



# 2013 GEM4 BioNanotechnology Summer Institute

## Cancer Nanotechnology and Cellular Mechanics

an NSF-IGERT  
and NIH-CNTC  
collaboration

July 29 - August 9, 2013

University of Illinois at Urbana-Champaign

## Summer Institute Program

**Venue: Micro and Nanotechnology Laboratory (MNTL); First Floor Atrium and Room 1000  
University of Illinois at Urbana-Champaign**

208 N. Wright Street, Urbana, IL 61801  
Phone: 217-333-3097 and 217-244-1353

The overall objective of the 2013 Summer Institute is to enhance the ability to address overarching challenges in the areas of Cancer Nanotechnology and Mechanobiology. Highly interdisciplinary in nature, the Institute will offer faculty expertise from biology, engineering, materials science, and nanotechnology through a combination of lectures and hands-on lab experiences.

<http://nano.illinois.edu/bionano2013/>

*Intended audience: senior undergraduates, graduate students, post docs, and faculty members from engineering, physical sciences, and biological sciences who are interested in state-of-the-art interdisciplinary research at the intersection of engineering and biology*

Rev. 8/9/2013 4:40 PM

### Monday, July 29

- 7:00-8:30 AM **Registration and Breakfast**
- 8:30-8:40 AM **GEM4 Background and History**  
*K. Jimmy Hsia, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign*
- Welcome Remarks**  
*Andreas C. Cangellaris, Dean, College of Engineering, University of Illinois at Urbana-Champaign*
- 8:40-8:50 AM **nano@Illinois: Center for Nanoscale Science and Technology (CNST)**  
*Rashid Bashir, Director, MNTL, University of Illinois at Urbana-Champaign*
- 8:50-9:00 AM **Summer Institute Evaluation**  
*Lizanne Destefano, Director, I-STEM, University of Illinois at Urbana-Champaign*  
*Ayesha Tillman, College of Education, University of Illinois at Urbana-Champaign*
- 9:00-9:20 AM **Student Introductions**
- 9:20-9:30 AM **2013 BioNanotechnology Summer Institute Logistics**  
*K. Jimmy Hsia, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign*  
*Laura Miller, Program Manager, University of Illinois at Urbana-Champaign*

- 9:30-10:30 AM **Participant Choice Introductory Lecture**
- A Brief Overview of Cell Biology: Focus on Biomolecules and Their Contribution to the Mechanical Properties of Cells, Part I – Room 1000 MNTL**  
*Scott Siechen, Natural Sciences, Parkland College*
- Introduction to Mechanics for Biologists, Part I – Room 2003 MNTL**  
*K. Jimmy Hsia, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign*
- 10:30-10:45 AM **Discussion**
- 10:45-11:00 AM **Break**
- 11:00 AM-12:00 PM **Participant Choice Introductory Lecture**
- A Brief Overview of Cell Biology: Focus on Biomolecules and Their Contribution to the Mechanical Properties of Cells, Part II – Room 1000 MNTL**  
*Scott Siechen, Natural Sciences, Parkland College*
- Introduction to Mechanics for Biologists, Part II – Room 2003 MNTL**  
*K. Jimmy Hsia, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign*
- 12:00-12:15 PM **Discussion**
- 12:15-1:15 PM **Lunch**
- 1:15-1:30 PM **Connect with Lab Leaders/TAs and find lab module locations**
- 1:30-5:30 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

## Tuesday, July 30

- 7:30-8:30 AM **Breakfast**
- 8:30-10:00 AM **Microfluidics and Nanotechnology: from Lab on Chip to Building with Cells**  
*Rashid Bashir, Electrical and Computer Engineering, and Bioengineering, University of Illinois at Urbana-Champaign*
- 10:00-10:20 AM **Discussion**
- 10:20-10:40 AM **Group Photo**
- 10:40-11:00 AM **Break and Setup for Speed Networking**
- 11:00 AM-12:30 PM **Speed Networking: Get to Know Your Class Members Professional Interests**
- 12:30-1:30 PM **Lunch**
- 1:30-5:30 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

