

# Facts at a Glance

**A new and promising science,** bioinformatics weds biological research with computer science, making way for scientific discoveries from agriculture to technology. At the interface of biology and information technology, bioinformatics uses computers to analyze, link, organize, and visualize complex sets of biological data. Bioinformatics includes tasks like mapping an organism's genome and deciphering the raw data with computer science tools. The products of bioinformatics research yield useful information to combat infectious diseases in humans, plants, and animals.

**Established in July 2000** at Virginia Tech, the Virginia Bioinformatics Institute (VBI) integrates experimental and computational research to increase the understanding of host, pathogen, and environment interactions, collectively known as the "disease triangle." At VBI, researchers collaborate to increase the understanding of molecular, cellular, and environmental interactions that affect human health, agricultural systems, and the environment.

**VBI's transdisciplinary research programs** have leveraged more than \$90 million (as of June 30, 2009) in active extramural funding. Building on Virginia Tech's strengths in life sciences, engineering, computer science, biotechnology, and agricultural research, VBI benefits a vast and varied constituency through cutting-edge research discoveries.

## VBI strives to:

- **Collaborate** to transform biological data into useful knowledge through accessible state-of-the-art informatics tools and software
- **Make** bioinformatic discoveries through cutting-edge research to improve the quality of human life
- **Develop** core laboratory and computational infrastructures available to all researchers on a cost-recovery basis
- **Educate** and train the next generation of diverse, internationally competitive bioinformatic scientists
- **Nurture** economic development in Virginia and beyond.

**The research groups** at VBI involve collaboration across diverse disciplines such as mathematics, computer science, biology, plant pathology, biochemistry, systems biology, statistics, economics and synthetic biology. These groups are developing new experimental techniques, applying existing and novel techniques to complex biological problems, and developing new analytic and theoretical tools to convert biological data into useful knowledge. VBI has over 200 employees, including faculty research staff; administrative, IT, and lab support staff; graduate research assistants; and undergraduate students.

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**VBI's facility** occupies 130,000 square feet on the Virginia Tech campus. The state-of-the-art building is home to principal investigator laboratories, as well as the Institute's core facilities. VBI occupies space in Alexandria, Virginia, as part of Virginia Tech's National Capital Region Operations. This location provides a platform for VBI researchers to interact with counterparts in academia, government, and industry in the metropolitan Washington D.C. area.

**A unique feature** of VBI's infrastructure is the integration of multi-user core facilities that integrate high-throughput data generation (Core Laboratory Facility, CLF) and data analysis (Core Computational Facility, CCF) capabilities. VBI's Core Facilities provide researchers with access to the latest technology platforms as well as to the computational tools needed for extensive analysis of the resulting data sets.

#### **Core Laboratory Facility**

The Core Laboratory Facility (CLF) is a multi-user, cost recovery production facility that brings industrial-scale biotechnologies for the analysis of DNA, RNA, and proteins to colleagues at Virginia Tech and the Commonwealth of Virginia, as well as an international client base. The CLF also provides a test bed for emerging technologies from sample handling and processing, to data production and data handling steps.

#### **Core Computational Facility**

The Core Computational Facility (CCF) provides high performance computing, data storage, and infrastructure, as well as higher-level services to enhance scientific capabilities for researchers. The CCF houses powerful supercomputers, including a Sun Microsystems Sunfire 15000. The facility provides over 160 terabytes of combined disk and tape storage.

**Outreach and education programs** at VBI present bioinformatics research and education to the larger community. Through educational partnerships, VBI hopes to foster interest and create new, useful skills in the scientists of tomorrow. Outreach and education programs offered by VBI:

- **Provide research** and learning experiences for students
  - **Create partnerships** with teachers to develop teaching resources
  - **Establish** a recruiting pipeline for those interested in bioinformatics careers
  - **Provide bioinformatics** research and educational experiences in bioinformatics for underrepresented groups and women
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**VBI's NDSSL** (Network Dynamics and Simulation Science Laboratory) pursues an advanced research and development program for interaction-based modeling, simulation, and associated analysis, experimental design, and decision support tools for understanding large biological, information, social, and technological systems. Extremely detailed, multi-scale computer simulations allow theoretical and experimental investigation of these systems.