Curriculum Vitae
Joon Ha

Contact Information
Department of Mathematics, Howard University
Annex III, Room 222, College St. NW & 4th St. NW
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Google Scholar: Link
ResearchGate: Link

Areas of Interest

- Mathematical Modeling of Diabetes and Neuroscience
- Applied Dynamical Systems
- Clinical Studies of Diabetes

Professional Positions

- Associate Professor, Department of Mathematics, Howard University, Washington, DC, U.S.A. (Aug. 2021 – Present)
- Special Volunteer, Laboratory of Biological Modeling (LBM), National Institute of Diabetes Digestive and Kidney Disease (NIDDK), National Institutes of Health (NIH), Bethesda, MD (Aug. 2021 – Present)
- Visiting Professor, AI and Mathematical Machine Learning Centers, POSTECH, South Korea (May 2024 – Aug. 2024)
- Senior Researcher, Joint appointment with The Pusan National University Hospital, South Korea (June 2023 – May 2026)
- Invited Scientist, Brain Pool Program, South Korea Government (May 2022 – Dec. 2024)
- Federal Government Scientist, LBM, National Institute of Diabetes and Digestive and Kidney Disease, NIH, Bethesda, MD, U.S.A. (Dec. 2018 – Aug. 2021)
- Research Fellow, LBM, NIDDK, NIH, Mentor: Dr. Arthur Sherman (Dec. 2015 – Nov. 2018)
- Visiting Research Fellow, LBM, NIDDK, NIH, Mentor: Dr. Arthur Sherman (Dec. 2010 – Nov. 2015)
- Postdoctoral Fellow, Department of Mathematical Sciences, Indiana University Purdue University Indianapolis, Mentor: Prof. Alexey Kuznetsov (Sep. 2008 – Oct. 2010)

Education

- Ph.D. in Applied Mathematics, New Jersey Institute of Technology, Newark, NJ (May 2008)
    - Advisor: Dr. Amit Bose

Awards

1) The Recipient of 2024-25 College of Arts and Sciences Award for **Outstanding Research by an Associate Professor**, Howard University
2) **Young Investigator Award**, American Diabetes Association (June 2021)

GRANTS

Funded

1) Artificial Intelligence Faculty Cluster Hiring (by Provost Office)
    - *Title:* Enhancing AI infrastructure and fostering interdisciplinary Excellence at Howard University
    - *Role:* Co-PI
    - *Duration:* 06/01/2025 -
    - *Status:* Two faculty Hiring Funded
2) NSF DMS 2401921 & DMS 2401922
    - *Title:* Collaborative Research: Identifying the dynamic structure of diabetes with existing mathematical models and its enhancement of diabetes research as its clinical application
    - *Role:* Primary PI (Total: $1,000,000, Portion: $650,000)
    - *Duration:* 09/01/2024 - 08/31/2029
    - *Status:* Funded
3) ERNEST JUST-PERCY JULIAN Graduate Research Assistantship with Ph. D. student Jazmin Jones, April 2023 (awarded)
4) NIH Grant, dkNET New Investigator Pilot Program in Bioinformatics (NIDDK, NIH)
    - *Title:* Estimating Relative Beta-Cell Function During Continuous Glucose Monitoring
    - *Role:* Single PI
    - *Funding:* $230,582
    - *Collaborator:* Dr. Gail Nunlee-Bland, Howard University Hospital
    - *Duration:* 07/01/2022 - 06/30/2025
    - *Status:* Funded
5) AIM-AHEAD Data Training subaward, NIH
    - *Role:* Single PI
    - *Funding:* $30,000
    - *Duration:* 07/15/2022 - 07/14/2023
    - *Status:* Funded
6) Brain Pool Program, National Foundation of South Korea (NRF)
    - *Title:* Finding a Robust Early Biomarker of Progression to Type 2 Diabetes Mellitus
    - *Role:* Invited Scientist, Host Institute: Pusan National University Hospital, South Korea
    - *Funding:* ~$130,000
    - *Duration:* 05/10/2022 - 12/31/2024
    - *Grant Number:* 20202H1D3A2A01063552
    - *Status:* Funded

Pending

7) DOD Grant
    - *Title*: Multi-Omics Research and STEM Training at Howard University Through Advanced Mass Spectrometry
    - *Role:* Co-PI (Total: $999,000)
    - *Duration:* 10/01/2025 -
    - *Status:* Pending

