Monday, May 14

Undergraduate Student Research Day

8:00 a.m. – 8:45 a.m.  **Registration**  (Coffee and Pastries)  
Kupfrian 1st Floor Lobby

8:45 a.m. – 12:00 p.m.  **Student Presentations: Morning Session**  
Kupfrian 118

**MORNING SESSION**

8:45 a.m.  **Katherine Dunning**, Arizona State University  
*Effects of Light Intensity on Daphnia Dynamics and Coexistence: A Stoichiometric Perspective*

9:00 a.m.  **Claire Pettit**, University of Louisiana  
*A Discrete-Time Three-Stage Population Model for Hyla cinerea Green Treefrog*

9:15 a.m.  **Abraham Rosales**, New Jersey Institute of Technology  
*Understanding Colonial Wading Bird Metapopulation Dynamics in NJ Meadowlands and NY Harbors*

9:30 a.m.  **Colin Kremer**, State University of New York at Geneseo  
*Chaotic Dynamics Lost in Small-World Network Metapopulations*

9:45 a.m.  **Neil Miller and Joel Adornetto**, Buffalo State College  
*Modified SIR Models to Forecast Epidemics*

10:00 a.m.  **Paula Piedrahita**, Arizona State University  
*Tropical Rain Forest Sustainability: A Mathematically Model Approach*

Fifteen minute break

10:30 a.m.  **Cassie Pawling**, Arizona State University  
*A Proposed High School Mathematics Course: Introduction to Mathematical Biology*

10:45 a.m.  **Reginald Dorcely and Frantz Voltaire**, Medgar Evers College of CUNY  
*Application of Singular Value Decomposition (SVD) Theorem and Principal Components Analysis (PCA) to Air Sampling*

11:00 a.m.  **Jamila Hedhli, Joe Brachocki, Sanjay Muddam, and Daniel Fong**, New Jersey Institute of Technology  
*Instability of the Fluid Strip*

11:15 a.m.  **Ellen Marie Schmidt**, State University of New York at Geneseo  
*Variations on Linear Regression*

11:30 a.m.  **Susan Bloomberg**, New York University  
*Common Statistical Properties of Bi-Stable Visual Phenomena*

11:45 a.m.  **Christopher Khalil, Arif Patel, and Arlene Pineda**, New Jersey Institute of Technology  
*Measurements of Membrane Capacitance in Neurons*

12:00 p.m. – 1:30 p.m.  **Lunch**  
Campus Center 3rd floor

1:30 p.m. – 4:45 p.m.  **Student Presentations: Afternoon Session**  
Kupfrian 118
# AFTERNOON SESSION

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Institution(s)</th>
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<tbody>
<tr>
<td>1:30 p.m.</td>
<td>Christian Volk</td>
<td>Canisius College</td>
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<td></td>
<td><strong>The Evolution of Proliferating Cells During the Course of Chemotherapy</strong></td>
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<td>1:45 p.m.</td>
<td>Tagan Griffin, Loan Nguyen, Abdessamad Tridane, and Yang Kuang</td>
<td>Arizona State University</td>
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<td><strong>Modeling B-cell Dysfunction in HIV infection</strong></td>
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<td>2:00 p.m.</td>
<td>Jasneet Kaur and Tao Lin</td>
<td>New Jersey Institute of Technology</td>
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<td><strong>Impact of constitutively active RhoA and change in cell shape on mitotic spindle orientation</strong></td>
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<td>2:15 p.m.</td>
<td>Jacob Ham and Dawn Clemons</td>
<td>Purdue University Calumet</td>
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<td><strong>A Three-Dimensional Simulation of Endothelial Cell Motility in Tumor Angiogenesis</strong></td>
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<td>2:30 p.m.</td>
<td>Arunima Ray and Aaron Young</td>
<td>State University of New York at Geneseo</td>
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<td><strong>Random DNA Statistics</strong></td>
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<td>2:45 p.m.</td>
<td>Leslie Padrnos</td>
<td>Arizona State University</td>
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<td><strong>The Birthing Question: Mathematical Modeling and the Decisions that Influence Mode of Delivery</strong></td>
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<td>Fifteen minute break</td>
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<td>3:15 p.m.</td>
<td>Russell Latterman</td>
<td>Arizona State University</td>
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<td><strong>Monte Carlo Model of Convergent Extension in the Ascidian Notochord</strong></td>
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<td>3:30 p.m.</td>
<td>Andrew Christian, Abraham Rosales, and Jason Ju</td>
<td>New Jersey Institute of Technology</td>
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<td><strong>Simulations and Experiments of Evaporative Drops</strong></td>
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<td>3:45 p.m.</td>
<td>Sebastian Acosta</td>
<td>Brigham Young University</td>
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<td><strong>Elliptic Grid Generator with Adaptive Control Functions</strong></td>
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<td>4:00 p.m.</td>
<td>Colin T. Waters</td>
<td>State University of New York at Geneseo</td>
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<td><strong>Construction of DNA Combinatorial Libraries for Use in DNA Computing</strong></td>
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<td>4:15 p.m.</td>
<td>Nick P. Tatonetti</td>
<td>Arizona State University</td>
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<td><strong>MetaboloDE: Optimization Software for Determining Kinetic Rate Coefficients for Biochemica Pathways of Metabolic Isotopomers</strong></td>
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<td>4:30 p.m.</td>
<td>Azfar Aziz, Kelly Crowe, and Michael DeCaro</td>
<td>New Jersey Institute of Technology</td>
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<td><strong>Shape and Break-up of a Pendant Drop</strong></td>
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5:00 p.m. - 6:00 p.m. **Plenary Lecture**

