National Center for the Biotechnology Workforce

www.biotechworkforce.org

Forsyth Technical Community College, NC
NH Community Technical College, NH
Indian Hills Community College, IA
Bellevue Community College, WA
Miracosta Community College, CA

Combining strengths of five premier community colleges from around the nation for new learning models to build our biotech workforce

BCC Bellevue Community College

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National Center Profile:
Bellevue Community College
Life Science Informatics Center of Expertise

www.bcc.ctc.edu/informatics

The President's High Growth Job Training Initiative supports visionary life science sector development sparking action at regional levels. Companies, educators, researchers, entrepreneurs and governments all work together to achieve new levels of innovation. This Profile presents the Life Science Informatics Center - ready to share ideas, resources and assistance at **www.bcc.ctc.edu/informatics**

When the sequences of three billion chemical base pairs in human DNA genes were successfully mapped in 2003, it sent shockwaves through the world. Given enough data and processing power, the ultimate secrets of life can be revealed. Life Science Informatics makes this dream real.

Bellevue Community College, with a strong background in developing skills standards, curricula, and professional development programming in Information Technology (IT), was selected to develop the Life Science Informatics Center of Expertise. Like Microsoft, its partner and neighbor in nearby Redmond, Bellevue Community College (BCC) has entered an entirely new – and rapidly expanding - area of information technology on the ground floor.

"A technology backbone is forming in the Life Sciences and we are working with industry to create learning that supports and advances it," says Patricia Dombrowski, Director of the National Community College Life Science Informatics Center of Expertise. She was formerly vice president, operations, for Norfox Software, and vice president of Comtex Telecommunications. Her informatics team today focuses on industry-driven skills needed to face U.S. economic growth challenges in an increasingly connected world. "Biology has become an information science – and informatics is the driver."

Life Science Informatics Center staff (left to right) Patricia Dombrowski, Christina Semeling, Jennifer Jones, Michèle Royer, Stephanie Tatem Murphy

Forging nearly sixty partnerships with industry (including one with Geospiza, a Seattle-based producer of bioinformatics tools and systems) plus conducting high level focus groups, the BCC bioinformatics team combined resources to publish the first industry validated Life Science Informatics Skills Standards. This work is part of the National Center's strategic plan to create national standards; design curricula for college and high school use nationwide; provide faculty development; offer classroom and flexible on-line training - plus industry trends analysis - for community college use.

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***To harness the power** of biotechnology industry potential – with a skilled, ready workforce – the U.S. Department of Labor Education and Training Administration created the National Center for the Biotechnology Workforce in 2004. Because community colleges are actively involved in meeting the needs of workers and industries in their communities, the National Center focuses energy and investments on five community colleges with different but congruent strengths in the biotechnology industry to create new curricula and infrastructure models that can easily be shared and replicated.*

Starting the Center

Rated one of the top Biotechnology centers in the country, the Seattle region has a strong emphasis on global health care and medical device research and implementation. The area is also a locus for Information Technology organizations and professionals. With resources available in both essential sectors, Bellevue Community College (BCC) is a logical choice for the Life Science Informatics National Center of Expertise.

Enrolling up to 20,000 students per quarter, BCC is the third largest institution of higher education in the State of Washington. It sends more transfer students to four-year schools than any of the other 34 community colleges in the state. Recently named a State Center of Excellence in Information Technology – and with strong leadership from President Jean Floten and Vice President for Workforce Development Paula Boyum – Bellevue used the 2004 investment from the Department of Labor to develop the LSI Center.

Partnerships are crucial to executing High Growth Job Initiative strategies. Bellevue started with a strong industry collaborator in Geospiza, with more than 10,000 bioinformatics customers around the world. Rob Arnold, its president and chief operating officer, says: "We are delighted to see Bellevue Community College become a National Center of Expertise and feel privileged to partner in its development. Bioinformatics provides both the wheels and the highway for life sciences research and discovery."

How to set skills standards

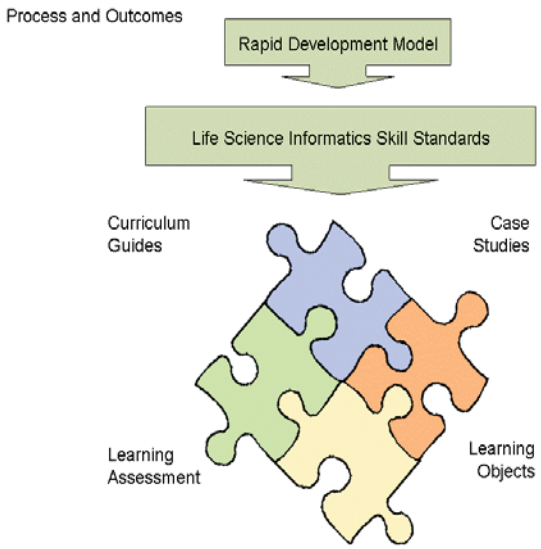
Skill standards are practical descriptions of different jobs and their tasks. Educators use them to create programs that true up with industry and prepare workers with the skills for specific employment.

