

2015 BioNanotechnology Summer Institute

Cancer Nanotechnology and Cell Mechanics
an NSF-IGERT and NIH-CNTC collaboration

July 27–August 7, 2015

University of Illinois at Urbana–Champaign



Summer Institute Program

Micro and Nanotechnology Laboratory (MNTL)

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 2015 BioNanotechnology Summer Institute is to enhance the ability to address challenges in Cancer Nanotechnology and Mechanobiology, offering expertise from interdisciplinary faculty in biology, engineering, materials science, and nanotechnology, through a combination of lectures and hands-on lab experiences.

<http://nano.illinois.edu/summer-institute-2015>

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. 8/5/2015 3:00 PM

Monday, July 27

- 7:00-8:15 AM **Registration and Breakfast – MNTL Atrium**
- 8:15-8:30 AM **Summer Institute Welcome – 1000 MNTL**
Rashid Bashir, Department Head, Bioengineering, University of Illinois at Urbana-Champaign
Brian Cunningham, Director, MNTL, University of Illinois at Urbana-Champaign
- Welcome Remarks**
Andreas Cangellaris, Dean, College of Engineering, University of Illinois at Urbana-Champaign
- 8:30-8:50 AM **Student Introductions**
- 8:50-9:00 AM **2015 BioNanotechnology Summer Institute Logistics**
Laura Miller, Program Manager, University of Illinois at Urbana-Champaign
- 9:00-10:15 AM **Participant Choice Introductory Lecture**
- A Whirlwind Overview of Cell and Molecular Biology!, Part I –1000 MNTL**
Scott Siechen, Department of Natural Sciences, Parkland College
- Introduction to Mechanics in Mechanobiology, Part I – 2003 MNTL**
M. Taher Saif, Professor, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign
- 10:15-10:30 AM **Break**

- 10:30-11:45 AM **Participant Choice Introductory Lecture**
A Whirlwind Overview of Cell and Molecular Biology!, Part II – 1000 MNTL
Scott Siechen, Department of Natural Sciences, Parkland College
Introduction to Mechanics in Mechanobiology, Part II – 2003 MNTL
M. Taher Saif, Professor, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign
- 11:45 AM-12:40 PM **Lunch and Safety Orientation**
Nancy Johnson, Principal Process Engineer, MNTL, University of Illinois at Urbana-Champaign
- 12:40-12:50 PM **2015 Summer Institute Evaluation**
Ayesha Tillman, I-STEM, College of Education, University of Illinois at Urbana-Champaign
- 12:50-1:00 PM **Connect with Lab Leaders/TAs and find lab module locations**
- 1:00-5:00 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

Tuesday, July 28

- 7:00-8:00 AM **Breakfast – Newman Hall**
- 8:00 AM-12:00 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail
- 12:00-1:30 PM **Lunch**
- Session Chair:** **Andrew Smith, Assistant Professor, Department of Bioengineering**
- 1:30-2:30 PM **Microfluidic Design Enables Single-cell and Sub-cellular Protein Measurement**
Amy Herr, Lloyd Professor, Bioengineering, University of California Berkeley
- 2:30-2:45 PM **Discussion**
- 2:45-3:00 PM **Break**
- 3:00-4:00 PM **Biology of Cancer Cell**
Marina Marjanovic, Associate Director, Imaging at Illinois, University of Illinois at Urbana-Champaign
- 4:00-4:15 PM **Discussion**

Wednesday, July 29

- 7:00-8:00 AM **Breakfast – Newman Hall**
- 8:00 AM-12:00 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail
- 12:00-1:30 PM **Lunch**
- Session Chair:** **Irfan Ahmad, Executive Director, Center for Nanoscale Science and Technology**
- 1:30-2:30 PM **Nanotechnology and Spectroscopic Instrumentation for Image-Guided Precision Medicine**
Shuming Nie, Director, Cancer Nanotechnology Center and Professor, Biomedical Engineering, Emory University

- 2:30-2:45 PM **Discussion**
- 2:45-3:15 PM **Break and Group Photo**
- 3:15-4:15 PM **Plasmonic Nanoparticles and Nanostructures**
Ivan Smalyukh, Associate Professor, Physics, University of Colorado at Boulder
- 4:15-4:30 PM **Discussion**
- 4:30-4:45 PM **Summer Institute Evaluation**

Thursday, July 30

- 7:00-8:30 AM **Breakfast – Newman Hall**
- 9:00-9:45 AM **Speed Networking Session I**
- 9:45-10:00 AM **Break**
- 10:00-10:40 AM **Speed Networking Session II**
- 10:40-10:55 AM **Break**
- 10:55-11:35 PM **Speed Networking Session III**
- 11:35 AM-1:00 PM **Lunch**
- 1:00-5:00 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail
- 6:00-8:00 PM **Special Program: Picnic and Meeting at Newman Hall**

