

# The Sanghani Center for AI & DA



SANGHANI CENTER FOR ARTIFICIAL  
INTELLIGENCE & DATA ANALYTICS

# Formerly known as the Discovery Analytics Center

- Research center focused on data science, ML, and knowledge discovery in key areas of national interest
  - intelligence analysis, sustainability, urban computing, and health informatics
- Diverse sponsor portfolio
  - Federal: NSF, NEH, DARPA, DTRA, IARPA, DHS, US Army, ONR
  - Industry: General Motors, HP Labs, NEC Labs, Google
- Composition
  - 18 academic faculty
  - 3 research faculty
  - 1 adm faculty
  - 2 adm staff (full-time)
  - 2 adm staff (part-time)
  - 115 Grad students (90 PhD)
  - 10 UG students



Bburg (Torg Hall)



NCR (Arlington)



NCR (Falls Church)



Bburg (Kelly Hall)



# Center Faculty and Areas

## Computer Science

Hoda Eldardiry  
Edward A. Fox  
Lenwood Heath  
Lifu Huang  
Anuj Karpatne  
Ismini Lourentzou  
Chang-Tien Lu  
Chris North  
Naren Ramakrishnan  
Chandan Reddy  
Layne T. Watson  
John Wenskovitch

## Statistics

Leanna House  
Scotland Leman

## ECE

A. Lynn Abbott  
Jia-Bin Huang  
Ruoxi Jia

## Math

Mark Embree

## Research Faculty

Patrick Butler  
Nathan Self  
Brian Mayer

## Areas

Visual Analytics  
Human in the Loop  
Explainability  
Spatial Databases  
Temporal Data Mining  
Social Networks  
Science-Guided ML  
Natural Language  
Processing  
Probabilistic Reasoning  
Bayesian Statistics  
Information Theory  
Computer Vision  
Image Processing



# Personnel



Wanawsha Shalaby,  
Manager of Operations



Afroze Mohammed,  
Industry Programs  
Director



Joyce Newberry,  
Grants  
Administrator



Juanita  
Victoria,  
Administrative  
Assistant



Barbara  
Micale,  
Public  
Relations  
Specialist



# Graduate Certificate in Data Analytics

- A 12-credit graduate certificate program open to all Virginia Tech students in Blacksburg and the NCR:
  - Teaches students to develop new analytical methods and tools by integrating the computational, statistical, and engineering techniques that form the heart of big data analytics.
- Collaboration between CS, STAT, and ECE.
  - Administered by Sanghani Center, faculty advisor is Chris North
- 12 credit certificate involving 2 core courses and 2 electives:
  - Core courses: CS/STAT 5525: Data Analytics I, CS/STAT 5526: Data Analytics II, and CS 5824/ECE 5424: Advanced Machine Learning
- More information including FAQ & Checksheet at:
  - <https://dac.cs.vt.edu/academics/data-analytics/>



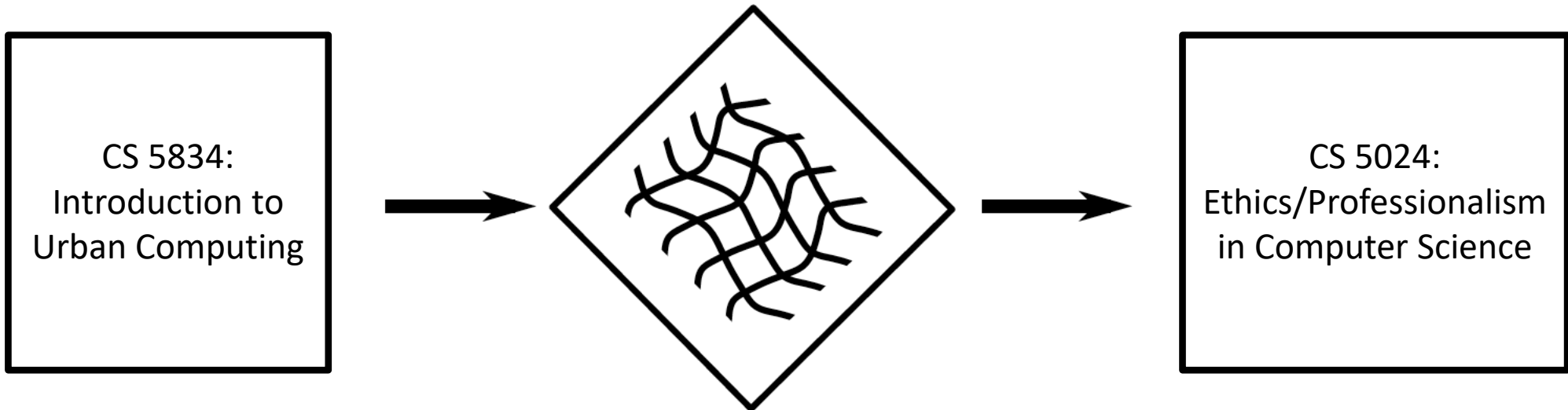


# Graduate Certificate in Urban Computing

- A 12-credit graduate certificate program open to Virginia Tech students
  - Focused on computational and data analytics approaches to solving problems faced in urban domains
- Supported by a \$3M NSF NRT (National Research Traineeship) Grant
- Collaboration between the departments of CS, STAT, ECE, MATH, PHS, CEE, SOC, UAP
  - The certificate is administered by the Sanghani Center
- More information including FAQ and Checksheet:  
<https://dac.cs.vt.edu/academics/urban-computing/>



