



Mathematics & Statistics

Chair's Message: Dr. Hideaki Kaneko

Hello Faculty, Staff, Students and Alumni

We have concluded an exciting and productive fall 2018 semester. At the undergraduate level, the department has piloted two important pilot programs aimed at improving students' performance in their mathematics and statistics classes. Bob Strozak, Blair Swoope and Andrea Jones have restructured the Math 162 course so that a number of problem sessions became a part of the course. Preliminary results show that the program has been very successful. We will collect more data on this pilot program in spring 2019. Robin Flanagan and Jeanette Shaw have piloted an ALEKS based Math 103 class in fall 2018. We will run this pilot program also in spring 2019 as preliminary data show some positive results. I congratulate all of the faculty who are participating in these pilot programs.

The department hosted two conferences: Southern Regional Conference on Statistics, SRCOS, during June 3-6 and The Second International Conference on Mathematics of Data Science, ICMDS, during November 2-4. Norou Diawara served as the organizer of SRCOS and Yuesheng Xu and Hideaki Kaneko were co-chairs of ICMDS. Katie Smith also played a significant role in the organization of ICMDS.

The department's Big Data Analytics program is off to a great start. Katie Smith taught BDA 411/511 – Introduction to Machine Learning I and Yuesheng Xu taught BDA 432/532 – Introduction to Optimization and Inverse Problems in fall 2018. In the area of research, the faculty gave many conference talks as well as seminars. A list of these presentations is included in this newsletter. The department continues to host a number of post-doctoral research associates and visiting graduate students. The total research expenditure has increased to \$833,920 from the previous level of \$669,176. I expect this amount to increase even more since several faculty members are very active in seeking external funding. During the spring of 2019, the department will be conducting three searches to find qualified faculty members: (1) Assistant Professor of Data Science – Computational Mathematics, (2) Assistant Professor of Data Science – Computational Statistics, (3) Assistant Professor of Statistics.

Thank you very much for your support in the past and I look forward to working with you in the year 2019!



Inside this issue

Chair's Message	
Welcome—Faculty, Staff, Students	
ICMDS 2018 Conference	
Featured Faculty	2
ICMDS 2018	2—3
Presentations	4
Visiting Scholars	5
Scholarship	5
Dr. Doviak Retirement	6
Southern Regional Conf.	7

Special points of interest

- Presentations 2018
- Julia Robinson Festival
- Scholarships
- Visiting Scholars
- Mike Doviak Luncheon

Featured Faculty Members:



Lee C. Land:

Ms. Land is Master Lecturer. She received M.S. degree in Computational and Applied Mathematics from ODU in 2003. She received a number of awards: The College of Science Distinguished Teaching Award (2013), Shining Star Award (2015), You Make A Difference Award (2016) and Most Influential Professor Award (2016). Lee wrote a textbook on College Algebra and recently developed online version of Math 163—Pre-Calculus II. We congratulate Lee for all of these accomplishments!



Li-Shi Luo:

Dr. Luo is Richard F. Barry Professor of Mathematics. He is also designated as Eminent Scholar. Li-Shi received his PhD from Georgia Institute of Technology in 1993. He joined ICASE at NASA Langley in 1996 and served as Senior Scientist till 2004 when he joined the department. Li-Shi is an internationally known scientist in the field of Lattice Boltzmann Methods. He has secured several grants from the agencies such as NSF, DoD, NASA LaRC, NIA, US Navy and US Air Force. Dr. Luo also served on the editorial board of Journal of Scientific Computing, Journal of Statistical Physics and SIAM Journal of Scientific Computing. He has published more than 70 research articles, some of which are considered groundbreaking.

Goal of ICMDS 2018: *Bringing together an international community of mathematicians and scientists to address important mathematical issues in data science.*

ICMDS 2018

The **Second International Conference on Mathematics of Data Science** was held on campus of ODU from November 2 – 4. The Department of Mathematics and Statistics played as the main organizer of this event. The Organizing Committee was comprised of Yuesheng Xu, Hideaki Kaneko, Katie Smith, Fang Hu, Norou Diawara, Gail Dodge and Robert Wojtowicz. The conference received financial support from eight sponsors:

- National Science Foundation
- Inspur
- Konwin
- Frontiers in Applied Mathematics and Statistics
- College of Sciences
- ODU Graduate School
- Department of Computer Science
- Department of Mathematics and Statistics

The support from the National Science Foundation enabled us to provide travel support for graduate students and post-doctoral researchers.

