

NERCCS 2025: Eighth Northeast Regional Conference on Complex Systems



April 9–11, 2025 Binghamton, NY

Conference Program

NERCCS 2025:
Eighth Northeast Regional Conference on Complex Systems

April 9 – 11, 2025
Innovative Technologies Complex
Binghamton University, Binghamton, NY, USA

<https://nerccs2025.github.io/>

Sponsors:

National Science Foundation
Complex Systems Society US Northeast Chapter
Binghamton Center of Complex Systems
Bernard M. and Ruth R. Bass Center for Leadership Studies
Binghamton University Institute for AI and Society
School of Systems Science and Industrial Engineering
DatArt Lab
Data Science and Artificial Intelligence for Scientific Discoveries Thematic Program of the Data Science Transdisciplinary Area of Excellence



Organizing Committee:

General Chairs: Luis Rocha (Binghamton University, SUNY)
Hiroki Sayama (Binghamton University, SUNY)
Program Chairs: Carlos Gershenson (Binghamton University, SUNY)
Changqing Cheng (Binghamton University, SUNY)
Poster Session Chairs: Zeynep Ertem (Binghamton University, SUNY)
Srinivas Pandey (Binghamton University, SUNY)
Logistics Chairs: Andreas Pape (Binghamton University, SUNY)
Kenneth Chiu (Binghamton University, SUNY)
Scholarship Chair: Jeremie Fish (Clarkson University)
Online Activity Chairs: Rory Eckardt (Binghamton University, SUNY)
Chou-Yu (Joey) Tsai (Binghamton University, SUNY)
Publication Chairs: Georgi Georgiev (Assumption University/Worcester Polytechnic Institute)
Bernard Ricca (University of Colorado Colorado Springs)
Student Volunteers: Akshay Gangadhar (Volunteer Lead) (Binghamton University, SUNY)
Rahul Balamurugan (Binghamton University, SUNY)
Sarah Escotto Rodriguez (Binghamton University, SUNY)
Shayan Esfarayeni (Binghamton University, SUNY)
Srikanth Iyer (Binghamton University, SUNY)
Amahury Jafet Lopez Diaz (Binghamton University, SUNY)
Ramin Naderi Beni (Binghamton University, SUNY)
Shrivats Nigam (Binghamton University, SUNY)

NERCCS 2025 Program Schedule

April 9 - 11, 2025
Binghamton, NY, United States

Allocated Presentation Time:

- Keynote talks: 40 min talk + 10 min Q&As
- Contributed Talk Session talks: 15 min talk + 5 min Q&As
- Posters: Throughout the conference (especially during lunch breaks)

Locations:

- [SH]: Symposium Hall
- [ES]: ES 2008
- [RT]: Rotunda

Day 1 (Wednesday April 9th, 2025)

8:00 AM - 4:00 PM: Registration open

9:00 AM - 9:20 AM: Opening Remarks [SH]
- Special opening address by Binghamton University President Harvey Stenger

9:20 AM - 10:10 AM: **Keynote 1 [Bernard M. and Ruth R. Bass Center for Leadership Studies Keynote Talk]: Mirta Galesic** (remote talk) [SH]

"Networks of Beliefs in Individual and Collective Minds"

Session Chair: Carlos Gershenson

(10:10 AM – 10:30 AM: 20 minutes for coffee break & transition)

10:30 AM - 11:50 AM: **Parallel Sessions**

Contributed Talk Session 1: Machine Learning Applications in Complex Systems
[SH]

Session Chair: Sadamori Kojaku

- #44 Declan A. Norton, Edward Ott, Andrew Pomerance, Brian Hunt and Michelle Girvan, Tailored Forecasting from Short Time Series via Meta-learning
- #30 Mario Franco, Gerardo Febres, Nelson Fernández and Carlos Gershenson, The Art of Misclassification: Too Many Classes, Not Enough Points
- #26 Neil Maclaren, Kazuyuki Aihara and Naoki Masuda, Spatial early warning signals for dynamics on complex networks
- #47 Sadamori Kojaku, Rachith Aiyappa, Munjung Kim, Ozgur Can Seckin, Yong-Yeol Ahn and Jisung Yoon, Implicit degree bias in the link prediction task

