WESTERN NEW YORK GENETICS IN HEALTH CARE PARTNERSHIP

A NIH’s Science Education Partnership Award (SEPA) Program: investing in educational activities that enhance the training of a workforce to meet the nation’s biomedical, behavioral and clinical research needs.

http://nihsepa.org

Informational Guide 2015-16

A partnership with University at Buffalo’s Department of Biotechnical and Clinical Laboratory Science

NYS AREA HEALTH EDUCATION CENTER SYSTEM
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716.816.7225
www.ahec.buffalo.edu

http://nihsepa.org
Table of Contents

NYS Area Health Education Center (NYSAHEC) System Background.. 2
Summary of the SEPA Program........................................ 3-4
Overview of the Study Activities .................................... 5
Careers in Bioinformatics & Genomics.............................. 6-8
Letter of Commitment..................................................... 9
Contact Information & Online Resources.............................. 10
Connecting students to careers, professionals to communities, and communities to better health....

Our Mission.
The New York State AHEC System is a workforce development initiative. We focus on increasing diversity by recruiting and training people of all races and ethnicities for careers in health care. Our mission is to enhance access to quality health care and improve health care outcomes by addressing the health workforce needs of medically disadvantaged communities and populations through partnerships between the institutions that train health professionals and the communities that need those most. New York State AHEC System strategies keep skills and talents in the state, contributing to the health of the economy while improving the health and well-being of all New Yorkers.

Connecting students to careers…
From middle and high school students to adults seeking new skills, AHEC program participants learn the real-life roles and rewards of health care occupations. Early exposure sparks interest and sets adolescents on the right academic path. Retraining directs displaced or downsized workers into jobs with a future.

Our vision for better jobs...
New York has more good health care jobs than qualified workers to fill them. In fact, health care is expected to grow more than five times faster than any other field. AHEC encourages and prepares workers to pursue these rewarding positions.

Making New York State a Campus...
Our nine New York State community-based AHECs are recognized leaders in developing a diverse, skilled and committed workforce across all sectors and disciplines of health care. We devote special attention to underserved urban and rural locales, ensuring that each community gets the help it needs.

Why Workforce Diversity Matters...
Quality health care is not about just biology; it is about treating the whole person. Diversity isn’t about just percentages; it is about relating to individuals. The relationship between a health care professional and a patient is influenced by everything from their language and ethnicity to their income and education levels, from their habits and beliefs, to the place where they grew up. The better a provider understands a patient’s culture, the better they will communicate. The more they trust each other, the better the care and the outcomes.

Encouraging young people to pursue health careers...
It’s hard to imagine working in a field without any knowledge or role models. One of our strategies is to guide students into an education “pipeline,” exposing them to the rewards of health care careers as early as possible. This not only encourages interest in health care, it also helps to assure that students take the math and science courses required for acceptance into college or training programs.
Introduction to the Western New York Genetics in Health Care Partnership

The purpose of this research is to develop better ways to teach bioinformatics through the use of hands-on, state-of-the-art bioinformatics tools and create awareness of careers in life science and health care.

The Western New York Genetics in Health Care Partnership is being led by researchers at the University of Buffalo and the New York State Area Health Education Center System. The goal of this project is to create the Genetics in Research in Health Care Partnership in Western New York to serve as a pipeline for recruiting students to careers in life science and health care.

High School Biology teachers from partnering schools will attend a Summer Workshop at the University at Buffalo where they will receive training in use of the GENI-ACT (Genomics Education National Initiative Annotation Collaboration Toolkit). Within each of the High School teachers’ classrooms during the following school year, 5 life science and health care related college and career exploration sessions will be conducted to familiarize their students with the gene annotation project and to give it some “real world” context. Students will develop career plans by the last of these sessions as well as indicate their interest in being part of gene annotation project the later part of the school year. Each teacher will work with at least 7 students from their school, and will participate in genome annotation using the GENI-ACT during the school year. Each spring, a Capstone Symposium will be held, bringing participating students and teachers together to present their projects and network with researchers and employers. Students will be offered support (e.g., scholarship and career information, new internship opportunities) as they enter and progress through college, supporting entry to, and retention in, health care related careers in the region.