Publications (peer reviewed)

Under review

1) A novel disposition index without insulin is an earlier and better diabetes risk predictor than current diagnostic criteria, *The Journal of Clinical Endocrinology & Metabolism*, Soree Ryang, Jinmi Kim, Doohwa Kim, Myungsoo Im, Mihee Jang, Wook Yi, Jeong Mi Kim, Minsoo Kim, Yeong Jin Kim, Young Jin Kim, Hyuk Kang, In Joo Kim, Stephanie T. Chung, Michael Bergman, Arthur S. Sherman, Sang Soo Kim, Joon Ha
2) Genetic and Lifestyle Factors Influence High One-Hour Plasma Glucose, a Predictor of Type 2 Diabetes, *The Diabetes Metabolism Journal,* Soobin Cho, Hyunsuk Lee, Joon Ha, Yeonsoo Park, Kyong Soo Park, Nam Han Cho, Michael Bergman, Soo Heon Kwak
3) Decling insulin sensitivity is a key pathological contributor to dysglycemia in Korean: A Longitudinal Validation Study in the Korean Genome and Epidemiology study (KoGES), *Diabetes Research and Clinical Practice*, Doohwa Kim, Jinmi Kim, Myungsoo Im, Soree Ryang, Minsoo Kim, Yeong Jin Kim, Young Jin Kim, Hyuk Kang, In Joo Kim, Ram Jagannathan, Stephanie T. Chung, Michael, Arthur S. Sherman, Sang Soo Kim, Joon Ha

2024

4) High one-hour plasma glucose is an intermediate risk state and an early predictor of type 2 diabetes in a longitudinal Korean cohort, *Diabetes Research and Clinical Practice* 219, 111938, Dec 2024. Myungsoo Im, Jinmi Kim, Soree Ryang, Doohwa Kim, Wook Yi, Jeong Mi Kim, Minsoo Kim, Yeong Jin Kim, Young Jin Kim, Hyuk Kang, In Joo Kim, Ram Jagannathan, Stephanie T. Chung, MBBS, Michael Bergman, Arthur S. Sherman, Sang Soo Kim, Joon Ha
   https://doi.org/10.1016/j.diabres.2024.111938
5) Staging schema for early diagnosis of prediabetes, *The Lancet Diabetes & Endocrinology* 12 (12), 873-876, Dec. 2024. Michael Bergman, Muhammad Abdul-Ghani, Juliana Chan, Maria Inês Schmidt, Joon Ha, Sang Soo Kim, Arthur S Sherman, Ram Jagannathan, Jaakko Tuomilehto. Impact factor: 44
   DOI: 10.1016/S2213-8587(24)00320-6
6) Determining the 1-hour post-load glucose which Identifies diabetes in Africans: Insight from the Africans in America Study Research Brief, Claudine B. Kabeza, Kauthrah Ntabadde1, Christopher W. DuBose, Joon Ha, Arthur S. Sherman, Anne E. Sumner
   Diabetes Research and Clinical Practice, Aug. 2024 Diabetes Research and Clinical Practice 214, 111792
   https://doi.org/10.1016/j.diabres.2024.111792
7) A Mathematical Model-Derived Disposition Index Without Insulin Validated in Youth with Obesity, Ha et al. *The Journal of Clinical Endocrinology & Metabolism*, dgae582, Aug. 2024, https://doi.org/10.1210/clinem/dgae582
8) Estimating Insulin Sensitivity and Beta-Cell Function from the Oral Glucose Tolerance Test: Validation of a new Insulin Sensitivity and Secretion (ISS) Model,

American Journal of Physiology, Endo. And Metabolism, April 2024, Ha et al. doi: 10.1152/ajpendo.00189.2023

9) Validation of Clinical Risk Model to Predict Future Diabetes, SS Kim, J Kim, J Ha, *Journal of Korean Medical Science*, 2024 Jan 31;39(5):e69 doi: 10.3346/jkms.2024.39.e69