Contributed Talk Session 2: Economics and Education [ES]

Session Chair: Andreas Pape

- #54 Christopher Zosh, Nency Dhameja, Yixin Ren and Andreas Pape, Agent-Based Econometrics: A Guide and General Method for Estimating Parameters and their Confidence Intervals in Agent-Based Simulations
- #17 [Online] Evangelos Katsamakos and Oleg Pavlov, University as a Platform: Systems and platform thinking for business model innovation in higher education
- #50 John O'Meara and Ashwin Vaidya, A Complex Systems Approach to Student Learning and Meaning-Making in Mathematics
- #71 Tessa K. Lawler, Sarah Phillips and Peter Sheridan Dodds, Computational Philology: Applying allotaxonomy to English-language translations of Homeric Epic

12:00 PM - 1:30 PM: **Lunch Break and Posters [RT]**

1:30 PM - 2:20 PM: **Keynote 2: Zoran Obradovic [SH]**

"Lifting the Fog by Harnessing Interactions Across Diverse Systems"

Session Chair: Hiroki Sayama

(2:20 PM – 2:30 PM: 10 minutes for transition)

2:30 PM - 3:50 PM: **Parallel Sessions**

Contributed Talk Session 3: Sponsored Session: Data Science and AI for Scientific Discoveries [SH]

Session Chair: Kenneth Chiu

- #8 Thomas Varley, "Dark information" in complex systems: exploring emergent structures with multivariate information theory.
- #40 Xuanchi Li, Xin Wang and Sadamori Kojaku, Near Linear-time Network Sampling for the Binary and Enhanced Configuration Models

- #58 James Hartz and Sarah Muldoon, Estimating Uncertainty in Network Measures and Structures Arising from Noisy Data
- #11 Shilong Yu, Neil MacLaren and Naoki Masuda, Using cross-covariance of node states to potentially improve early warning signals

Contributed Talk Session 4: Emergent Phenomena in Dynamical Systems I [ES]

Session Chair: Naoki Masuda

- #2 Nam Le, Richard Watson, Josh Bongard, Chris Buckley and Michael Levin, Emergent Collective Reproduction via Evolving Neuronal Flocks
- #72 Malbor Asllani, Pattern Formation Framework for Chimera States in Complex Networks
- #20 Chanon Thongprayoon and Naoki Masuda, Tie-decay networks with splines
- #64 Ravi Chepuri and Michelle Girvan, Exploring the role of heterogeneity in reservoir computing dynamics

(3:50 PM – 4:10 PM: 20 minutes for coffee break)

4:10 PM - 05:00 PM: **Keynote 3 [School of Systems Science and Industrial Engineering Keynote Talk]: Alessandro Vespignani [SH]**

"Navigating Complexity: Human Mobility Networks for Pandemic Prediction and Surveillance"

Session Chair: Luis Rocha

Day 2 (Thursday April 10th, 2025)

8:00 AM - 4:00 PM: *Registration open*

9:00 AM - 9:10 AM: Opening Remarks [SH]

9:10 AM - 10:00 AM: **Keynote 4: Deepak Dhar** (remote talk) [SH]

"Modelling Proportionate Growth in Animals"

Session Chair: Manoj Agarwal

(10:00 AM – 10:20 AM: 20 minutes for coffee break & transition)

10:20 AM - 12:00 PM: **Parallel Sessions**

Contributed Talk Session 5: Communications in Social Systems [SH]