The conference attracted more than 110 students, post-doctoral researchers as well as professors from around the world who work in the area of Data Science. Plenary speakers for the conference were:

- Norden Huang, Fellow of the U.S. Academy of Engineering, K. T. Lee Chair professor of the National Central University.
- Zuowei Shen, Tan Chin Tuan Professor of Mathematics, National University of Singapore
- Ding-Xuan Zhou, Chair Professor, City University of Hong Kong
- Wotao Yin, Professor, University of California at Los Angeles

Course Coordinators:

Math 101– Shari Davis
Math 102– Eunice Pepper
Math 103M– R. Flanagan
Math 162– E. Swoope
Math 163– R. Stowe
Math 200- - A. Jones
Math 211/212/312– P. Bogacki &
Gordon Melrose
Stat 130M– Katie Rafferty

ICMDS 2018 Continued:

Other invited speakers were:

- Hrushikesh Mhasker, Claremont Graduate University
- Rosemary Renaut, Arizona State University
- Jack Xin, University of California at Irvine
- Jun Zhang, University of Michigan

Special Sessions on (1) Functional Spaces Suitable for Big Data Analysis (2) Convex and Non-Convex Optimization for Data Analysis (3) Sparse Medical Image Processing (4) Statistical Analysis for Big Data and (5) Applications of Data Science were organized by:

- Norou Diawara, Old Dominion University
- Yaohang Li, Old Dominion University
- Yao Lu, Sun Yat-Sen University
- Lixin Shen, Syracuse University
- Guohui Song, Clarkson University

For additional information, the conference program can be viewed at <http://icmids2018.org>.

Prior to the conference, Old Dominion University's public relations ran an article about the event. We have copied it below.

By Noell Saunders

Old Dominion University's department of mathematics & statistics will host its second international conference on data science mathematics from Nov. 2– 4.

The conference will bring top data science experts to campus. Old Dominion students will have opportunities to attend lectures by international scholars for their perspectives on cutting-edge techniques. Registration fees will be waived for ODU faculty and current students. More information and the schedule can be found at <http://icmids2018.org>.

Data science is a new field that provides theory and methods to help make decisions using raw data.

Hideaki Kaneko, professor and chair of the department of mathematics & statistics, said the event will enhance the University's international reputation and strengthen the connection between academics and practitioners.

"It will certainly provide a great opportunity for the campus to understand how mathematics and statistics play a crucial role in the field of data science," he said. "It will also help ODU to establish collaboration in both research and education in the field of data science with the international participants."

Data science covers almost all fields of science, including social science, engineering, medicine and business analytics. Some examples are a machine learning algorithm for skin cancer detection that matches the performance of dermatologists; supply-chain design and management; advertising; and data-handling techniques to automatically detect relevant features from large data sets. Due to the field's rapid growth, Kaneko said the plan is to organize workshops every year and work with regional government agencies and industry to promote research, education applications of data science.



ICMDS 2018
INTERNATIONAL CONFERENCE ON
MATHEMATICS OF DATA SCIENCE
@ OLD DOMINION UNIVERSITY
NOVEMBER 2-4, 2018
[HTTP://ICMDS2018.ORG](http://icmids2018.org)

THEME
Sparse Representation of Big Data

SPECIAL SESSIONS
Sparse representation of big data sets
Functional spaces suitable for big data
Mathematical foundations of sparse machine learning
Sparse signal and image processing
Statistical analysis for big data
Convex and non-convex sparse optimization for data analysis
Applications of data science

SPEAKERS INCLUDE
Charles Micchelli - SUNY Albany
Zuowei Shen - National University of Singapore
Wotao Yin - UCLA
Anne Gelb, - Dartmouth College
Yao Lu - Sun Yat-sen University
Massimiliano Pontil - Istituto Italiano di Tecnologia & University College London
Rosemary Renaut - Arizona State University
Lixin Shen - Syracuse University
Guohui Song - Clarkson University
Xue-Cheng Tai - Hong Kong Baptist University
Jack Xin - University of California at Irvine
Qi Ye - South China Normal University
Ding-Xuan Zhou - City University of Hong Kong

G To bring together active researchers and practitioners in industry in various fields related to data science to identify mathematical and statistical challenges, promote research collaboration among different areas, and, in particular, to encourage young talent to work in the field of data science.



Presentations by Faculty during Year 2018

John Adam: (1) "Mountain Shadows and Glitter Paths Revisited." ODU Mathematics Awareness SIAM Conference, April 21, 2018. (2) "Patterns in Nature: A Treasure Trove for the Curious". University of Wisconsin at Milwaukee, Fall 2018 Dean's Distinguished Lecture in the Natural Sciences, October 23, 2018.

