https://nanohub.org/topics/SummerSchool2012

NCN Summer School 2012

Electronics from the Bottom Up

WHAT:

NCN's Electronics from the Bottom Up (EBU) is an innovative educational initiative co-sponsored by Intel, NCN, and Purdue University – to introduce students to new ways of thinking about electronic materials and devices. New concepts and approaches, emerging from current research on nanoscience, are applied to non-equilibrium problems like nanoscale transistors, energy conversion devices and bio-sensors. Lectures are designed to be broadly accessible to students with a BS in engineering, physics, and chemistry. The goal is to provide students with a deeper understanding of how structures at the atomistic and nanoscale affect performance at the micro and macrosopic scales. EBU shows students how a broad understanding of fundamental concepts helps understand cutting edge research in nanoscience and technology.

Please register @ www.conf.purdue.edu/nano

WHEN:

July 16-20, 2012

WHERE:

Purdue University – Burton Morgan Bldg. 121
West Lafayette, IN, USA

WHO:

Graduate students, faculty, and industry professionals working on electronic materials and devices. The Summer School will be an intensive and collaborative experience.
Attendance is limited to fifty participants.

TOPIC:

The 2012 Summer School will feature a series of lectures on electron transport in Nanotransistors, combined with lectures and hands-on tutorials using the NEMO5 nanoelectronic modeling software. Another set of lectures will show researchers, educators, and students how to take advantage of the nanoHUB.org, a cyberinfrastructure for science.

"Great lecturers - they are best in the world!"

"What I like most are the opportunities to talk with the professors one-on-one."

"The breadth and variety of lectures was excellent."

"The summer school taught me that things aren't as difficult as they seem to be."

- Participants, 2011

LEARN MORE

Explore NCN's Electronics from the Bottom Up and previous summer school materials at:
http://www.nanohub.org/topics/electronics_from_the_bottom_up

For a related initiative that expands Electronics from the Bottom Up beyond electronics, see nanoHUB-University at: **http://www.nanohub.org/u**

July 16-20, 2012, Curriculum at-a-glance

CURRICULUM

Rapid Application Deployment:

Lecture 1: Introducing the Rappture Toolkit (McLennan)
Lecture 2: Rappture: What's Under the Hood? (McLennan)
Lecture 3: More Rappture Objects (McLennan)
Lecture 4: Uploading and Publishing New Tools (McLennan)

Semiconductor Physics:

Lecture 5: Lessons of Nanoelectronics (Datta)
Lecture 6: Quantum Transport (Datta)
Lecture 7: Single Impurities (Klimeck)
Lecture 8: Band to Band Tunneling (Klimeck)
Lecture 9: Introduction to Transistors (Lundstrom)
Lecture 10: The Landauer Approach to Transport (Lundstrom)
Lecture 11: The Ballistic Nanotransistor (Lundstrom)
Lecture 12: Scattering in Nanotransistors (Lundstrom)
Lecture 13: MOSFET below 10 nm Channel Lengths (Lundstrom)

Device Modeling with NEMO5:

Lecture 14: NEMO5 Introduction (NEMO5 Team)
Tutorial 1: NEMO5 Technical Overview (NEMO5 Team)
Tutorial 2: NEMO5 Input and Visualization (NEMO5 Team)
Tutorial 3: NEMO 5 Models (NEMO5 Team)
Tutorial 4: Device Simulation – Graphene (NEMO5 Team)
Tutorial 5: Device Simulation – Quantum Dots (NEMO5 Team)
Tutorial 6: Device Simulation – Transistor (NEMO5 Team)

INSTRUCTORS

Supriyo Datta is the Thomas Duncan Distinguished Professor of Electrical and Computer Engineering at Purdue University. His unique approach to the problem of quantum transport combining the non-equlibrium Green function (NEGF) formalism of many-body physics with the Landauer formalism from mesoscopic physics has been widely adopted in the field of nano-electronics.

Mark Lundstrom is the Don and Carol Scifres Distinguished Professor of Electrical and Computer Engineering at Purdue University. He uses theory, modeling, and computer simulation to explore the physics and ultimate limits of electronic devices. Lundstrom is known for his pioneering studies of carrier transport in nanoscale transistors.

Gerhard Klimeck is the Director of the Network for Computational Nanotechnology at Purdue University and a Professor of Electrical and Computer Engineering. His research interests inlcude the modeling of nanoelectronic devices, parallel cluster computing, and genetic algorithms. He was the lead architect of the first CAD tool for quantum devices, NEMO1D, and his group is currently developing NEMO5 for simulating quantum transport in nanodevices.

Michael McLennan received a Ph.D. in 1990 from Purdue University for his dissertation on dissipative quantum mechanical electron transport in semiconductor heterostructure devices. He went on to work at Bell Labs and Cadence Design Systems, where he developed many CAD tools for semiconductor device and process simulation. He joined the nanoHUB.org team in 2004 and is now the director of the HUBzero Project at Purdue.

Tillmann Kubis is a Research Assistant Professor in the Network for Computational Nanotechnology at Purdue. His research interests are the modeling of realistic charge, spin and heat transport in semiconductor nanodevices and optoelectronics using numerical implementations of the nonequilibrium Green's function formalism.

Jean Michel Sellier is a Research Assistant Professor in the Network for Computational Nanotechnology, Purdue. He is one of the core developers of NEMO5, a NanoElectronic MOdeling simulator. His research focuses on the simulation of Schroedinger-Poisson systems in both stationary and transient phases.

Michael Povolotskyi is a Research Assistant Professor in the Network for Computational Nanotechnology at Purdue. His research interests include the modeling of semiconductor nanostructures, devices, and high-power computing. He is a coauthor of electronic modeling software nextnano3, TiberCAD, and NEMO5.

Jim Fonseca is a Postdoctoral Research Associate and a core developer of NEMO5. He developed software to study ionic selectivity in ion protein channels using Monte Carlo simulations as a postdoc at Rush University before joining the Klimeck group. He is interested in developing software for scientists.