Session Chair: Chou-Yu (Joey) Tsai

- #36 [Online] Markus Hofer, Jan Korbel and Stefan Thurner, Phase Transitions in Socially Balanced Systems: Why More Interactions Drive Polarization
- #37 Haoyang Qian and Malbor Asllani, Explosive opinion spreading with polarization and depolarization via asymmetric perception
- #61 Yan Hao, Tate Tower, Hannah Lax, Marc-Thorsten Hütt and Daniel Graham, Survivability of colliding-spreading messages on scale-free networks
- #62 Malak Fora, Zhiyuan Wang, Bethany Teachman, Laura Barnes and Congyu Wu, Predicting Interpersonal Perception in Face-to-Face Communication Using Video-Based Cross-Recurrence Quantification Analysis (CRQA)
- #13 [Online] Ali Nasirzonouzi and Carlos Gershenson, The Dynamics of Word-of-Mouth Marketing: An Agent-Based Modeling Approach to Message Credibility and Consumer Engagement

Contributed Talk Session 6: Emergent Phenomena in Dynamical Systems II [ES]

Session Chair: Georgi Georgiev

- #34 Elizabeth Castro, Ferdinand Schweser, Sarah Muldoon, John Leddy and Mohammad Haider, Adolescent Structural Whole-Brain Changes After Sport-Related Concussion
- #35 Yoshiaki Fujita and Carlos Gershenson, How Are Cortical PV / SST Interneurons Differentiated?
- #15 [Online] Oleksandr Hulianskyi, The Evolution of Global Gold and Copper Trade Networks
- #68 Leila Hedayatifar, Alfredo J. Morales, Dominic E. Saadi, Rachel A. Rigg, Olha Buchel, Amir Akhavan, Egemen Sert, Aabir Abubaker Kar, Mehrzad Sasanpour, Irving R. Epstein and Yaneer Bar-Yam, Predicting System Dynamics of Universal Growth Patterns in Complex Systems
- #59 Buddhika Nettasinghe, Allon Percus and Kristina Lerman, How Out-Group Animosity Shapes Partisan Divisions: A Dynamical Model of Affective Polarization

12:00 PM - 1:30 PM: **Lunch Break and Posters [RT]**

1:30 PM - 2:20 PM: **Keynote 5: Réka Albert [SH]**

"Boolean Modeling of Biological Systems: How to Refine a Model to Improve Its Predictive Power"

Session Chair: Luis Rocha

(2:20 PM – 2:30 PM: 10 minutes for transition)

2:30 PM - 3:50 PM: **Parallel Sessions**

Contributed Talk Session 7: Sponsored Session: AI and Society [SH]

Session Chair: Changqing Cheng

- #55 Akshay Gangadhar and Hiroki Sayama, Opinion dynamics and the unpredictability of opinion trajectories in an adaptive social network model
- #14 Danushka Bandara, Ruhuan Liao and Leslie Abbott, Classification of human trust in AI using brain activity data
- #23 Kaj Hansteen Izora and Christof Teuscher, Exploring the Potential of Large Language Models (LLMs) to Simulate Social Group Dynamics: A Case Study Using the Board Game "Secret Hitler"
- #49 Sadamori Kojaku, Visualizing ideas in motion through researcher mobility with Lorentzian hyperbolic space

Contributed Talk Session 8: Healthcare and Public Health [ES]

Session Chair: Zeynep Ertem

- #63 Hicham El Baz and Yong Wang, Integrating AGVs into Complex Systems: Enhancing Efficiency and Cost Savings in Healthcare Material Handling
- #18 Brandon Bedenbender, Agent-Based Modeling to Stress Test New York State Healthcare Robustness
- #31 [Online] Lu Zhong, Pei Sen and Jianxi Gao, Patient flow networks absorb healthcare stress during pandemic crises in the United States
- #41 Bibandhan Poudyal, Gourab Ghoshal and David Soriano-Panós, Can Mobility Save Us From Both? Unraveling the Dynamics of Dual Disease Spread

(3:50 PM – 4:10 PM: 20 minutes for coffee break)

4:10 PM - 05:00 PM: **Keynote 6: Jeremy Blackburn [SH]**

"AI and Society: How Can We Get It Right?"