Przemek Bogacki: "Developing and Teaching an Online Linear Algebra Class – An Interim Report" at the 30th International Conference on Technology in Collegiate Mathematics held March 18-21, 2018 in Washington, DC.

Robert Brown: "A beginner's introduction to Galerkin finite element methods," ODU Mathematics Awareness SIAM Conference, April 21, 2018.

Rao Chaganty: "Dr. T. Krishnan, Professor and Gentleman. Memorial Session. Chennai Mathematical Institute, Chennai, India. August 10, 2018.

Raymond Cheng: (1) "The Pythagorean Comma." Invited Colloquium, Christopher Newport University, Newport News, VA. March 15, 2018. (2) "On the function theory of $l^p(A)$." Southeast Analysis Meeting XXXV Georgia Tech, Atlanta, GA. March 25, 2018.

Fang Hu: (1) "Overview of research activities of Dept. Math and Stat." VMASC, March 21, 2018, (2) "Numerical Investigation on Acoustic Energy Flux Distribution in a Lined Duct," AIAA/CEAS Aeroacoustics Conference, with C. Chen and X. Li, June 2018, (3) "Simulation of Sound Absorption by Scattering Bodies Treated with Acoustic Liners Using a Time-Domain Boundary Element Method," AIAA/CEAS Aeroacoustics Conference, with M.E. Pizzo and D. M. Nark, June 2018.

Sookyung Joo: (1) "Soft-matter Packing, and Active Systems: Materials and Biological Applications," Workshop on Liquid Crystals, IMA, Minneapolis, Jan 2018, (2) "Boundary vortex formation on polarization-modulated orthogonal smectic liquid crystals", SIAM Conference on Mathematical aspects on material sciences, Portland, OR, July 2018, (2) "Switching mechanism in modulated bent-core liquid crystal phases", Choongnam National University, Korea, Aug 2018, (3) "Switching mechanism in modulated bent-core liquid crystal phases", Yonsei University, Korea, Aug 2018.

Li-Shi Luo: (1) "LBE in Rotating Frame of Reference", The 15th ICMMS, University of Delaware, July 9–13, 2018, (2) "Computational Mechanics: Fluids and More", Niels Bohr Institute, Copenhagen, Denmark, June 29, 2018, (3) "Computational Mechanics: Fluids and More", NTNU, Trondheim, Norway, June 19, 2018.

Yet Nguyen: "Identifying relevant covariates in RNA-seq analysis by pseudo-variable augmentation," Third Workshop on Higher-Order Asymptotics and Post-Selection Inference, Washington University at St. Louis, MO, September 08-10, 2018.

Yan Peng: (1) "Study of bioparticle transport using lattice Boltzmann method and immersed boundary method," Joint Mathematics Meetings, San Diego, Jan. 10-13, 2018, (2) "A multigrid lattice Boltzmann model of capsule deformation," The 15th international conference for mesoscopic methods in engineering and science. University of Delaware, Newark, Delaware, USA. July 9-13, 2018.

Ke Shi: (1) "Structure-preserving Finite Element Methods for stationary incompressible magnetohydrodynamics," Hunan Normal University, Changsha, China. June 21, 2018, (2) "DG and HDG methods for stationary incompressible magnetohydrodynamics," The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications. Taipei, Taiwan, July 4-9, 2018, (3) "Multiscale HDG methods for flows in heterogeneous media," South China Normal University, Guangzhou, China. July 18, 2018.

Robert Strozak: (1) "Using Custom "Common Errors" MyLab Questions for High-Risk Calculus Students", International Conference on Technology in Collegiate Mathematics (ICTCM), Washington, DC, March 2018, (2) "Using Open Educational Resources in Precalculus I", International Conference on Technology in Collegiate Mathematics (ICTCM), Washington, DC, March 2018

Lucia Tabacu: "Change point analysis using logarithmic quantile estimation". JSM, July 28-August 2, 2018, Vancouver Canada.

Xiang Xu: (1) "A variational approach to Poisson-Nernst-Planck equations," PDE Seminar, Shanghai University, Shanghai, China, May 18th, 2018, (2) "A variational approach to Poisson-Nernst-Planck equations," Conference, Nonlinear Analysis, PDE and Applications, George Washington University, Washington, DC, Apr. 25th, 2018, (3) "An elementary proof of the eigenvalue preservation for the co-rotational Beris-Edwards system," 42nd SIAM Southeastern Atlantic Sectional Conference, Chapel Hill, NC, Mar. 10th, 2018.