2023

10) One-hour plasma glucose is an earlier marker than the two-hour for prediabetes and diabetes, *Diabetes Research and Clinical Practice*, Sep. 2023, vol. 203. Ha et al. https://doi.org/10.1016/j.diabres.2023.110839
11) Glycemia and Gluconeogenesis With Metformin and Liraglutide: A Randomized Trial in Youth-onset Type 2 Diabetes, *Journal of Clinical Endo and Metabloism*, Nov. 2023. Katrina Dietsche, Sheela N. Magge, Sydney Dixon, Faith Davis, Andrea Krenek, Aruba Chowdhury, Faith Davis, Lilian Mabundo, Michael Stagliano, Amber Courville, Shanna Yang, Sara Turner, Hongyi Cai, Arthur Sherman, Joon Ha, Eileen Shouppe, Mary Walter, Peter J. Walter, Fran Cogen, D. Elizabeth Estrada, Shaji Chacko, Stephanie T. Chung https://doi.org/10.1210/clinem/dgad669
12) Predictive value of 1-Hour Glucose elevations during oral glucose tolerance testing for Cystic Fibrosis-Related Diabetes, *Pediatric Diabetes*, April 2023, https://doi.org/10.1155/2023/4395556 Andrea Lorenz, Collin Walentine, Laura Pyle, Joon Ha, Arthur Sherman, Melanie Cree-Green, Scott Sagel, Kristen Nadeau, Christine Chan

2022

13) Editorial: Metabolic Estimates during Glucose Challenge Tests and Continuous Glucose Monitoring, *Front. Physiol*., 16 December 2022, Sec. Clinical and Translational Physiology Volume 13 - 2022, Joon Ha, Melanie Cree-Green, Stephanie Chung, Cecilia Diniz Behn
14) The relationship between lipoproteins and insulin sensitivity in youth with obesity and anbormal glucose tolerance, *Journal of Clinical Endocrinology & Metabolism* 2022 ;107 (6), 1541-1552, ST Chung, LEL Katz, N Stettler-Davis, J Shults, A Sherman, J Ha, Darko Stefanovski, Ray C Boston, Daniel J Rader, Sheela N Magge
15) Slow Oscillations persist in pancreatic beta cells lacking phosphofructokinase M, *Biophysical Journal* 121 (5), 692-704, Isabella Marinelli, Vishal Parekh, Patrick Fletcher, Benjamin Thompson, Jinhua Ren, Xiaoqing Tang, Thomas L Saunders, Joon Ha, Arthur Sherman, Richard Bertram, Leslie S Satin

2021

16) Beta-cell failure rather than insulin resistance is the major cause of abnormal glucose tolerance in Africans: insight from the Africans in America study, *BMJ Open Diabetes Res Care* 2021 Sep;9(1):e002447, M C Sage Ishimwe , Annemarie Wentzel , Elyssa M Shoup , Nana H Osei-Tutu , Thomas Hormenu , Arielle C Patterson , Hadi Bagheri, Christopher W DuBose , Lilian S Mabundo, Joon Ha , Arthur Sherman, Anne E Sumner
17) MINMOD Artififactually Interprets Strong Insulin Secretion as Weak Insulin Action, *Frontiers in Physiology, Section System Biology*, DOI: 10.3389/fphys.2021.601894 Joon Ha, Ranganath Muniyappa, Arthur Sherman, Michael J. Quon Michael

2020

18) The OGTT is highly reproducible in *Africans* for the diagnosis of diabetes: Implications for treatment and protocol design. Diabetes Research and Clinical Practice 170, 10852, Oct. 2020, Journal Impact Factor=4.234
Ram Jagannathan, Christopher W DuBose, Lilian S. Mabundo, Stephanie T. Chung, Joon Ha, Arthur Sherman, Michael Bergman, Anne Sumner

19) Type 2 Diabetes: One Disease, Many Pathways, American Journal of Physiology-Endocrinology and Metabolism 319 (2), E410-E426, Aug 2020, Journal Impact Factor=4.2, Joon Ha and Arthur Sherman.