Session Chair: Srinivas Pandey

Day 3 (Friday April 11th, 2025)

8:00 AM - 12:00 PM: *Registration open*

9:00 AM - 9:10 AM: Opening Remarks [SH]

9:10 AM - 10:00 AM: **Keynote 7: Sarah Muldoon** [SH]

"Quantifying Individual Differences in Brain Network Evolution"

Session Chair: Georgi Georgiev

(10:00 AM – 10:20 AM: 20 minutes for coffee break & transition)

10:20 AM - 11:20 AM: **Parallel Sessions**

Contributed Talk Session 9: Complex Networks I [SH]

Session Chair: Rory Eckardt

- #43 Chirantha Piyamal Tharusha Bandara and Naoki Masuda, Enhancing Spatial Early Warning Signals: Optimized Node Selection for Tipping Point Detection
- #38 Haoyang Qian and Malbor Asllani, Dense communities drive epidemic spreading in structured populations
- #25 Ziqi Guo, Jack Felag, Jordan Rozum, Xuan Wang, Luis Rocha and Rion Correia, Focused digital cohort selection from social media using the metric backbone of biomedical knowledge graphs

Contributed Talk Session 10: Complexity Reduction [ES]

Session Chair: Changqing Cheng

- #21 Bisna Mary Eldo, Sarbendu Rakshit and Naoki Masuda, Dimension reduction for graphon nonlinear dynamical systems
- #22 Tucker Mastin and Christof Teuscher, Coarse-Graining Spiking Reservoirs: Reducing Reservoir Size While Preserving Critical Dynamics
- #46 [Online] Sarbendu Rakshit and Naoki Masuda, Low-dimensional approximations in hypergraph dynamical systems

(11:20 AM – 11:30 AM: 10 minutes for transition)

11:30 AM – 12:20 PM: **Keynote 8: Joaquin Goni** [SH]

"Human Brain Functional Connectivity: Fingerprinting and Reconfiguration"

Session Chair: Luis Rocha

12:20 PM - 1:30 PM: **Lunch Break and Posters** [RT]

1:30 PM – 2:30 PM: **Contributed Talk Session 11: Complex Networks II** [SH]

Session Chair: Carlos Gershenson

- #33 Elisa Ceñal, Mario Franco, Carlos Gershenson and Nelson Fernández, Refining Soccer Analytics: A Classificability-Based Approach to Identifying Key Performance Metrics
- #27 Saiful Islam, Alber Aqil, Omer Gokcumen and Naoki Masuda, Interpretable community detection in multilayer gene co-expression networks
- #56 Akshay Gangadhar, Yoshiaki Fujita and Sadamori Kojaku, Centrality as a form of higher-order cumulative advantage

2:30 PM - 3:20 PM: **Keynote 9: David Sloan Wilson** [SH]

"Complex Systems Science and Generalized Darwinism: Two New Bodies of Information in Need of Integration"

Session Chair: Hiroki Sayama

3:20 PM - 3:50 PM: **Closing and Award Ceremony** [SH]

