signature in cursive script, appearing to read "M. A. Jelinek".

Mary Anne Jelinek, Ph.D.
Senior Scientist
Active Motif, Inc-Lake Placid
1915 Saranac Ave, Suite 2
Lake Placid, NY 12946
(T) 518-523-7025, ext. 204
mjelinek@activemotif.com

cc. Dr John Tine,
Coordinator, Biotechnology Instrumentation Training Program



Pulmokine®

7 University Place, B127B

Rensselaer, NY 12144

Phone: 518-573-8315

Fax: 518-375-7025

Email: lz.pulmokine@gmail.com

October 25, 2011

Dr. Martin Tenniswood,
Director,
Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

Dear Martin,

I enthusiastically support the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am the founder and CEO of Pulmokine®, a biotechnology company that is located on the UAlbany East Campus in Rensselaer. The Center for Functional Genomics' Core facilities at the University at Albany has been important in the growth and development of startup biotechnology companies such as ours on the East Campus.

Developing a program to generate a pool of highly trained personnel that is readily available to fill new technologically demanding positions will be an important growth stimulus for the campus and the region. Our collaborations with CFG have led to significant translational research in the area of pulmonary vascular disorders, including the development of particular kinase inhibitors for the treatment of these diseases. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force.

We look forward to participating in the Training program and witnessing the continued expansion of Biotechnology Infrastructure in the Capital Region.

Yours sincerely,

Lawrence S. Zisman, MD FACC
CEO, Pulmokine®

Dr. Martin Tenniswood
Director, Cancer Research Center
University at Albany, SUNY
CRC 304
1 Discovery Drive
Rensselaer, NY 12144

Dear Dr. Tenniswood,

As the Senior Director of Human Resources and Technical Training of Regeneron Pharmaceuticals, I would like to express my support for the University at Albany's application for a New York State Regional Economic Development Grant. Several aspects of this application are of significant interest to Regeneron. The proposed undergraduate training program in Biotechnology Instrumentation will help to increase the pool of highly trained personnel in this region available to fill technologically demanding positions in biotechnology research. This will be of great value not only to existing companies such as Regeneron, but also will make this region more attractive as a location for new biotechnology ventures and thus will be an important stimulus for growth of this sector.

We are particularly excited about the opportunity to participate in the proposed cooperative internship training program. Participation in the education of students is in keeping with our institutional goals, and it will also provide us with an opportunity to identify promising candidates for positions within our company.

I look forward to the success of your application, and the continued expansion of the biotechnology infrastructure on the East Campus and throughout the Capital Region.

Yours sincerely,



Lynne Fuierer, SPHR
Senior Director, Human Resources and Technical Training
Regeneron Pharmaceuticals, Inc.
81 Columbia Turnpike
Rensselaer, NY 12144
(518) 488-6175

cc. Dr. John Tine
Coordinator, Biotechnology Instrumentation Training Program



Dr. Martin Tenniswood,
Director,
Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

October 27, 2011

Dear Martin,

The Albany Site Laboratories of Taconic Farms, Inc would like to express our support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am Director, Head of Global Scientific Services and Development at Taconic, a biotechnology company with laboratories located in at the University of Albany East Campus. The Center for Functional Genomics' Core facilities at the University at Albany has been important in the growth and development of biotechnology companies on the East Campus of the university. Developing a program that ensures that a pool of highly trained personnel is readily available to fill new technologically demanding positions will be an important growth stimulus. Our collaborations with CFG have led to successful testing relationships and services in support of our core research models business. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force. We look forward to participating in the Training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Yours sincerely,

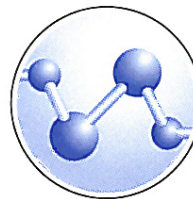
Stephen Festin, PhD
Director, Taconic Farms
Head of Global Molecular Analysis, Health Testing and R&D

cc. Dr John Tine,
Co-ordinator, Biotechnology Instrumentation Training Program

Corporate Office
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Hudson, NY 12534
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Fax: +45 56 86 14 20
taconiceurope@taconic.com

www.taconic.com



AMRI[®]

October 31, 2011

Albany Molecular Research, Inc. | 26 Corporate Circle | P.O. Box 15098 | Albany, NY 12212-5098 USA
t. (518) 512-2000 | f. (518) 512-2020 | www.amriglobal.com

Dr. Martin Tenniswood,
Director,
Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

Dear Dr. Tenniswood,

I would like to express my support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am the Chairman of Global Quality Council, and Senior Director of Pharmaceutical and Quality Services, Albany Molecular Research Inc. (AMRI) headquartered in the Capital Region. I oversee analytical chemistry, preformulation and formulation, quality assurance and regulatory affairs efforts; provide leadership to a team of over 170 skilled scientists and quality professionals.