GENI-ACT Details

The innovative technology experience for students and teachers used in this project involves a “hands-on” cyber-learning approach, known as GENI-ACT, that will involve participants in a current and global research project while learning basic concepts of biology. The GENI-ACT consists of nine independent modules which includes learning about: DNA Sequencing, Cellular Localization Data, Structure-based Evidence, Enzymatic Function, Gene Duplication/Gene Degradation, Horizontal Gene Transfer, and RNA.

The use of the GENI-ACT modules encourages participants to:

- Use and master multiple database analysis software packages related to bioinformatics.
- Strengthen library and web-search skills.
- Develop skills in making hypotheses and the design of experiments to test them.
- Sharpen skills in analysis, synthesis and in the presentation and interpretation of results.
- Experience the collaborative nature of science.
Department of Biotechnical and Clinical Laboratory Sciences

Research Study

High School Science Teachers Wanted!

“Western New York Genetics in Research in Health Care Partnership”

Purpose: The purpose of this research is to develop better ways to teach bioinformatics through use of hands-on, state-of-the-art bioinformatics tools and create awareness of careers in life science and health care. This project will train teachers in GENI-ACT (Genomics Education National Initiative Annotation Collaboration Toolkit), an innovative technology experience for students and teachers which includes a “hands-on” cyber-learning approach, to increase knowledge of bioinformatics and allow them to gain experience with bioinformatics software for classroom use. The project will expand student understanding of basic bioinformatics and the scientific process through the use of GENI-ACT, and provide ongoing support to students as they pursue life science and health care career plans.

Criteria for participation: High school (grades 9-12) teachers from Allegany, Cattaraugus, Chautauqua, Erie, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Steuben, Wayne, Wyoming and Yates counties/schools categorized as disadvantaged based on the percentage of free/reduced lunch and the percent of students entering college.

Benefits to Teachers: Through the activities of this project, you will participate in an intensive Summer Teacher Workshop led by University at Buffalo faculty who are part of the Education Program of the U.S. Department of Energy’s Joint Genome Institute. This workshop will increase your knowledge of bioinformatics and allow you to gain experience with bioinformatics software for classroom use.

Time commitment: With support from project researchers, participating teachers will:

- July 2015: participate in 5 days of training in on the GENI-ACT.
- Oct. – Dec. 2015: coordinate 5 In Class/After School sessions related to gene basics and health care careers.
- Sept. – Dec. 2015: recruit 14 students – 7 will be randomly selected for the GENI-ACT project.
- January – May 2016: lead a group of 7 students in 5-month GENI-ACT project.

Compensation: Teachers will be paid for training, teaching and preparation, up to $2,137.50 per year, for an expected 85.5 hours of work annually ($25/hr).

Who to contact if you have questions about the research: Stephen T. Koury, PhD, Principal Investigator, University at Buffalo, Department of Biotechnical and Clinical Laboratory Sciences, 26 Cary Hall, Buffalo, NY 14214, 716-829-5188 [stvkoury@buffalo.edu].

A YouTube video with background information relevant to the project can be found at: http://youtu.be/C5bo4alokp4

2015-16 Calendars of Events for Study Activities:

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Study Activity</th>
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<tbody>
<tr>
<td>July 2015</td>
<td>Teachers will participate in GENI-ACT training</td>
</tr>
<tr>
<td>October – Dec. 2015</td>
<td>In class/after school lessons 1-5 will be conducted by your local AHEC center.</td>
</tr>
<tr>
<td>January – May 2016</td>
<td>Students/teachers &amp; WNY Genetics in Research Partnership staff work to complete GENI-ACT modules.</td>
</tr>
<tr>
<td>June 2016</td>
<td>Capstone Symposium at UB</td>
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</table>
What to Expect During the Study School Year

During the beginning of the school year, teachers will work with the local NYS AHEC Center representatives to schedule 5 activities with their students to be completed between October and December 2015. NYS AHEC representatives will present and guide the first 4 activities with the students, and the final activity will be presented by Dr. Stephen Koury a faculty member of UB’s Biotechnical and Clinical Laboratory Sciences. All materials used during these activities will be provided by NYS AHEC.

