

NCN Nano-Devices for Medicine and Biology

This NCN theme seeks to extend the understanding and computational tools developed in the Nanoelectronics and NEMS themes and apply them to the development of devices for medicine and biology. The long-term vision is to develop a full hierarchy of coupled models and simulations that constitute a true multiscale approach to the analysis and design of biological, bio-inspired, and bio-analytical systems. In the same way that the Nanoelectronics and NEMS themes study the behavior of individual devices in order to design a system with complex input-output behavior, we seek a detailed understanding of the behavior of biomolecular elementary components – to manipulate, for example, membranes and proteins to realize bio-inspired systems. In addition to these ‘bio-for-nano’ systems, we also explore ‘nano-for-bio’ systems like electronic biosensors for applications in genomics and proteomics. The work of this theme directly leverages the work of the Nanoelectronics and NEMS themes and brings in the perspectives and techniques of computational biology as well. The focus is an exploratory one that seeks to engage engineers, physical scientists, and biologists in the exploration and development of new kinds of devices for applications in medicine and biology. The educational resources and tools being developed specifically address the challenges and opportunities of connecting these communities. Major programs funded by NIH and NSF at Illinois, Northwestern, and Purdue support the research research activities that this NCN theme leverages.

This page is a starting point for nanoHUB users. It lists a few resources developed or recommended by the NCN Nano-devices team. You can find other resources by browsing through the list with the tags [nano/bio](#) or [nanomedicine](#), or by using the nanoHUB search box to locate other resources.

Selected Resources

- [NCN Nano-Devices for Medicine and Biology: Tutorials](#)
- [NCN Nano-Devices for Medicine and Biology: Research Seminars](#)
- **Short course:** [An Introduction to BioMEMS and Bionanotechnology](#)
- **Course:** [BME 695N: Engineering Nanomedical Systems \(Fall 2007\)](#)
- **Course:** [Illinois Physics 498: Introduction to Biological Physics](#)
- [NCN Nano-Devices for Medicine and Biology: Simulation Tools for Education](#)
- [NCN Nano-Devices for Medicine and Biology: Simulation Tools for Research](#)

Special Initiatives

Recommended Links

- **Educational Tutorial:** [Modeling Ion Channels Using Poisson–Nernst–Planck Theory as an Integrated Approach To Introducing Nanotechnology Concepts: The PNP Cyclic Peptide Ion Channel Model](#),
B. Radak, H. Hwang, and G.C. Schatz, J. Chem. Ed. **85**, 744 (2008)
- [NIH Roadmap for Medical Research – Nanomedicine](#)

- [National Center for Design of Biomimetic Nanoconductors](#)

Starting Resources for those New to Biology

- [BioEd Online: Resources for Biology Teachers](#)
- [Atlas of the Human Body](#)
- [Principles of Surface Plasmon Resonance \(SPR\) Bio-sensing\]](#)
- [Discovering Biology in a Digital World: A good blog](#)
- [Animated Tutorials on Molecular Biology](#)
- [Immunoassay Animations](#)