WPI approaches life sciences research in a collaborative way, driven by a desire to solve important problems that often cross departmental boundaries. The Life Sciences and Bioengineering Center houses six academic departments and over 50 faculty members.

Research

Regenerative Medicine
- Biomechanics (Billiar, Gaudette, Pins, Rolle, Troy, Wen)
- Stem cell biology and engineering (Dominko, Gaudette, Jain, Page)
- Tissue engineering (Billiar, Dominko, Gaudette, Jain, Peterson, Pins, Rolle, Wen)
- Biomaterials (Billiar, Camesano, Gaudette, Jain, Peterson, Pins, Rolle)
- Mechanobiology (Billiar, Wen)

Bioreactors, Bioprocessing, Bioseparations
- Bioreactors—Tissue and Plant (Billiar, Gaudette, Lambert, Rolle, Weathers)
- Pichia, S. cerevisiae, E. coli expression systems (BioProcess Center, Prusty-Rao)
- Fermentation development and optimization (BioProcess Center, Prusty-Rao)
- Biofuels/bioenergy (Clark, Deskins, Prusty-Rao, Thompson, Weathers)

Medical Diagnostics
- Biomedical instrumentation (Chon, Mendelson)
- Telediagnostics (Chon, Mendelson)
- Biosensors (Camesano, Iannacchione, Jain, Lambert, Mendelson, Su, Zhou)
- Signal processing (Chon, Flaherty, Mendelson)
- Neutron tomography (Medich)

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Healthcare Delivery
- Health information technologies (HIT), care delivery modeling and design, healthcare analytics (Bar-On, Johnson, Strong, Tulu)
- Mobile health (Chon, Mendelson)

BioInformatics and Computational Biology
- Biostatistics, statistical genetics and genomics (Flaherty, Wu)
- Biological and biomedical data mining (Flaherty, Ruiz)
- Visual analytics of biological data (Ward)
- Simulation of biological systems (Ryder, Troy, Ward)
- Pharmacokinetic and pharmacodynamic modeling (Kaminski)

Biomedical Imaging and Spectroscopy
- Fluorescence spectroscopy and lifetime methods (Connors, Gericke, Lambert)
- Spectroscopic imaging (Lambert)
- Time-resolved imaging (Lambert)
- IR chemical imaging (Gericke)
- Deconvolution imaging (Duffy)
- Atomic force microscopy (Camesano, Wen)
- Total internal reflection/single molecule fluorescence microscopy (Gericke)
- Confocal (Tuzel, Vidali)
- MRI for diagnostics of traumatic brain injury (Jain)
- Quantitative CT image analysis (Troy)
- Contrast agents (Su)

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Membrane and Matrix Biology
- Extracellular matrix/cell wall biology (Billiar, Camesano, Duffy, Gericke, Politz, Prusty-Rao, Rolle, Wen)
- Lipid biochemistry, self-assembly (Duffy, Gericke, Iannacchione, MacDonald)
- Membrane proteins (Arguello, Dempski, Dominko, Duffy, Gericke, Iannacchione, Jain, Kaminski, Page, Ryder, Stroe, Tuzel)
- Protein structure/function and polymerization (Arguello, Dempski, Gericke, Kaminski, Iannacchione, Stroe, Vidali)

Therapeutics Screening and Development
- Delivery, nanomedicine, screening, testing (Camesano, Dittami, Duffy, Gericke, Jain, Kaminski, Prusty-Rao, Stroe, Su, Weathers, Zhou)
- High throughput microfluidics (Albrecht, Srinivasan, Zhou)
- Radiation therapy (Su)
- Cancer nanotechnology for early detection and enhanced delivery (Su)

Neuroscience and Neuroengineering
- Degenerative disease/regenerative processes (Adams, Duffy, Jain, Lambert, Pins, Stroe)
- Neuronal cell biology (Albrecht, Srinivasan)
- Developmental neuronal biology (Ryder)
- Biomaterials for neuron applications (Jain, Su, Zhou)
- Behavioral biology (Duffy, Gegen, Matthews)
- Traumatic brain injury and stroke (Jain, Su)
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Uniquely positioned within a world-renowned research university
Core Facilities

The Core Facilities at the Life Sciences and Bioengineering Center (LSBC) at Worcester Polytechnic Institute are available for internal and external use on a fee-for-service basis.

**Microscopy/Histology**
The Microscopy/Histology Core provides users the opportunity to image live, fixed, unlabeled, or fluorescently labeled samples.

- Leica SP5 Point Scanning Confocal/DMI6000 inverted
- Zeiss Axiovert 200M inverted
- Eppendorf Transfer Man NK2 micromanipulators
- Burleigh piezo
- Narishige Micro forge and beveler
- Atomic Force microscopes
- Accuri flow cytometer
- Patch-clamping electrophysiology
- Leica cryostat and microtome
- Total internal reflection fluorescence microscope
- Shandon Hypercenter XP tissue processor

**Instrumentation Core**
The Instrumentation Core provides users the opportunity to access sophisticated analytical capabilities to characterize chemical and biological compounds.

- Bruker Biospin Digital NMR spectrometer
- Bruker AXS single crystal x-ray diffractometer
- Bruker AXS powder x-ray diffractometer
- Agilent LC/MS System 6130 Series quadrupole
- Agilent GC/MS System 5975 Series quadrupole
- BrukerOptics FTIR Spectrometer Vetex70
- Varian atomic absorption spectrometer
- Applied Biosystems qPCR

**BioProcess Center**
The WPI BioProcess Center at Gateway Park is equipped with state-of-the-art facilities and skilled scientists leading customized, small-scale bioprocess services. With a highly qualified team designing and applying scalable processes, WPI has been helping industry partners get their research to market faster since the early 1990s.

- NBS Bioflo 3000 fermentors (5L/10L)
- Sartorius 100L fermentor
- NBS Celligen BLU cell culture bioreactors (5L/10L)
- NBS shaker incubators
- Microfluidizer M-110Y for cell disruption
- Pilot scale Homogenizer
- Virtis Shelf Lyophilizer
- Multiple small scale TFF Systems
- Millipore Pro-Flux TFF system
- GE AKTAprime
- Agilent (1200 Series) HPLC

**Vivarium**
The Vivarium is a 3,500 square foot facility that houses small rodents and aquatics. The facility has 8 housing rooms including a quarantine room and a barrier facility, 2 procedure rooms, laboratory, cage wash room, and a shower.

- 3500 square foot AAALAC accredited facility
- Rodents, aquatic animals
- 8 housing rooms and 2 procedure rooms

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