NERCCS 2025 Accepted Poster List

April 9 - 11, 2025

Binghamton, NY, United States

- #19 Andrea Afify, Leveraging Dynamical System Theory to Optimize Interactions in Virtual Environments
- #24 Eric Solis-Montufar, Alejandro Muñoz-Diosdado, José Alberto Zamora-Justo and Ana María Aguilar-Molina, Analysis of Aftershocks from California and Synthetic Series by Using Visibility Graph Algorithm
- #28 Fathima Nuzla Ismail, Saiful Islam, Alber Aqil, Omer Gokcumen and Naoki Masuda, Multi-Layer Co-Expression Networks: Insights into Gene Expression Variability and Regulatory Interactions
- #29 Javier Gómez Sánchez-Seco, Mary Luz Mouronte-López and Rosa María Benito Zafrilla, Description and recognition of X accounts that publish on the environmental sustainability
- #32 Hiroki Sayama, Updating the Complex Systems Keyword Diagram Using Collective Feedback and Latest Literature Data
- #39 Osamah Yaeesh, Yong Wang and Mohammad Khasawneh, Artificial Intelligence-Driven Forecasting of Immunization Needs in Rural Regions
- #42 Dalal Bamufleh and Yong Wang, Optimizing Energy Storage Systems Supply Chains: A Bibliometric Analysis (2014-2024)
- #45 Michael Magid, Melissa Zeynep Ertem and David Cingranelli, Comparative Analysis of Intervention Strategies for Mass Atrocity Prevention Using Agent-Based Modeling
- #52 Thankgod Ikpe, Takayuki Hiraoka and Naoya Fujiwara, Epidemic Induced Network Evolution
- #53 Muhammad Aasif Shaik Sulaiman, Yong Wang, Natalya Chernova, Shailesh Upreti, Baasit Ali, Qijin Huang, Niloofar Karami and Amar Mallu, ADVANCEMENTS IN THE BATTERY TECHNOLOGY: EMERGING TECHNOLOGIES
- #60 Yara Suleiman, Congyu Wu, Sujoy Sikdar and Narmada Sambaturu, Analyzing Empirically Measured Social Connectivity Patterns Among University Students: A Case Study in UT Austin
- #67 Kaviyarasan Ganesamoorthy and Neha Patankar, Optimizing Renewable Energy Siting in New York State: A Scenario-Based Approach for Onshore Wind and Utility-Scale Solar Development
- #73 Omar Faruq Osama and Margia Yesmin, Adaptive Equilibrium Learning: Integrating Transformer-Based Neural Networks with Evolutionary Game Theory for Multi-Agent Decision Optimization

Logistic Information

Registration desk – Registration will open at 8:00am on each day. Its location will be near the Rotunda. Please pick up your registration materials before going to sessions. You are required to always wear your name tag while you participate in the conference.

Parking – Parking spaces in Lot J and Lot J5 right next to the conference venue are available for NERCCS 2025 participants free of charge.

Rooms – Keynote and plenary sessions will be held in the Symposium Hall. Parallel sessions will be held in the Symposium Hall and ES 2008. Poster sessions and coffee/lunch breaks will be held in the Rotunda. A physical meeting space (CE 2011) is also available for participants to use during the conference. Feel free to use CE 2011 for checking emails, having an online meeting, or organizing a collaborative discussion with other fellow participants. See the map on the back cover.

Oral presentation – All the speakers (both in-person and online) will use Zoom to present their talks. Meeting room links have been emailed to the conference participants. Make sure to log in to Zoom (you can use any Zoom account) before connecting to the meeting room. If you are an in-person presenter, please mute yourself and reduce the laptop's speaker volume to zero to avoid audio feedback. No need to physically connect your laptop to the projector; the screen sharing will be projected to the room via the organizer's laptop.

Poster presentation – Posters will be displayed in the Rotunda during the conference. Binder clips to mount your poster will be provided. Please present your poster during the lunch breaks on each day.

WiFi – You can use Binghamton University's WiFi by connecting to **Welcome2Bing** and following instructions. You can also connect to **eduroam** if you have an account.

Social media – We encourage participants to spread their conference experience on social media. The conference's official hashtag is **#NERCCS2025**.