Presentations during Year 2018 Continued:

Yuesheng Xu: (1) Invited Talk, VMASC Research Meeting, Feb. 8, 2018, (2) Plenary Talk, International Workshop on Analysis and Numerical Approximation of Singular Problems, Cagliari, Italy, September 4-6, 2018, (3) Invited Talk, Workshop on Applied Harmonic Analysis and Statistical Learning, University of Alberta, August 2-3, 2018, (3) Invited Talk, Matrix Workshop on the Frontiers of High Dimensional Computation, Melbourne, Australia, June 10-15, 2018, (4) Invited Talk, International Conference on Applied Mathematics 2018, City University of Hong Kong, June 4-8, 2018.

Nail Yamaleev: (1) “Energy and Entropy stable WENO Finite Difference Schemes” at ERC, Edwards Air Force Base, CA, March 21, 2018, (2) “Entropy stable artificial dissipation based on the Brenner regularization of the Navier-Stokes equations” at the Inter. Conf. on Spectral and High-order Methods (ICOSAHOM’18), London UK, July 9-12, 2018.

Ruhai Zhou: (1) “Kinetic simulations of complex fluid of liquid crystal polymers”, 5th Annual NIA Meeting, Hampton, VA 2018, (2) “Numerical simulation results of active liquid crystals using kinetic theory”, SIAMSEAS conference, Chapel-Hill, NC, March 10, 2018.

Visiting Scholars:

We are hosting two visitors from Sun Yat-Sen University:

Dr. Meipeng Zhi – Meipeng received his PhD from Sun Yat-Sen University in 2018. His current research field is the hyperbolic cross approximation of function in the Besov space. His mentor is Professor Yuesheng Xu. While he was an undergraduate student, Meipeng received the third prize in the 2011 China Undergraduate Mathematical Contest in Modeling as well as the second prize in the 2012 American Mathematical Contest in Modeling.

Dr. Rongrong Li – Rongrong received his PhD from Sun Yat-Sen University in 2017 and currently serving as Research Associate Professor there. His research fields are kernel methods in machine learning and also time-frequency analysis. His mentor is Professor Yuesheng Xu. As a graduate student, he received the Outstanding Student Scholarship as well as Guanghai Scholarship. In his young career, Rongrong has published 6 research articles in top journals.

Scholarship

Johnathon Upperman received a prestigious Science, Mathematics and Research for Transformation (SMART) Scholarship from the Department of Defense (DoD). The award is for \$50,000/year (\$38,000 in stipend and \$12,000 for summer internship support for three years. Johnathon’s thesis advisor is **Dr. Nail Yamaleev**. The title of Johnathon’s research is “High-order Entropy Stable Schemes for Modeling Shock Waves from the Decay of Ultra-Short Pulsed Laser Filaments”.

Abstract:

The main focus of this research is on the development of new high-order entropy stable artificial dissipation methods and their application to modelling shock waves generated by ultra-short pulsed laser (USPL) filaments. The energy that a USPL filament deposits into the air converts into the heat mostly in the narrow region where the laser passed through. The deposited energy leads to the formation of an outward-propagating shock wave. Though various first-order finite difference and finite volume methods have been used for simulating this phenomenon, these approaches are too dissipative to accurately simulate multiple laser pulses over sufficiently long period of time. To address these problems, we develop a new high-order nonlinearly stable artificial dissipation spectral collocation method that is capable of accurately capturing the propagation of strong shock waves over large time intervals. The long-term goal of this ongoing research project is to accurately predict and characterize the resultant atmospheric conditions between multiple pulses.



Dr. Michael J. Doviak Retirement

Dr. Doviak is retiring at the end of Fall 2018 semester. Mike received his BS degree in Mathematics from Alfred University in 1968 and his MA degree in Mathematics from Bucknell University in 1970. He then joined the PhD program in Statistics at University of Florida. Mike was quite an athlete at Alfred University where he played in the varsity men's basketball team for 4 years. You may not know this, but he held a school record for rebounding which stood till recently. He was inducted into the Alfred University Athletic Hall of Fame.



At the University of Florida, Mike received his PhD degree in Statistics in 1975. Immediately after that he joined the Department of Math & Stat in the fall of 75. He took a year of leave at Lederle Laboratories in NY as a statistical consultant but otherwise spent his entire career at Old Dominion University.