Friday, July 31

- 7:00-8:30 AM **Breakfast – Newman Hall**
- Session Chair: Graciela Wild Padua, Food Science and Human Nutrition**
- 8:30-9:30 AM **Translational Nanomedicine from Drug Discovery to Preclinical Studies**
Dipanjan Pan, Assistant Professor, Bioengineering, University of Illinois at Urbana-Champaign
- 9:30-9:45 AM **Discussion**
- 9:45-10:00 AM **Break**
- 10:00-11:00 AM **Chemical and Biological Detection for Diagnostic, Food Safety, and Drug Safety using the Internal Sensing Capabilities of Mobile Devices**
Brian Cunningham, Director, Micro and Nanotechnology Lab and Professor, Electrical and Computer Engineering, University of Illinois at Urban-Champaign
- 11:30 AM-1:00 PM **Lunch**
- 1:00-5:00 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

Saturday, August 1

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 2

Free Day – rest and prepare for week 2

Monday, August 3

7:00-8:30 AM **Breakfast – Newman Hall**

Session Chair: **Irfan Ahmad, Executive Director, Center for Nanoscale Science and Technology**

8:30-9:30 AM **Estimation of Lamellipod Protrusion Forces**

Richard Chadwick, Chief, National Institute on Deafness and Other Communication Disorders

9:30-9:45 AM **Discussion**

9:45-10:00 AM **Break**

10:00-11:00 AM **Nanosopic Tools in Live Cell Analysis**

Joseph Irudayaraj, Professor, Biological Engineering, Purdue University

11:00-11:15 AM **Discussion**

11:15 AM-1:00 PM **Lunch**

1:00-5:00 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

Tuesday, August 4

7:00-8:00 AM **Breakfast – Newman Hall**

8:00 AM-12:00 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail

12:00-1:30 PM **Lunch**

1:30-2:30 PM **Controlling Spatial Organization of Nanomaterials for Vascular Imaging and Treatment**

Hyun Joon Kong, Professor, Chemical and Biomolecular Engineering, University of Illinois at Urbana-Champaign

2:30-2:45 PM **Discussion**

2:45-3:00 PM **Break**

3:00-5:00 PM **Poster Session I – Groups A and B**

Wednesday, August 5

- 7:00-8:00 AM **Breakfast – Newman Hall**
- 8:00 AM-12:00 PM **Hands-on Laboratory Modules:** Please consult Lab Schedule Detail
- 12:00-1:30 PM **Lunch**
- 1:30-2:30 PM **Engineering Bacteria from Single Cells to Communities**
Ting Lu, Professor, Bioengineering, University of Illinois at Urbana-Champaign
- 2:30-2:45 PM **Discussion**
- 2:45-3:00 PM **Break**
- 3:00-5:00 PM **Poster Session II – Groups C and D**

Thursday, August 6

- 7:00-8:30 AM **Breakfast – Newman Hall**
- 8:30-9:30 AM **Modeling Nanopore for Sequencing DNA**
Alexei Aksimentiev, Associate Professor, Physics, University of Illinois at Urbana-Champaign
- 9:30-9:45 AM **Discussion**
- 9:45-10:00 AM **Break**
- 10:00-11:00 AM **Microfluidics and Lab on Chip for Point of Care Diagnostics**
Rashid Bashir, Department Head, Bioengineering, University of Illinois at Urbana-Champaign
- 11:00-11:15 AM **Discussion**
- 11:15 AM -12:30 PM **Lunch**
- 12:30-5:00 PM **Organized Lab Tours**

Friday, August 7

- 7:30-8:30 AM **Breakfast – MNTL Atrium**
- 8:30-9:30 AM **Wearable and Implantable Graphene Nanoelectronic Sensors**
SungWoo Nam, Assistant Professor, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign
- 9:30-9:45 AM **Discussion**
- 9:45-10:00 AM **Break**
- 10:00-11:00 AM **A Golden Age for Colloidal Nanoparticles**
Catherine Murphy, Professor, Chemistry, University of Illinois at Urbana-Champaign
- 11:00-11:15 AM **Discussion**

11:15-11:45 AM **Overall Summer Institute Evaluation and Break**

11:45-12:15 PM **Closing Session**

- Remarks and Recognitions
- Best Poster Awards
- Presentation of Certificates of Completion

12:15 AM-1:30 PM **Lunch**

1:30 PM **ADJOURN**

2015 BioNanotechnology Summer Institute Organizing Committee

- **Rashid Bashir**, Department Head, Bioengineering, and Professor of Electrical and Computer Engineering, and Bioengineering, Summer Institute Organizing Committee 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
- **Lizanne DeStefano**, Professor of Education Psychology, and Director of I-STEM, College of Education
- **Taher Saif**, Professor of Mechanical Science and Engineering
- **Nahil Sobh**, Site Lead, Network for Computational Nanotechnology, Research Staff, Computational Multiscale Nanosystems, nanoBIO node
- **Ayesha Tillman**, I-STEM, College of Education
- **Dorothy Gordon**, Administrative Assistant, Micro and Nanotechnology Laboratory

Sponsors

The Summer Institute is sponsored by NSF IGERT, NIH M-CNTC, NSF EBICS, CNST, NSF nanoBIO node, and MNTL.



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