David Terman, Ohio State University

*Neuronal Dynamics*

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**UNDERGRADUATE RESEARCH DAY ORGANIZING COMMITTEE**

Amitabha Bose and Zoi-Heleni Michalopoulou (New Jersey Institute of Technology)

Anthony Macula (State University of New York at Geneseo)
PROGRAM SCHEDULE

Tuesday, May 15

8:00-8:45 a.m.  Registration + coffee and pastries  
Set Up Posters  
Poster session all day  
Kupfrian 1st floor lobby  
Kupfrian 103,104,107,108

8:45-9:00 a.m.  Introductory Remarks  
Daljit S. Ahluwalia, Chair  
Department of Mathematical Sciences  
Theater

9:00-10:00 a.m.  PLENARY LECTURE I  
Nancy Kopell, Boston University  
Multiple Rhythms and Switches in the Nervous System  
Theater

10:00-10:30 a.m.  Coffee Break  
Kupfrian 1st floor lobby

MINISYMPHOSIA I

<table>
<thead>
<tr>
<th>MINISYMPHOSIA I</th>
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</table>
| **Mathematical Biology I**  
Kupfrian 117  
Chair: Louis Tao, NJIT |
| **Mathematical Biology II**  
Kupfrian 118  
Chair: Gareth Russell, NJIT |
| **Waves I**  
Kupfrian 106  
Chair: Roy Goodman, NJIT |
| Alex Reyes  
New York University  
Synchrony in Feedforward Networks: Dependence on Single Cell Statistics and Network Size |
| Gregor Fussmann  
McGill University  
Eco-Evolutionary Dynamics |
| Jie Shen  
Purdue University  
Efficient and Stable Spectral Methods for the Helmholtz Equation in Exterior Domains |
| 10:30-11:00 a.m.  
Horacio Rotstein  
New Jersey Institute of Technology  
Rhythmic Mixed-Mode Oscillatory Activity in Entorhinal Cortex Stellate Cells |
| 11:00-11:30 a.m.  
Yang Kuang  
Arizona State University  
Resource Quality Dynamics and Its Implications |
| 11:30-12:00 noon  
Tobias Schäfer  
City University of New York  
Coarse-Graining Noise in Stochastic Ordinary Differential Equations with Multiple Time Scales |
| 12:00-12:30 p.m.  
Carmen Canavier  
LSU Health Sciences Center  
Pulse Coupled Oscillators |
| 12:00-12:30 p.m.  
Abdul-Aziz Yakubu  
Howard University  
Spatially Discrete Dispersal-Linked Models with Directional Dispersal |
| 12:00-12:30 p.m.  
Keith Promislow  
Michigan State University  
Pore Formation in Polymer Electrolyte Membranes |
| 12:00-12:30 p.m.  
Robert Butera  
Georgia Tech  
Weak Coupling and Neuronal Synchronization - A Mathematical Abstraction or Biophysical Reality? |
| 12:00-12:30 p.m.  
Gareth Russell  
New Jersey Institute of Technology  
Ecological Communities: How Does Nature Construct Them? |
| 12:00-12:30 p.m.  
Rudy Horne  
Florida State University  
Random Dispersion and Four-Wave Mixing in an Optical Fiber |
12:30-2:30 p.m. Lunch and Poster Session Kupfrian 1st floor lobby Kupfrian 103,104,107,108