Current skill standards and curriculum models have limitations in addressing careers in Life Science Informatics. Because of their silo-style design, traditional skill models tend to be narrowly defined. This approach offers little incentive for collaboration and is inadequate in representing informatics tasks that are highly interdependent, complex, and multifaceted in nature. A new method of creating skill standards - modular and flexible - was required to more precisely respond to the unique needs of occupations residing in the convergence of information technology and life science. So BCC created -

At the IT Convergence Zone: A Rapid Development Model for Skill Standards and Curriculum to short cut the traditional process. This tool helps colleges confidently underwrite IT programs that industry supports.

The Rapid Development Model for Skill Standards acknowledges that all industry sectors are infused with Information Technology, necessitating IT-integrated programs in community colleges that mirror the business community. The new model is a framework for skills and knowledge from formerly separate career areas easily combined into an integrated educational program.

In the traditional process, skill standards are fully developed and validated before the curriculum development process begins. Instead, project leader Michele Royer, Ph.D. designed these two phases to overlap. As curriculum elements emerged from discussions and research, their development was initiated. This was enabled in part by the modular design adopted as a model early in the project. Several drafts with increasing levels of detail and formalization were built during the project and were presented to industry for review and refinement.



Key Learning

Partnership is the foundation of this process because each player brings a set of knowledge, resources and perspectives required to achieve complete consensus.

An active and highly cooperative process with industry, including close working relationships with individuals and organizations, was used to develop and finalize required skill standards and education requirements. The Rapid Development guide helps users create skill standards that are economical - because they are quick to develop, implement, and translate into curriculum.

A Rapid Development Model for Skill Standards and Curriculum available at http://www.bcc.ctc.edu/informatics/convergence.htm

Principles guide skill standards development process

- Align curriculum, student activities, and student assessment in educational programs to industry perspectives, occupational skill requirements, and work contexts
- Stress a competency-based approach to curriculum with emphasis on skills and competencies, rather than knowledge
- Provide the basis for an integrated framework to the learning process, integrating technical, work-specific, and soft skills and knowledge

A toolbox full of BioInformatics Teaching - Learning Resources

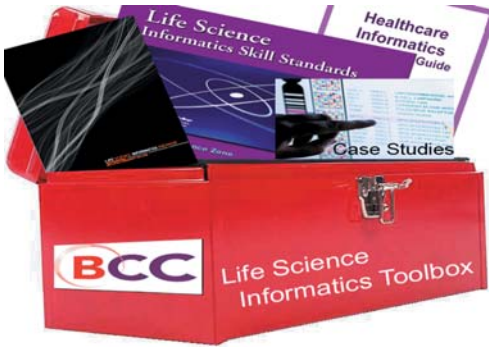
Community and technical colleges seeking a straight forward roadmap to developing curricula on the shifting landscape of Information Technology will be able to apply these innovative models to a wide range of newly emerging informatics professions, not limited to only the Life Sciences. Several community colleges across the country have requested BCC consultation regarding Life Science Informatics program building. The staff is happy to share the products of their partnerships.

Three new publications available for download now at
http://www.bcc.ctc.edu/informatics/lsicresources.htm

At the IT Convergence Zone:
A Rapid Development Model for Skill Standards and Curriculum

Bioinformatics Overview:
A Program Building Resource for Community and Technical Colleges

Life Science Informatics Skill Standards



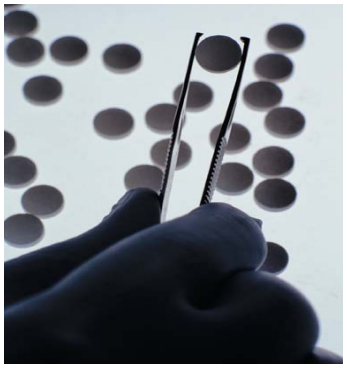
Life Science Informatics Skill Standards

The Life Science Informatics Center of Expertise at Bellevue Community College brought together scientists, administrators, practitioners and academicians from nationally and internationally recognized organizations (see list on page 4) to build the **Life Science Informatics Skill Standards** and resulting curricula.

The Health Information Management Systems Society (HIMSS) and more than 60 other participants assisted in creating the methodology that uses a creative "Scenarios" approach that can be broadly and easily applied. Focusing on Life Science, three new skill standards have been completed: Bioinformatics; Clinical Trials Data Management; and Software Validation in the Life Sciences.