Below are the activities the students will attend during Semester 1 of the study.

Semester 1: October – December 2015

- **Activity 1**: “Introduction to the Power of Molecular Diagnostics” using a "Disease Detectives" approach and discussion of methodology.

- **Activity 2**: “Specific Application of Molecular Diagnostics to Disease” using cystic fibrosis as an example.

- **Activity 3**: “Ethics of DNA Testing” in which students will be presented with scenarios dealing with ethical issues related to DNA testing and be encouraged to think about the impact it will have on their lives.

- **Activity 4**: “Spotlight on Health Professionals and Genomics” including videos of interviews with those individuals discussing how and why they entered the field. Students will be offered career guidance by AHEC facilitators at the end of this activity as well.

- **Activity 5**: “Applications of Molecular Diagnostics” in relation to microbial infections. This module will include an introduction to the genome annotation activities in Semester

Semester 2: January – May 2016

Teachers and members of the UB WNY Genetic in Research Partnerships Staff will help teachers and students complete a series of a series of GENI-ACT modules as follows:

- Module 1: Basic Information
- Module 2: Sequence Based Similarity
- Module 3: Structure Based Evidence
- Module 4: Cellular Localization
- Module 5: Alternative Open Reading Frame
- Module 6: Enzymatic Function
- Module 7: Duplication and Degradation
- Module 8: Horizontal Gene Transfer
- Module 9: RNA

**June 2016**
A Capstone Symposium will be held at UB, bringing participating students and teachers together to present their projects and network with researchers, educational programs and employers.
Careers in Bioinformatics & Genomics

We're finding new ways to discover our past, solve crimes, restore the environment!

There's a lot more to life sciences than lab coats and test tubes. Western New York's growing industry cluster of more than 125 life sciences companies includes both established and fledging firms, as well as research institutions like Roswell Park Cancer Institute and the Hauptman-Woodward Medical Research Institute. Collectively, these companies and institutions employ more than 10,000 people, and offer job opportunities within these seven Career Pathways:

- Laboratory Sciences
- Engineering
- Information Technology
- Manufacturing
- Quality Control
- Business
- Support

At the beginning of the decade, there were approximately 8,840 medical and clinical laboratory technicians employed throughout New York State. By 2012, there will be approximately 9,680. This represents an increase of 74% jobs each year.

Nationally, employment of clinical laboratory workers is expected to grow to 362,000 by 2016. That is a 14% annual increase, which is faster than average for most occupations.

Source: www.nycareerzone.org

NYS AHEC  http://www.ahec.buffalo.edu

The New York State AHEC System encourages local individuals to pursue careers in health care. To aid with this we have helpful links to a variety of web sites that offer programs for the development of health professionals and to aid students in making a decision to pursue a health career.
What do biomedical informatics companies do?
Biomedical informatics organizations provide products and services that use computers, software and databases to gather, manage, and analyze data for other life sciences and health care companies and institutions. These data can include genetic information, clinical trials or laboratory research information, electronic patient medical records and more.

What types of people do they employ?
Biomedical informatics organizations employ a range of individuals with technical and non-technical backgrounds, including biostatisticians, customer service representatives, computer engineers, administrative assistants, IT support people, accountants, and clinical research associates.