# The UrbComp Curriculum



# Weaving a Tapestry

- Goals: disciplinary depth, methodological breadth (cf. CMDA undergrad major)
- Offer *approachable* classes that offer such depth and breadth for a diverse set of students
- Work with students / advisors to identify good “horizontal” courses with reasonable prerequisites

“Horizontal” (Research Methods) Courses		“Verticals” (Applications) Courses
CS/STAT 5525 and 5526: Data Analytics I & II	CS 5824/ECE 5424: Advanced Machine Learning	CEE 5604: Traffic Flow and Characteristics
STAT 5104: Prob. & Dist. Theory	STAT 5444: Bayesian Statistics	CEE 5634: Analysis & Planning of Mass Transit Systems
ECE 5554: Computer Vision	ECE 5606: Signal Detection and Estimation	PHS 5314: Infectious Disease Epidemiology
CS 5804: Graduate AI	CS 5604: Information Storage & Retrieval	PHS 5334: Modeling Infectious Diseases
CS 5764: Information Visualization	CS 5234: Advanced Parallel Computation	ECE 6364: Smart Grid Design and Operation
CS 6424/ECE 6424: Probabilistic Graphical Models and Structured Prediction	STAT 5314: Monte Carlo Methods in Statistics	ECE 6304: Advanced Topics in Power
STAT 5434: Applied Stochastic Processes	STAT 5504: Multivariate Statistical Methods	ECE 6334: Computational Methods in Power Engineering
STAT 5544: Spatial Statistics	STAT 6114: Adv. Topics Stat Inference	SOC 5504: Population Processes and Policies
CS/MATH 5465/5466: Numerical Analysis I&II	ISE 5405 and 5406: Optimization I and II	SOC 6504: The Sociology of Culture
MATH 5454: Graph Theory	MATH 5524: Matrix Theory	SOC 6524: Sociology of Health
MATH 5515/5516: Modeling and Simulation of Biological Systems	ECE 5634: Information Theory	UAP 5234: Urban Economics and Policy
ECE 5734: Convex Optimization	ECE 5524: Pattern Recognition	UAP 5784: Urban Fiscal Resilience





# Other Key Components of UrbComp

- Co-advising across horizontal and vertical departments w/ shared expectations
- Partnerships with government/industry to support internships, data sharing for research, practicums
  - WMATA, The Police Foundation, NEC Labs, Zillow, Commonwealth of Virginia, and Loudoun County Public Schools
- Seminars featuring both internal and external research, simulcast across B"burg and NCR campuses



# UrbComp fellows

## First graduates of UrbComp Program:

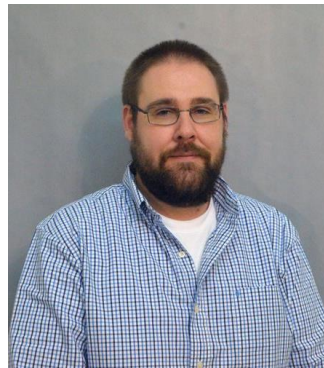


Huthaifa Ashqar,  
Department of Civil  
and Environmental  
Engineering, Now:  
Transportation Analyst  
at Booz Allen  
Hamilton



Gloria Kang,  
Department of  
Population Health  
Sciences, Now: Post-  
doctoral Fellow at  
Center for Disease  
Control and  
Prevention

## Currently Funded Students:



Matt Slifko, STAT,  
co-advised by UAP



Jonathan Baker, MATH,  
co-advised by ME



Nikhil Muralidhar, CS,  
co-advised by ECE



Davon Woodard, UAP,  
co-advised by CS



Michelle Dowling, CS,  
co-advised by COMM



Moeti Massiane, CS,  
co-advised by CEE



Ellis Kessler, ME,  
co-advised by MATH



Shane Bookhutz, STAT,  
co-advised by AAEC



Stacey Clifton, SOC,  
co-advised by CS



# Thank you!

**Wanawsha Shalaby (on maternity leave, Sept. 13 – Jan. 24),**  
**[wanah92@vt.edu](mailto:wanah92@vt.edu)**

**Juanita Victoria,**  
**[juaniv6@vt.edu](mailto:juaniv6@vt.edu)**



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