Bioinformatics Curriculum e-Map

Available free to all community and technical colleges in the country is the new **Bioinformatics Overview: A Program Building Resource for Community and Technical Colleges**. This is a creative publication that functions as an exciting "Bioinformatics Curriculum e-Map" offering a novel and accessible format far removed from static, rapidly obsolescing coursework. Elements are aggregated for use in credit and noncredit courses. Their touchstone is a series of durable, stable web resources educators can use to create learning opportunities in a wide range of circumstances.



These learning materials are freely available to all community and technical colleges in the country, as is implementation advice from the Center of Expertise staff.

Useful Skills Upgrade

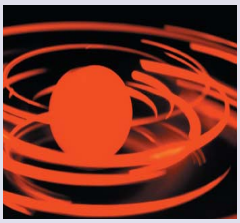
Informatics is a unique challenge to building the workforce because it does not create many new jobs in and of itself; rather, it's become an essential component of all knowledge-based jobs of the new global economy.

The role of the community college is to assist industry in keeping workforce skills current - that means taking existing life science curricula and infusing it with informatics learning.

Bellevue Community College teaches bioinformatics on a non credit basis. This strategy provides learners with ways to upgrade skills to enter into new levels of biotech or to progress in currently held jobs. A healthcare informatics certificate program at BCC targets nurses, pharmacists, therapists and technicians whose jobs are becoming more technology intensive.

Moving Forward

With three major skills standards and curriculum resource publications complete – the products of sustained cooperative efforts – the BCC team is increasing its dissemination work. Bellevue Community College hosts an annual two-state Clinical Informatics Symposium to disseminate grant-funded skill standards and curricula while providing a day of learning and exploration for community college students, informatics practitioners and educators.



Several community colleges across the country have requested BCC consultation regarding Life Science Informatics program building. Among many professional and dissemination projects, BCC lead a panel of national bioinformatics education experts at the BIO-IT Life Sciences Conference in 2006. Director Patricia Dombrowski serves on the Workforce, Education and Training Committee of the Washington Biomedical and Biotechnology Association.

The BCC Life Science Informatics Center also partners with the Bellevue School District, the largest school district in the state, and the Washington Office of the Superintendent of Public Instruction in strategizing informatics infusion in high school programming. Newly developed medical informatics curricula have been repurposed for high school use. On-ramp and articulation concepts are being explored.

Biostatistics Module development is being scoped now: this vital underpinning of biotechnology is often neglected. Industry focus groups rate statistics as one of the essential foundations of the industry, and stress that students need an understanding of statistical methods. Like other curricular elements BCC has developed, the Biostats Module will be useful for credit or non credit courses.

Life Science Informatics Prior Learning Assessment Model: A key intake element to programs in emerging sectors is the ability to pinpoint what a student has previously learned that is included in curriculum. The BCC development team is designing a method for assessing skills, knowledge or competencies acquired through work experience, unrecognized training, independent study, volunteer activities and hobbies. A BCC Bioinformatics Podcast is being created. Clinical Trials Data Management Module development is underway.

An ambitious new initiative to focus on "Visualization Tools for Life Science Informatics," has begun. This use of computer-generated graphics to visually represent information derived from databases or sensors for direct analysis or interpretation is a cutting edge for advanced results in the field.

A pilot for a new "Industry Trends Analysis" program is being designed to centralize current life science informatics developments and resources for efficient use by community colleges.

Informatics is infused in every biomedical and biotechnology pursuit today

Informatics does not stand alone - its power must be harnessed by 21st century enterprises to increase productivity, reduce costs and accelerate business plans. Talented people use informatics to catalyze, facilitate and leverage all available resources, quickly. Understanding and integrating information technology into life science supports success for biomedical and biotechnology employers right now. Efficient exchange of formerly disparate data and information is essential for infrastructure development.

Global genomic and proteomic research exponentially increases the levels of knowledge and potential breakthroughs in health care.

This progress requires new tools and methodologies to manage and analyze.

Community colleges can and - increasingly - do train people to operate these mission-critical tools.

They help store, manage, retrieve, organize, compare, integrate and communicate ever-increasing amounts of data. They take on new challenges in the digitalization of biology and medicine.

Thanks to Sponsors, Partners, Supporters, Participants:

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The National Center for the Biotechnology Workforce is the recipient of a Presidential High Growth Job Training Initiative Grant as implemented by the U.S. Department of Labor's Employment and Training Administration

The National Center for the Biotechnology Workforce
preparing workers for in-demand jobs in high growth, advanced technologies maintaining U.S. competitiveness in our growing global economy.