**WNY Bioinformatics Companies & Institutions**

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHRM Inc.</td>
<td>Buffalo, New York</td>
<td><a href="http://www.ahrminc.com">www.ahrminc.com</a></td>
</tr>
<tr>
<td>Celerity LLC</td>
<td>Buffalo, New York</td>
<td><a href="http://www.celerityllc.net">www.celerityllc.net</a></td>
</tr>
<tr>
<td>Angus Buffa &amp; Biochemicals</td>
<td>Niagara Falls, New York</td>
<td><a href="http://www.dow.com/angus">www.dow.com/angus</a></td>
</tr>
<tr>
<td>Buckler Biodefense</td>
<td>Buffalo, New York</td>
<td><a href="http://www.bucklerbiodefense.com">www.bucklerbiodefense.com</a></td>
</tr>
<tr>
<td>Buffalo Clinical Research Center, LLC</td>
<td>Buffalo, New York</td>
<td><a href="http://www.bcr.com">www.bcr.com</a></td>
</tr>
<tr>
<td>CH3 Biosystems, LLC</td>
<td>Buffalo, New York</td>
<td><a href="http://www.ch3biosystems.com">www.ch3biosystems.com</a></td>
</tr>
<tr>
<td>CPL Associates, LLC</td>
<td>Amherst, New York</td>
<td><a href="http://www.cplassociates.com">www.cplassociates.com</a></td>
</tr>
<tr>
<td>Hauptman-Woodward Medical Research Institute</td>
<td>Buffalo, New York</td>
<td><a href="http://www.hwmbuffalo.edu">www.hwmbuffalo.edu</a></td>
</tr>
<tr>
<td>Life Technologies Corporation</td>
<td>Grand Island, New York</td>
<td><a href="http://www.lifetechologies.com">www.lifetechologies.com</a></td>
</tr>
<tr>
<td>Rhenox Inc.</td>
<td>Grand Island, New York</td>
<td><a href="http://www.rhenox.com">www.rhenox.com</a></td>
</tr>
<tr>
<td>Roswell Park Cancer Institute</td>
<td>Buffalo, New York</td>
<td><a href="http://www.roswellpark.org">www.roswellpark.org</a></td>
</tr>
<tr>
<td>United Biochemicals</td>
<td>Sanborn, New York</td>
<td><a href="http://www.unitedbiochemicals.com">www.unitedbiochemicals.com</a></td>
</tr>
<tr>
<td>University at Buffalo</td>
<td>Buffalo, New York</td>
<td><a href="http://www.buffalo.edu">www.buffalo.edu</a></td>
</tr>
<tr>
<td>Zeptronics Corporation</td>
<td>Buffalo, New York</td>
<td><a href="http://www.zeptronics.com">www.zeptronics.com</a></td>
</tr>
<tr>
<td>Empire Genomics</td>
<td>Buffalo, NY</td>
<td><a href="http://www.empiregenomics.com">www.empiregenomics.com</a></td>
</tr>
<tr>
<td>New York State Center of Excellence in Bioinformatics &amp; Life Sciences</td>
<td>Buffalo, NY</td>
<td><a href="http://www.bioinformatics.buffalo.edu">www.bioinformatics.buffalo.edu</a></td>
</tr>
</tbody>
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**Regional Higher Education Institutions**

- Alfred State College
- Bryant & Stratton Business Institute
- Buffalo State College
- Canisius College
- D'Youville College
- Daemen College
- Empire State College
- Erie Community College
- Frewsburg Institute - Rochester
- Genesee Community College
- Hobart College
- Roberts and William Smith Colleges
- Ithaca College
- ITT Technical Institute
- Jamestown Business College
- Jamestown Community College
- Keuka College
- Medaille College
- Monroe Community College
- Nazareth College
- Niagara County Community College
- Niagara University
- Olean Business Institute
- Roberts Wesleyan College
- Rochester Institute of Technology
- St. Bonaventure University
- St. John Fisher College
- SUNY at Brockport
- SUNY at Fredonia
- SUNY at Geneseo
- Trocaire College
- University at Buffalo
- University of Rochester
- Villa Maria College
Genomic & Bioinformatics Career Resources & Links

The National Institute of Health Genomic Careers Resource:
http://www.genome.gov/genomicCareers

The National Human Genome Research Institute (NHGRI) has developed this interactive tool to help students explore the possibilities of finding a fulfilling and rewarding career in a Genetics or Genomic-related field. It is also designed as a resource for counselors and teachers. Through the use of interactive video, this unique tool allows students to listen to professionals explain what they do and what they find inspiring about their work. With many of the interviews, students can choose which question they would like to ask and they take a tour of some of the most cutting-edge facilities in the United States. The interviews and tours are conducted in a fun, light-hearted and engaging manner.

iSciWNY Careers in Life Sciences
http://isciwny.com

iSciWNY is your gateway to the life sciences industry in Western New York. Through this program, you’ll learn about career pathways, types of life sciences companies, available education and training, and more!

