

MS Degree Programs in Mechanical Engineering

MS degree specializing in Biology and Bio-inspired Engineering



Enhance your resume with a Northwestern MS degree specializing in Biology and Bio-inspired Engineering.

This research area reflects the increasingly tight relationship between engineering and the study of biological systems. Techniques from engineering often provide substantial insight into biological problems, while biology simultaneously inspires new engineering developments. Faculty in this research area work on both sides of this duality. For example, several labs are developing artificial sensors that model vertebrate hair-cells, whiskers, and electrosensors. These sensors are then used to study basic biological questions and to advance engineering capabilities.

There are several possible themes within the biological and bio-inspired engineering speciality: Neurobiology, Biomechanics, Biomaterials, Robotics for Rehabilitation and Surgical Assistance, Nanoscale Biotic-Abiotic Systems., Biologically-inspired sensors and sensing.



Faculty active in Biological and Bio-inspired Engineering:

Neural engineering: M. MacIver and M. Hartmann

Human Movement and Neurorehabilitation: J. Patton

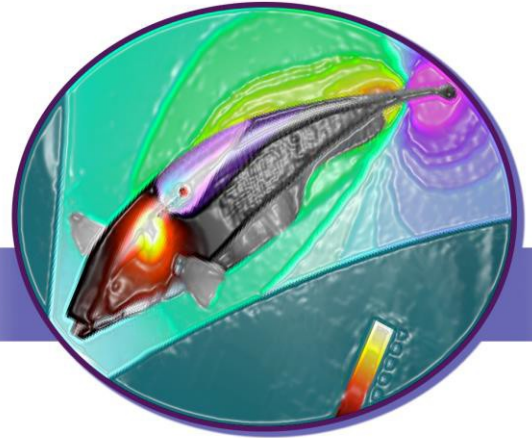
Nanomedicine, Bionanotechnology, Drug Delivery, Biosensing:

D. Ho, S. Ghosal and N. Pantankar

Rehabilitation and Surgical Robotics: J. E. Colgate,
K. M. Lynch, and M. Peshkin.

Implant Materials: C. Brinson

Bio-inspired Materials: H. Espinoza



- ❖ Hands-on courses and projects
- ❖ State-of-the-art labs
- ❖ Focused advanced study in Biological Applications
- ❖ 3-quarter course only, or 5-quarter with project programs
- ❖ Optional “mini-MBA” certificate Program
- ❖ Starting salaries with MS \$10k higher than with BS (2007, National Association of Colleges and Employers)



For the thesis option, all nine of the required courses must be 300-level or above, at least five must be ME courses, and at least five must be 400-level. For the course-only option, 11 courses are required of which at least seven must be ME courses. To satisfy the breadth requirement, one course must be taken from three of the following six areas: Solids, Fluids, Biomedical/Biology, Design/Manufacturing/Tribology, Robotics/Controls, and Mathematics/Sciences.

Biological and Bio-inspired Engineering ME courses:

ME 389 Molecular Machines in Biology
 ME 420 Micro and Nano Scale Fluid Dynamics
 ME 462 Sensory Acquisition
 ME 489 Selected Topics in Cellular-Level Transport
 ME 495 Neuromechatronics
 ME 495 Computational neuromechanics and neuroethology

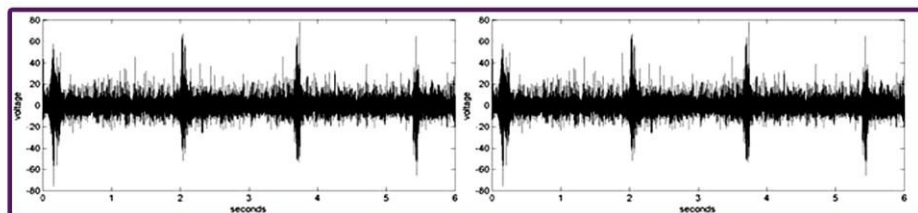
Selected Nanotechnology courses in other departments:

BME 317 Biochemical Sensors
 BME 380 Biomedical Transducers and Instrumentation
 CEE 411 Micromechanics
 CHEM 448 Computational Chemistry
 ChBE 367 Fabrication of Microelectronic Devices
 ChBE 379 Intro to Computational Biology
 EECS 388 Microelectronic Technology
 EECS 381 Electronic Properties of Materials
 EECS 384 Solid State Electronic Devices
 EECS 401 Fundamentals of Electronic Devices
 ESAM 495 Interdisciplinary Nonlinear Dynamics
 ESAM 346 Modeling and Computation in Science and Engineering
 MSc 340 Ceramic Processing
 MSc 355 Electronic Materials
 MSc 361 Crystallography and Diffraction
 MSc 376 Nanomaterials
 MSc 380 Surface Science
 MSc 415 Fundamentals of Thin Film Materials
 MSc 434 Fracture of Materials
 MSc 455 Solid State Physics of Nanomaterials
 PHYS 422-1,2,3 Solid-State Physics



Additional course information available at these webpages:

ME courses: <http://www.mech.northwestern.edu/web/courses/index.php>
 BME courses: http://www.bme.northwestern.edu/current/graduate/course_descriptions.html
 ChBE courses: <http://www.chem-biol-eng.northwestern.edu/gradpgm/courses/>
 EECS courses: <http://www.eecs.northwestern.edu/academics/course/>
 ESAM courses: http://www.esam.northwestern.edu/courses/course_listing.html



In addition to Biology and Bio-inspired Engineering, MS degrees with other specialization options are available.

For more information contact:

Dr. Manohar Kulkarni, Assistant Chair, Department of Mechanical Engineering
 Email: manohar.kulkarni@northwestern.edu, Phone: 847-467-6741