## Wednesday, July 31

- 7:30-8:30 AM **Breakfast**
- 8:30-10:00 AM **Intro to Intellectual Property, Patents, and Technology Transfer: Commercializing your Scientific Research and Innovations**  
*Jennifer Rice, Office of Technology Management, University of Illinois at Urbana-Champaign*
- 10:00-10:15 AM **Discussion**
- 10:15-10:30 AM **Break and Setup for Speed Networking**
- 10:30 AM-12:00 PM **Speed Networking: Get to Know Your Class Members Professional Interests**
- 12:00-12:30 AM **Evaluation of Week 1**
- 12:30-1:30 PM **Lunch**
- 1:30-5:30 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

## Thursday, August 1

- 7:30-8:30 AM **Breakfast**
- 8:30-10:00 AM **Mechanobiology in Neuronal Development**  
*M. Taher A. Saif, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign*
- 10:00-10:15 AM **Discussion**
- 10:15-10:30 AM **Break**
- 10:30 AM-12:30 PM **Poster Session I – Group A**  
**Session Chairs:** Lizanne DeStefano, Director of I-STEM, and Ayesha Tillman, I-STEM, University of Illinois at Urbana-Champaign
- 12:30-1:30 PM **Lunch**
- 1:30-5:30 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail
- 6:30-8:30 PM **Special Program: Picnic and Social at Crystal Lake Park**  
Shuttle from Newman Hall to Crystal Lake Park will be available starting at 6:00PM

## Friday, August 2

- 7:30-8:30 AM **Breakfast**
- 8:30-9:00 AM **Cleanroom Safety Orientation**  
*Glennys Mensing, Research Engineer, Micro and Nanotechnology Laboratory*
- 9:00-10:00 AM **Cancer Nanotechnology on Microchips ☐ From Cell Manipulation, Molecular Screening to Early Cancer Detection**  
*John X.J. Zhang, Biomedical Engineering, University of Texas at Austin*
- 10:00-10:15 AM **Discussion**

- 10:15-10:30 AM **Break**
- 10:30 AM-12:30 PM **Poster Session II – Group B**  
**Session Chairs:** Lizanne DeStefano, Director of I-STEM, University of Illinois, and Ayesha Tillman, I-STEM, University of Illinois
- 12:30-1:30 PM **Lunch**
- 1:30-5:30 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

### Saturday, August 3

- 8:00 AM-10:00 PM **Suggested Activity** (optional): **Day Trip to Chicago** – if you have not signed up, there may still be room on the bus (please check at the registration table)

### Sunday, August 4

**Free Day** – rest and prepare for week 2

### Monday, August 5

- 7:00-8:00 AM **Breakfast**
- 8:00-9:00 AM **Biology of the Cancer Cell**  
*Marina Marjanovic, Associate Director, Imaging at Illinois, University of Illinois at Urbana-Champaign*
- 9:00-9:15 AM **Discussion**
- 9:15-10:15 AM **Nanoelectronics Meets Biology: From Biomolecular Detection, Nanoelectrophysiology to Hybrid Device-Tissue Interfaces**  
*SungWoo Nam, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign*
- 10:15-10:30 AM **Discussion**
- 10:30-10:45 AM **Break**
- 10:45 AM-12:30 PM **Poster Session III – Group C**  
**Session Chairs:** Lizanne DeStefano, Director of I-STEM, University of Illinois, and Ayesha Tillman, I-STEM, University of Illinois
- 12:30-1:30 PM **Lunch**
- 1:30-5:30 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

## Tuesday, August 6

- 7:00-8:00 AM **Breakfast**
- 8:00-9:00 AM **Extracellular Matrix Degradation during Cancer Progression and Metastasis**  
*Manu Platt, Biomedical Engineering, Georgia Institute of Technology*
- 9:00-9:15 AM **Discussion**
- 9:15-10:15 AM **The Role of Nanoparticle Surface Chemistry in Alveolar Macrophage Inflammatory Response**  
*Valerie Leppert, Biological Engineering and Small-scale Technologies, University of California, Merced*
- 10:15-10:30 AM **Discussion**
- 10:30-10:45 AM **Break**
- 10:45 AM-12:30 PM **Poster Session IV – Group D**  
**Session Chairs:** Lizanne DeStefano, Director of I-STEM, University of Illinois, and Ayesha Tillman, I-STEM, University of Illinois
- 12:30-1:30 PM **Lunch**
- 1:30-5:30 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