2:30-3:30 p.m. PLENARY LECTURE II Theater Sheldon Weinbaum, CUNY Kupfrian 103,104,107,108
A New View of the Classic Starling Hypothesis for Microvascular Exchange

3:30-4:00 p.m. National Science Foundation Presentation Theater Henry Warchall

4:00-4:30 p.m. Coffee Break Kupfrian 1st floor lobby

**MINISYMPOSIA II**

<table>
<thead>
<tr>
<th>Time</th>
<th>Mathematical Biology III</th>
<th>Mathematical Biology IV</th>
<th>Mathematical Fluid Dynamics I</th>
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<tr>
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<td>Kupfrian 117</td>
<td>Kupfrian 118</td>
<td>Kupfrian 106</td>
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<tr>
<td></td>
<td>Chair: Victor Matveev, NJIT</td>
<td>Chair: Cyrill Muratov, NJIT</td>
<td>Chair: Lou Kondic, NJIT</td>
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<td>4:30-5:00 p.m.</td>
<td>Charles Wilson University of Texas at San Antonio Generation of Natural Firing Patterns of Striatal Cholinergic Interneurons</td>
<td>Glen Webb Vanderbilt University Modeling Antibiotic Resistance Epidemics in Hospitals</td>
<td>Sarah Waters University of Nottingham Three-Dimensional Flows in Rapidly Oscillating Vessels</td>
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<td>5:00-5:30 p.m.</td>
<td>Jorge Golowasch New Jersey Institute of Technology Activity in Gap Junction-Coupled Networks Depends on Dendrite Diameters</td>
<td>John King University of Nottingham Population-Scale Modelling of Cellular Chemotaxis and Aggregation</td>
<td>Mark Sussman Florida State University Adaptive Solution Techniques for Fluid-Structure Interaction and Multiphase Flow</td>
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<tr>
<td>5:30-6:00 p.m.</td>
<td>David Terman Ohio State University Multiple Attractors and Transient Synchrony in a Model for an Insect's Antennal Lobe</td>
<td>Tasso Kaper Boston University Wave Speeds for Reaction-Diffusion Systems with Cutoffs</td>
<td>Mark Blyth University of East Anglia Manipulation of Liquid Film Flows</td>
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6:15-9:00 p.m. Banquet Campus Center Atrium
PROGRAM SCHEDULE

Wednesday, May 16

8:00-8:45 a.m.   Coffee and pastries  Kupfrian 1st floor lobby
                  Poster session (half day)  Kupfrian 103,104,107,108

9:00-10:00 a.m.  PLENARY LECTURE III  Theater
                  Leslie Greengard, Courant Institute of Mathematical Sciences
                  Electromagnetic Scattering and Design