The Hauptman-Woodward Institute's High School Apprenticeship Program
http://www.hwi.buffalo.edu/outreach/high_school_program.html

The Hauptman-Woodward Institute's high school apprenticeship program is a unique learning experience that affords area high school students the opportunity to study evolution and bioinformatics in the laboratory of H. A. Hauptman Distinguished Scientist, Dr. William L. Duax. If you are a Buffalo-area high school student, and you would like to join the team working on this exciting project, download an application or contact Dr. Duax for more information at duax@hwi.buffalo.edu

New York State Center of Excellence in Bioinformatics & Life Sciences
http://www.bioinformatics.buffalo.edu

The mission of the University at Buffalo’s New York State Center of Excellence in Bioinformatics and Life Sciences is to foster economic development by connecting university resources with life sciences and high-tech industry through funding, research and development support, programming and education, with the goal of helping companies find business solutions, accelerate new ideas, and grow. This technology-based economic development mission is complemented by the COE’s efforts to support the advancement of new discoveries in science that seek better ways of preventing and managing disease and improving lives.

Bioinformatics at Rochester Institute of Technology (RIT)
http://www.rit.edu/cos/bioinformatics/index.html

Graduates of the RIT Bioinformatics programs have entered such laboratories, both in industry and academia, as bioinformaticists. Some have also gone on to leverage their biotechnology experiences as wet lab experimentalists themselves. RIT offers a combined BS/MS program which can be completed in a total of five years. For those who wish more laboratory experience, they also offer a Molecular Genetics Option with less computer science and more molecular genetics experience.
SEPA RESEARCH PARTICIPANT LETTER OF COMMITMENT

This document serves as a letter of commitment by (print name) ________________________________ to participate as a teacher in the Western New York Genetics in Health Care Partnership Research Project.

Purpose: The purpose of this research is to develop better ways to teach bioinformatics through use of hands-on, state-of-the-art bioinformatics tools and create awareness of careers in life science and health care. This project will train teachers in GENI-ACT (Genomics Education National Initiative Annotation Collaboration Toolkit), an innovative technology experience for students and teachers which includes a “hands-on” cyber-learning approach, to increase knowledge of bioinformatics and allow them to gain experience with bioinformatics software for classroom use. The project will expand student understanding of basic bioinformatics and the scientific process through the use of GENI-ACT, and provide ongoing support to students as they pursue life science and health care career plans.

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Teacher Contact Information:

School Name: ________________________________________________________________

School Address: ______________________________________________________________

Grades & Courses Taught: ______________________________________________________

e-mail: ________________________________________________________________

Cell or home phone: _______________________________________________________

I have read this document and I pledge my commitment to participate in this study. My signature indicates that I am committed to participate in this research project freely, without coercion. I understand that participation in this research is voluntary and that I will not be penalized if I choose not to participate in the research.

Teacher name (please print): ________________________________________________

Teacher signature _________________________________________________ Date _________
LOCAL NYS AHEC CENTERS:

Western New York Rural AHEC Center: 20 Duncan St., Warsaw NY 14569  http://www.r-ahec.org

SEPA in the NEWS:

NIH award will prepare WNY high school students for careers in genetics and genomics
http://www.buffalo.edu/news/releases/2014/09/023.html#sthash.nSadPgj6.dpuf

University at Buffalo Lands $1.2M to Launch Genomics Training for Regional High Schools
https://www.genomeweb.com/university-buffalo-lands-12m-launch-genomics-training-regional-high-schools

Higgins, UB announce $1.2 million grant to help high schools prepare students for careers in genetics, genomics

New program encourages students to study genetics & genomics
http://news.wbfo.org/post/new-program-encourages-students-study-genetics-genomics

A Head Start for Tomorrow’s Scientists:
http://youtu.be/C5bo4alokp4