## Wednesday, August 7

- 7:30-8:30 AM **Breakfast**
- 8:30-9:30 AM **Abbott – Turning Science into Caring**  
*Andy Fischer, Abbott Diagnostics*
- 9:30-9:45 AM **Discussion**
- 9:45-10:45 AM **Multidisciplinary Approaches to Study Molecular Motors**  
*Ekaterina L. Grishchuk, Physiology, University of Pennsylvania*
- 10:45 - 11:00 AM **Discussion**
- 11:00-11:15 AM **Break**
- 11:15 AM-12:15 PM **Optics-based Biosensors for Diagnostics, Cell Imaging, Pharmaceutical Research, and Tissue Imaging**  
*Brian Cunningham, Electrical and Computer Engineering, University of Illinois at Urbana-Champaign*
- 12:15-12:30 PM **Discussion**
- 12:30-1:30 PM **Lunch**
- 1:30-5:30 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

## Thursday, August 8

- 7:30-8:30 AM **Breakfast**
- 8:30-9:30 AM **Planes, Trains, Automobiles....and Cells?**  
*Philip R. LeDuc, Mechanical Engineering, Carnegie Mellon*
- 9:30-9:45 AM **Discussion**
- 9:45-10:45 AM **Cellular Forces in Mechanobiology and Mechanomedicine**  
*Ning Wang, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign*
- 10:45-11:00 AM **Discussion**
- 11:00-11:15 AM **Break**
- 11:15-2:30 PM **Focus Groups and Lunch**  
Participants will be notified if they will participate in a focus group. Please use the lunch ticket found in your name tag holder and walk to Beckman between 11:00 AM and 2:00 PM for lunch.
- 2:30-5:30 PM **Organized Lab and Campus Tours**

## Friday, August 9

- 7:30-8:30 AM **Breakfast**
- 8:30-9:30 AM **Bionanoscience for Innovative Global Healthcare Research & Technology (BIGHEART)**  
*Luke P. Lee, Bioengineering, University of California, Berkeley*
- 9:30-9:45 AM **Discussion**
- 9:45-10:45 AM **Force transducers at cell-cell junctions**  
*Deborah Leckband, Chemistry, University of Illinois at Urbana-Champaign*
- 10:45-11:00 AM **Discussion**
- 11:00-11:30 AM **Overall Evaluation**
- 11:30 AM-1:00 PM **Lunch**
- 1:00-2:00 PM **Closing Session**
- Remarks and Recognitions
  - Best Poster Awards
  - Presentation of Certificates
- 2:00 PM **ADJOURN**

## 2013 Summer Institute Organizing Committee

- **Rashid Bashir**, Director of MNTL and Professor of Electrical and Computer Engineering, and Bioengineering, Summer Institute Organizing Committee Chair
- **Jimmy Hsia**, Professor of Mechanical Science and Engineering, Associate Vice Chancellor for Research, Summer Institute Organizing Committee Co-chair
- **Laura A. Miller**, Program Manager, CMMB IGERT and M-CNTC, Summer Institute Organizing Committee Co-chair
- **Irfan Ahmad**, Executive Director of CNST, Research Faculty in Agricultural and Biological Engineering
- **Ryan Bailey**, Professor of Chemistry
- **Lizanne DeStefano**, Professor of Education Psychology, and Director of I-STEM, College of Education
- **Catherine Murphy**, Professor of Chemistry
- **Taher Saif**, Professor of Mechanical Science and Engineering
- **Nahil Sobh**, Site Lead, Network for Computational Nanotechnology, Research Staff, Computational Multiscale Nanosystems, NanoHub
- **Ayesha Tillman**, I-STEM, College of Education
- **Carrie Kouadio**, Visiting Education Coordinator, Center for Nanoscale Science and Technology
- **Susan McKenna**, Assistant Director of Communications, Bioengineering and Micro and Nanotechnology Lab

## Sponsors

The Summer Institute is sponsored by GEM4, NSF IGERT, NIH M-CNTC, NSF EBICS, CNST, and NSF NanoBio Node.



**IGERT** Cellular and Molecular Mechanics and BioNanotechnology

**M-CNTC** Midwest Cancer Nanotechnology Training Center

**Micro and Nanotechnology Laboratory**

**nano@illinois**  
*nano solutions for mega problems*

**CNST** University of Illinois Center for Nanoscale Science and Technology