The Center for Functional Genomics (CFG)' Core facilities at the University at Albany has been important in the growth and development of biotechnology companies in the capital region. Developing a program that ensures that a pool of highly trained personnel is readily available to fill new technologically demanding positions will be an important growth stimulus. CFG's scientific capabilities such as high-resolution mass measurements and excellent peptide analysis is of importance in the development of new drug candidates; as our company grows we anticipate increased collaboration with CFG. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential talents who would be excellent additions to our work force.

We look forward to participating in the Training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Yours sincerely,

Junan Guo, Ph.D.
Chairman, Global Quality Council
Senior Director, Pharmaceutical and Quality Services
AMRI

cc. Dr John Tine,
Coordinator, Biotechnology Instrumentation Training Program

RANDALL WEINBERG LLC

7 University Place, Rensselaer, NY 12144

Dr. Martin Tenniswood
Director
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144

27 October 2011

Dear Dr. Tenniswood,

We would like to express our support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am the lead scientist for Randall Weinberg LLC, a biotechnology company located in the Capital Region. The Center for Functional Genomics Core facilities at the University at Albany has been important in the growth and development of startup biotechnology companies on the East Campus of the University – it was a significant reason for locating our startup lab here. Developing a program that ensures that a pool of highly trained personnel is readily available to fill new technologically demanding positions will be an important growth stimulus. Our very positive collaborations with CFG include maintenance and amplification of cells for tissue culture, construction of novel plasmids, complex DNA sequencing, and excellent peptide analysis that have facilitated our development of new vaccine candidates; as our company grows we anticipate increased collaboration with the Center for Functional Genomics and are encouraged by the prospect of an expanded pool of potential new employees from the training program.

We look forward to seeing continued expansion of the Biotechnology Infrastructure in the Capital Region.

Yours sincerely,



Randall Weinberg LLC
randyweinberg@msn.com

cc. Dr John Tine,

Co-ordinator, Biotechnology Instrumentation Training Program

STEM CULTURE INC.
ONE DISCOVERY DRIVE
RENSSELAER, NEW YORK 12144
518.694.8188

October 27, 2011

Dr. Martin Tenniswood,
Director, Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

Dear Martin,

On behalf of Stem Culture Inc., a biotechnology company affiliated with the Regenerative Research Foundation – Neural Stem Cell Institute, I would like to express our whole hearted support for development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. We recognize that the Center for Functional Genomics' Core facilities at the University at Albany have been an important component for the growth and development of startup biotechnology companies on the university's East Campus.

Regional and national economic growth and development will require a readily available pool of highly trained individuals to assume the technologically demanding positions needed in the biotechnology arena. We anticipate that our collaborations with CFG will provide the impetus to develop new products and services. We are very excited with your invitation to participate in the proposed co-operative training program which will provide an opportunity to identify potential employees with exceptional skills required to fill our firm's highly technical positions.

We look forward to participating in the training program and the continued expansion of the Capital Region's biotechnology infrastructure.

Sincerely,



Sally Temple, PhD
Stem Culture Inc.

cc: Dr John Tine
Co-ordinator, Biotechnology Instrumentation Training Program

NEXT >>> ADVANCE

October 28, 2011

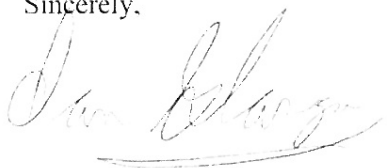
Dr. Martin Tenniswood
Director
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144

Dear Martin,

As president and founder of Next Advance, Inc., I would like to express my support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. Next Advance develops and manufactures laboratory instruments for molecular biologists. We started in the East Campus Incubator in 2003, and have grown from just me to 12 employees and sales to customers in over 40 countries worldwide. Starting in the incubator and access to the Center for Functional Genomics' core facilities at the University of Albany have been instrumental in our success. We would be very interested in coop training or interns from an instrumentation training program. Students (from other colleges) that have done work for us have been invaluable to us and they have gained very useful experience and knowledge from our veteran technicians and engineers. Developing a program that ensures that a pool of highly trained personnel to fill new technologically demanding positions will be an important growth stimulus. Our invaluable collaborations with CFG have led to one of our product lines, real-world product testing, and development of manufacturing protocols. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force.

