

LIFE SCIENCES AND BIOENGINEERING

Introduction

UMBC's full complement of Life Sciences programs, from bachelor's to doctoral degrees, are widely recognized for their emphasis on research, scientific approach, faculty contact and extensive lab offerings. The growing trend toward interdisciplinary and interdepartmental work enhances the UMBC Life Sciences potential for collaboration in research, research training and teaching.

Programs in the Life Sciences



Biological Sciences

Dr. Lasse Lindahl, Chair
lindahl@umbc.edu

Faculty: 32

Faculty Areas of Expertise:

- Molecular, Cellular and Developmental Biology
- Neurobiology
- Physiology
- Ecology and Environmental Biology
- Bioinformatics



Chemical and Biochemical Engineering

Dr. Govind Rao, Chair
grao@umbc.edu

Faculty: 10

Faculty Areas of Expertise:

- Fermentation scale-up
- Fungal proteomics
- Regulatory issues and GMPs
- Protein purification using chromatofocusing
- Microbial adhesion to collagen and tissue
- Neural disease progression in a tissue culture model
- Prion assay development
- Green manufacturing and bioresource (chitosan) development
- High throughput Bioprocessing
- Low-cost optical sensors



Chemistry and Biochemistry

Dr. Ralph Pollack, Chair
pollack@umbc.edu

Faculty: 23

Faculty Areas of Expertise:

- Structural Biology
- Bioanalytical Chemistry
- Protein and Enzyme Biochemistry
- Medicinal Chemistry and Toxicology
- Laser Spectroscopy

Research Facilities

The departments in the Life Sciences and Bioengineering have extensive facilities for research, including:

- Automated DNA Sequencing
- Adsorptive Separations
- Bio-optics
- Bioseparations
- Flow Cytometry
- Tissue Engineering
- A \$12.2-million reconstruction of the 62,640 square feet Biological Sciences building, which included the addition of a biology tutorial center, a research presentation room, a graphics shop, an aquaria center and expanded research space.
- 10,000 square feet of research space is available in the \$30-million Engineering and Computer Science building and recently renovated Technology Research Center. These provide facilities for cloning through purification of various biological products.
- A \$30-million, two-year Chemistry and Biochemistry building renovation will upgrade the research laboratories, and add approximately 20,000 square feet of research space.
- 35,000 square feet of wet laboratory space in the techcenter@UMBC

State-of-the art equipment includes:

- X-ray crystallography system
- Fourier transform ion cyclotron resonance mass spectrometer
- Femtosecond laser system
- Electron paramagnetic resonance spectrometer
- High-vacuum evaporator/sputterer
- Nuclear Magnetic Resonance (800 MHz, two 600 MHz, 500 MHz and 400 MHz)
- Autoclave, glass warewasher, -80°C freezers, refrigerators, centrifuges (techcenter@UMBC location)

Recent Collaborations

Dr. Suzanne O. Rosenberg (Biological Sciences) with the Department of Defense (Army) Conducting applied research in tumor cells and immunology related to breast cancer and Directing an undergraduate training program in Breast Cancer research.

Dr. Charles Bieberich (Biological Sciences) with the National Institutes of Health Conducting research in prostate cancer.

Dr. Bill LaCourse (Chemistry) with Becton Dickinson Developed specific chemical assays for clinical diagnostic testing.

Dr. Govind Rao (Chemical Engineering) with Merck Developed novel optical bioprocess monitoring techniques.

Research Centers

Bioinformatics Research Center

Howard Hughes Medical Institute at UMBC

Interactive Systems Research Center

Laboratory for Healthcare Informatics

University of Maryland Biotechnology Institute

User System Environment Research (USER) Laboratory

Highlights

A new **Bioinformatics Research Center** has been established through a coalition between biology faculty and colleagues in other UMBC departments, the University of Maryland Biotechnology Institute and the University of Maryland, Baltimore.

Dr. Michael Summers, investigator of **Howard Hughes Medical Institute** at UMBC is primarily engaged in the research on application of nuclear magnetic resonance (NMR) to studies of the structure and function of proteins and macromolecular interactions.

Dr. Summers accepted the 2000 **Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring** from President Clinton. He was one of 10 national recipients of the award.

www.umbc.edu/academics/research



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A Look Ahead: Futures in Biomedical Research

UMBC's annual scientific symposium, A Look Ahead, is a one-day conference focusing on the future of research in the biomedical industry. A Look Ahead VI featured a visionary perspective from **Dr. David Baltimore**, president of California Institute of Technology and Nobel Laureate virologist, **Dr. Polly Matzinger**, section head of the National Institute of Allergy and Infectious Diseases, and, vice president of BioProcess R&D of Merck.

Previous speakers include luminaries like:

Dr. Thomas Cech, president, HHMI

Dr. Claire Fraser, president, Institute of Genomic Research

Dr. Craig Smith, chairman and CEO, Guilford Pharmaceuticals

Dr. Sol Snyder, Johns Hopkins University

Dr. Shirley Tilghman, president, Princeton University

Dr. Craig Venter, former president, Celera Genomics

Technology Transfer Success

The Office of Technology Development helps to turn academic research into commercial products by identifying student and faculty technologies and ideas, and facilitating cooperative agreements between the university, business and industry.

The Chronicle of Higher Education
July 19, 2002

- Sixth in the number of inventions disclosed relative to research spending (out of 118 institutions in this analysis)
- Ninth in the number of patent applications filed relative to research spending

www.umbc.edu/otd

About UMBC

The University is a thriving center for research and development and technology commercialization. Campus research grants and training contracts have topped \$85.5-million, up from just \$10-million nine years ago. Patent applications by UMBC researchers have more than quadrupled in the three years and more than 125 University-developed technologies are available for licensing.

Adjacent to the campus, the techcenter@UMBC is a magnet for high-technology business development and offers a dynamic, fully-equipped facility for start-up and emerging companies. Its specialized environment promotes strategic alliances among tenants and connections with UMBC faculty, students and external companies in the region. UMBC is a member of Internet 2 with high-speed Internet connectivity.

A Region of Opportunities

The Baltimore-Washington corridor has a large concentration of life sciences research institutions and industry. Maryland's growing life sciences industry has more than 5,500 biotechnology jobs and another 3,400 jobs in pharmaceuticals.

A distinct advantage of being in the bwtech@UMBC Research and Technology Park is the proximity of the campus to other prominent research institutions. UMBC's convenient, suburban location 15 minutes from downtown Baltimore and 30 minutes from the Washington, D.C. beltway offers exciting opportunities for research collaboration with industry and government agencies, access to outstanding seminar speakers, and a wealth of cultural and recreational activities.



1. Naval Research Lab
2. Library of Congress
3. Smithsonian Institution
4. National Institutes of Health
5. National Institute of Standards and Technology/Center for Advanced Research in Biotechnology
6. University of Maryland College Park/Center for Agricultural Biotechnology
7. United States department of Agriculture
8. NASA Goddard
9. Patuxent Wildlife Research Center
10. BWI Airport
11. Johns Hopkins Hospital
12. Christopher Columbus Center / Center of Marine Biotechnology
13. National Aquarium of Baltimore
14. UM School of Law
15. UM Medical Center/Center for Medical Biotechnology
16. BD Diagnostic Systems
17. Maryland Psychiatric Research Center

Contact Information

Ellen Hemmerly, Executive Director

UMBC Research Park Corporation

410-455-8400
hemmerly@umbc.edu

www.bwtechUMBC.com