Throughout his career, he published a number of articles and provided statistical consultation to faculties in and outside the department. He is a well-regarded instructor of statistics courses and has been very popular among the students. In the student opinion survey, students routinely express their appreciation for Mike's passion for teaching and caring toward his students. During his tenure, Mike developed three important statistics courses for the department: Statistical Methods for Health Scientists, Categorical Data Analysis and Biostatistics for MPH students.

Dr. Doviak continued his professional activities in the area of actuarial science. He played a catalytic role in establishing the actuarial science major within the BS degree in Mathematics. Throughout this process Mike took and passed 8 exams which are administered by the Society of Actuaries, sufficient to attain the designation of Associateship in the society.

Please join me in congratulating him for his dedicated service to the department and for the job well done!

Southern Regional Conference on Statistics

The Southern Regional Conference on Statistics held its annual meeting at Virginia Beach Resort Hotel in Virginia Beach during June 3-6, 2018. The conference website is <https://www.odu.edu/math/srcos>. Dr. Norou Diawara (picture shown on right) was the ODU contact/organizer to bring this conference to this region. Dr. Diawara reports the following:

“The Summer Research Conference (SRC) organized by Old Dominion University in Virginia Beach was on June 3-6, 2018. It was a wonderful venue, with many great talks and opportunities to connect and learn from experts in the field. We had more than 100 participants from universities and research entities in the South-East of US, and many private companies such as SAS and Google.

The conference was a success because of the dedication of the committees directed by Professors Susmita Datta (University of Florida) and Rudy Guerra (Rice University), and all their invited guests and speakers.

Many thanks are due to the following Old Dominion University members: Profs. Kaneko, Chaganty, Bogacki, Tabacu, and secretaries: Mrs. Jeffrey-Dixon, Hegwood and Venables, and our graduate students, specially: Jennifer Lorio and Mohammed Alqawba, and the many other ODU members.

We had wonderful times. ODU has gained tremendously in organizing the meeting, and it has truly been a pleasure and an honor hosting the research program.”



Julia Robinson Mathematics Festival : March 2, 2019

The ODU Math & Stats department will be hosting the Second JRMF ODU Mathematics and Computer Science Festival at Old Dominion University this year! In short, this is an event where fourth through eighth grade students come to ODU and play math and computer science!

The event is a free, non-competitive celebration of great ideas and problems in mathematics and computer science. There are many activities with levels of difficulty from fourth grade to problems that would challenge college mathematics majors, so there is no chance any student will be too challenged or bored. The activities are led by ODU faculty and students, so students get to come on campus and see that math and computer science don't have to be scary or intimidating! This year's event will be held Saturday, March 2, 2019 from 9 am to 12 pm in ODU's Webb Center and registration opens January 19.

The event coordinators are Katie Smith (pictures shown on right) and Blair Swoope (picture unavailable).



Save the Date!
ODU Mathematics
and Computer Science
Festival

Sat, Mar 2,
2019
9:00-12:00

Fun Math and CS
activities,
t-shirts, snacks,
and more . . .

ODU Webb
Center

For more info: <https://fs.wp.odu.edu/k3smith/jrmf>
Contact: Katie Smith k3smith@odu.edu



Richard F. Barry Seminars—Fall 2018

Dr. Yan Peng became a new RFB Colloquium coordinator. She arranged a number of speakers to the department. busy semester of the RFB colloquium. Speakers were:

Aug. 30– Jan Nordstrom, Linking University, Sweden

Sept. 27–Yangwen Zhang, University of Delaware

Oct. 18–Kevin Potcner, SAS Institute

Nov. 1–Zuomei Shen, Nat'l University of Singapore

Nov. 8– Hongjie Dong, Brown University

Nov. 30– Shidong Jiang, N.J. Institute of Technology

Dec. 7– Honghu Liu, Virginia Tech

April 19, Ana-Maria Staicu, N.C. State U.

Mathematical & Statistical Department

4700 Elkhorn Avenue
ECSB/2nd Fl. Suite
2300
Norfolk, Va. 23529

Officers and Staff - Department of Mathematics & Statistics

- Chair: Hideaki Kaneko
- Associate Chair of Research: Fang Hu
- Assistant Chair of Instruction: Gordon Melrose
- GPD: Raymond Cheng
- Statistics Program Director; Rao Chaganty
- CDA: Robert Strozak
- Faculty Advisor of Student Chapter of SIAM: Raymond Cheng
- RFB Colloquium: Yang Peng
- Faculty Advisor of Student Chapter of Association for Women in Mathematics (AWM) Sookyung Joo.
- Coordinator of Online instruction: P. Bogacki
- Office Managers: Sheila Hegwood, Miriam Venable (both in ECSB)