We look forward to participating in the training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Sincerely,



Ian Glasgow, PhD, PE
President

cc. Dr. John Tine
Coordinator, Biotechnology Instrumentation Training Program



Dr. Martin Tenniswood
Director, Cancer Research Center
University at Albany, SUNY
CRC 304
1 Discovery Drive
Rensselaer, NY 12144

Dear Martin,

As the CEO of V-Core Technologies Inc. I would like to express my support for the University at Albany's application for a New York State Regional Economic Development Grant.

Several aspects of this application are of significant interest to V-Core Technologies. The Core Facilities located on the East Campus were one of the factors that made this site attractive when locating my company here. I have utilized the services provided by these facilities to a significant extent, and the proposed expansion of the facilities is a positive development that will continue to make this a desirable location for start-up biotechnology companies.

In addition, the proposed undergraduate training program in Biotechnology Instrumentation will help to increase the pool of highly trained personnel in this region available to fill technologically demanding positions in biotechnology research. This will be of great value not only to existing companies, but also will make this region more attractive as a location for new biotechnology ventures and thus will be an important stimulus for growth of this sector.

On behalf of my company I would like to additionally express interest in participating in the proposed co-operative training (internship) program and I am looking forward to receiving additional details.

I look forward to the success of your application, and the continued expansion of the biotechnology infrastructure of the Capital Region.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Enzo Paoletti".

Enzo Paoletti, PhD
CEO, V-Core Technologies, Inc.
Laboratory B210
7 University Place
Rensselaer, NY 12144-12973
Cell # 518 210 8850
Email enzopaol2@gmail.com

cc. Dr. John Tine, Coordinator, Biotechnology Instrumentation Training Program



BREONICS
W.A. Harriman Technology Campus
Bldg 7A, Suite 310
Albany, NY 12206
Phone: 518.213.4670

October 28, 2011

Dr. Martin Tenniswood, Director
Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

RE: development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany.

Dear Dr. Tenniswood,

Please consider this "Letter of Support" for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am a co-founder and Chairman of BREONICS, Inc. a biomedical research and development company that is located on the Harriman State Campus in Albany. The Center for Functional Genomics' Core facilities at the University at Albany will be important to the growth and development of small developing companies such as ours.

Developing a program to generate a pool of highly trained personnel that is readily available to fill new technologically demanding positions will be an important growth stimulus for the region. Our successful collaborations with CFG as well as the College of Nanoscale Science have given us the needed access to technologies that have resulted in our ability to qualify for several large NIH funded grants . We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force.

We look forward to participating in the Training program and witnessing the continued expansion of Biotechnology Infrastructure in the Capital Region.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Ernest M. Green", written over a white background.

Ernest M. Green, Chairman
BREONICS, Inc.

cc. Dr John Tine,
Co-ordinator, Biotechnology Instrumentation Training Program



October 31, 2011

Dr. Martin Tenniswood,
Director,
Cancer Research Center,
1 Discovery Drive,
Rensselaer, NY 12144

Dear Martin,

I would like to express our support for the development of an undergraduate training program in Biotechnology Instrumentation at the University at Albany. I am the founder and CEO of Ultradian Diagnostics, a biotechnology company located on the East Campus. The Center for Functional Genomics' Core facilities at the University at Albany has been important in the growth and development of the startup biotechnology companies on the East Campus of the university. Developing a program that ensures that a pool of highly trained personnel is readily available to fill new technologically demanding positions will be an important growth stimulus. We are particularly excited about the opportunity to participate in the proposed Co-op training program since it will provide an opportunity to identify potential employees who would be excellent additions to our work force.

We look forward to participating in the Training program and seeing the continued expansion of the Biotechnology Infrastructure in the Capital Region.

Yours sincerely,

A handwritten signature in black ink that reads "John Willis". The signature is written in a cursive, flowing style.

John P. Willis, PhD

cc. Dr John Tine,
Co-ordinator, Biotechnology Instrumentation Training Program

Ultradian Diagnostics LLC
5 University Place, Suite A324
Rensselaer, NY 12144-3425

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