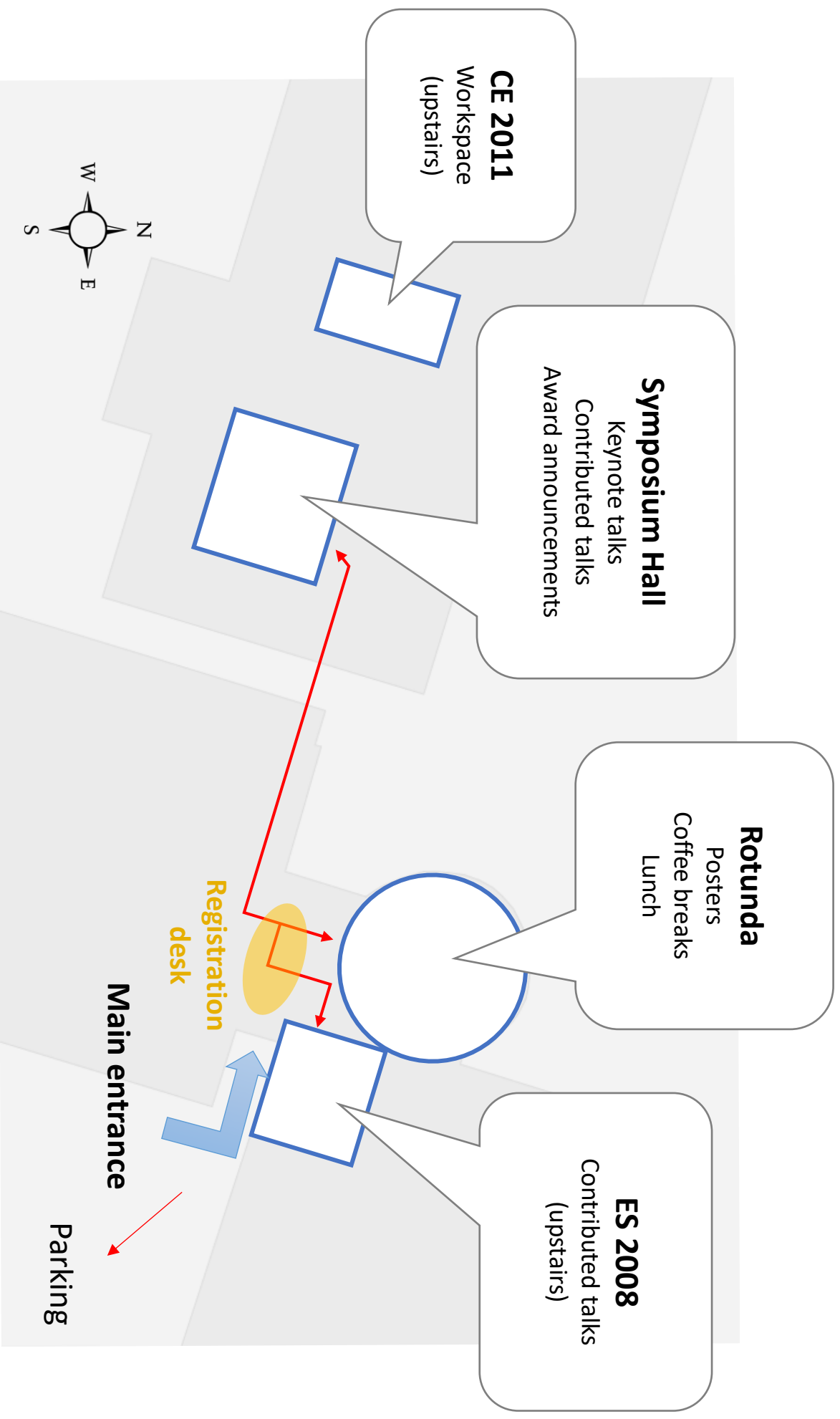
Lunch – Lunch will be included in the registration. Special lunch options (e.g., vegetarian) will be available for those who submitted specific dietary requests. Those who did not submit such requests should not take those lunch options.

Places to eat & local attractions – <https://VisitBinghamton.org> provides a lot of local information about food, entertainment and attractions. Also check out the VisitBinghamton booklet that is available at the registration desk.

Transportation – OCC Transport's ITC-UClub Shuttle serves the Innovative Technologies Complex (<https://occtransport.org/pages/routes/iu.html>). For public transportation in the Greater Binghamton area, see BC Transit's website (<https://broomecountyny.gov/transit/>).

Emergency contact information – In case of emergency (medical, fire, etc.), call the University Police at 607-777-2222 or call 911.

NERCCS 2025 Map



<https://nerccs2025.github.io/>

Conference hashtag: #NERCCS2025