10:00-10:30 a.m. Coffee Break  Kupfrian 1st floor lobby

MINISYMPOSIA III

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<tr>
<th>Time</th>
<th>MINISYMPOSIA III</th>
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| 10:30-11:00 a.m. | Mathematical Biology V  
                  Kupfrian 117  
                  Chair: Horacio Rotstein, NJIT  
                  Steven J. Cox  
                  Rice University  
                  Real-Time Inference of Channel and Receptor Distributions from Calcium Fluorescence Data  
| 10:30-11:00 a.m. | Mathematical Fluid Dynamics II  
                  Kupfrian 118  
                  Chair: Wooyoung Choi, NJIT  
                  Lisa Fauci  
                  Tulane University  
                  Fluid Dynamic Models of Spirochete Motility  
| 10:30-11:00 a.m. | Biostatistics I  
                  Kupfrian 106  
                  Chair: Manish Bhattacharjee, NJIT  
                  Ian McKeague  
                  Columbia University  
                  Functional Regression Analysis with Trajectories as Predictors  
| 11:00-11:30 a.m. | Alla Borisyuk  
                  University of Utah  
                  Fluctuation-Driven Rhythmogenesis in an Excitatory Neuronal Network with Slow Adaptation  
| 11:00-11:30 a.m. | Aaron Fogelson  
                  University of Utah  
                  Multi-velocity Viscoelastic Flow in Blood Clotting and other Physiological Systems: Models and Numerics  
| 11:00-11:30 a.m. | Ram Tiwari  
                  National Cancer Institute  
                  New Developments in Population-Based Survival: Estimation of Fraction of Cured Cancer Patients  
| 11:30-12:00 noon | Stephen Coombes  
                  University of Nottingham  
                  A Bidomain Threshold Model of Intracellular Calcium Release and Propagating Calcium Waves  
| 11:30-12:00 noon | Isaac Klapper  
                  Montana State University  
                  A Physical View of Microbial Colony Structure  
| 11:30-12:00 noon | Pranab K. Sen  
                  University of North Carolina at Chapel Hill  
                  Kendall’s Tau in High-Dimension Parsimony  
| 12:00-12:30 p.m. | Victor Matveev  
                  New Jersey Institute of Technology  
                  Capturing the Multistable Anti-Phase Bursting in a Two-Cell Inhibitory Network Using a One-Dimensional Map  
| 12:00-12:30 p.m. | Martin Bazant  
                  Massachusetts Institute of Technology  
                  Induced-Charge Electro-osmosis  
| 12:00-12:30 p.m. | José Pinheiro  
                  Novartis Pharmaceuticals  
                  Design Issues in Confirmatory Clinical Trials with Longitudinal Endpoints  

12:30-2:00 p.m. Lunch and Poster Session
Removal of posters
Kupfrian 1st floor lobby
Kupfrian 103,104,107,108

2:00-3:00 p.m. **PLENARY LECTURE IV**
Jack Cowan, University of Chicago
Theater
*Statistical Mechanics of Activity in Biological Networks*

3:00-3:30 p.m. Coffee Break
Kupfrian 1st floor lobby

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<th>MINISYMPOSIA IV</th>
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| **Mathematical Biology VI**  
Kupfrian 117  
Chair: Amitabha Bose, NJIT |
| **Waves II**  
Kupfrian 118  
Chair: Petros Petropoulos, NJIT |
| **Biostatistics II**  
Kupfrian 106  
Chair: Sunil Dhar, NJIT |

3:30-4:00 p.m.

| Xiao-Jing Wang  
Yale University  
A Recurrent Neural Circuit  
Model of Working Memory and Decision Making |
| Moysey Brio  
University of Arizona  
Stability of FDTD Algorithms with Local Mesh Refinement for Maxwell’s Equations |
| Hira Koul  
Michigan State University  
Goodness-of-Fit Testing in Interval Censoring Case 1 |

4:00-4:30 p.m.

| Frances Skinner  
Toronto Western Research Institute, UHN  
Tuning Network Dynamics with Gap Junctions Located at Distal Dendritic Sites |
| Yu Chen  
Courant Institute of Mathematical Sciences  
Gaussian Quadratures and Signal Processing |
| Ming-Hui Chen  
University of Connecticut  
Bayesian Variable Selection and Computation for Generalized Linear Models with Conjugate Priors |

4:30-5:00 p.m.

| André Longtin  
University of Ottawa  
Extracting Time Scales with Feedback and Nonlinearity |
| Thomas Hagstrom  
University of New Mexico  
Complete Plane Wave Expansions, Optimal Local Radiation Boundary Conditions and Optimal Perfectly Matched Layers |
| Bahjat Qaqish  
University of North Carolina at Chapel Hill  
Regression Models for Multivariate Categorical Outcomes |

5:00-5:30 p.m.

| Louis Tao  
New Jersey Institute of Technology  
Spatio-Temporal Dynamics of Contrast Adaptation in Visual Cortex |
| Alejandro Aceves  
University of New Mexico  
Modeling Nonlinear Pulse Dynamics in Photonic Structures |
| Kaushik Ghosh  
New Jersey Institute of Technology  
Prediction of U.S. Cancer Mortality Counts Using Semiparametric Bayesian Techniques |

End of conference