20) Improved Detection of Abnormal Glucose Tolerance in *Africans*: The Value of Combining Hemoglobin A1c With Glycated Albumin, Diabetes Care, Oct. 2020, 43:10;2607-2613, Journal Impact Factor=16.019.
Arsene F Hobabagabo, Nana H Osei-Tutu, Thomas Hormenu, Elyssa M Shoup, Christopher W DuBose, Lilian S Mabundo, Joon Ha, Arthur Sherman, Stephanie T Chung, David B Sacks, Anne E Sumner

21) Metabolic Characteristics of *Africans* with Normal Glucose Tolerance and Elevated One-Hour Glucose: Insight from the Africans in America Study. BMJ Open Diabetes Research and Care 8 (1), e000837, Jan, 2020, Journal Impact Factor=3.4
Sara M. Briker, Thomas Hormenu, Christopher W. DuBose, Lilian S. Mabundo, Stephanie T. Chung, Joon Ha, Arthur Sherman, Marshall K. Tulloch Reid, Michael Bergman, Anne E. Sumner

2019

22) A1C Underperforms as a diagnostic test in *Africans* Even in the Absence of Nutritional Deficiencies, Anemia and Hemoglobinopathies: insight from the Africans in America Study. Frontiers in endocrinology 10, 533, Aug. 2019, Journal Impact Factor=3.5, Sara Briker,Jessica Aduwo, Regine Mugeni, Margrethe Frost Horlyck-Romanovsky, Christopher DuBose, Lilian Mabundo, Thomas Hormenu, Stephanie Therese Chung, Joon Ha, Arthur Sherman, Anne E Sumner

2017

23) How adaptation makes low firing rates robust, The Journal of Mathematical Neuroscience 7 (1), 1-21 Dec. 2017, Journal Impact Factor=2.18, Arthur Sherman and Joon Ha

24) Time to Glucose Peak During an Oral Glucose Tolerance Test Identifies Prediabetes Risk, Clinical Endocrinology, 2017 Nov;87(5):484-491, Journal Impact Factor=3.380
Stephanie T. Chung, Joon Ha, Anthony U. Onuzuruike, Kannan Kasturi, Mirella Galvan-De La Cruz, Brianna A. Bingham, Rafeal L. Baker, Jean N. Utumatwishima, Lilian S. Mabundo, Madia Ricks, Arthur S. Sherman, Anne E. Sumner

25) Hemoglobin Glycation Index Is Associated with Cardiovascular Diseases in People with Impaired Glucose Metabolism, The Journal of Clinical Endocrinology & Metabolism 102 (8), 2905-2913. , May 2017, Journal Impact Factor=5.605

Chang Ho Ahn, See Hee Min, Dong-Wha Lee, Tae Jung Oh, Kyoung Min Kim, Jae Hoon Moon, Sung Hee Choi, Joon Ha, Arthur Sherman, Kyong Soo Park, Hak Chul Jang, and Soo Lim.

2016

26) A Mathematical Model of the Pathogenesis, Prevention and Reversal of Type 2 Diabetes, Endocrinology. Endocrinology;157(2):624-35, Feb. 2016, Journal Impact Factor=3.961
Joon Ha, Leslie Satin, and Arthur Sherman.

27) Chronic glucose exposure systematically shifts the oscillatory threshold of mouse islets: Experimental evidence for an early intrinsic mechanism of compensation for hyperglycemia, Endocrinology;157(2):611-23, Feb. 2016, Journal Impact Factor=3.961
Eric Glynn, Benjamin Thompson, Shusheng Lu, Suryakiran Vadrevu, Robert T. Kennedy, Joon Ha, Arthur Sherman and Leslie S. Satin.

28) Islets Transplanted into the Eye: Do they improve our insight into islet adaptation to insulin resistance? Diabetes. 2016 Sep;65(9):2470-2, Journal Impact Factor=7.72
Leslie Satin, Joon Ha, and Arthur Sherman

29) Paracrine Regulation of Glucagon Secretion: The β-α-δ Model", American Journal of Physiology-Endocrinology and Metabolism 310 (8), E597-E611, Journal Impact Factor= 4.181
Margaret Watts, Joon Ha, Ofer Kimchi, and Arthur Sherman

30) Calcium Effects on ATP Production and Consumption Have Key Regulatory Roles on Oscillatory Islet Activity, Biophysical journal, Feb 2016, 110 (3), 733-742, Journal Impact Journal=3.665
J. P. McKenna, J. Ha, M. J. Merrins, L. S. Satin, A. Sherman, and R. Bertram

31) Phase Analysis of Metabolic Oscillations and Membrane Potential in Pancreatic Islet β cells, Biophysical journal, Feb 2016, 110 (3), 691-699, Journal Impact Journal=3.665
Matthew J. Merrins, Chetan Poudel, Joseph P. McKenna, Joon Ha, Arthur Sherman, Richard Bertram, and Leslie S. Satin

2015

32) Pulsatile insulin secretion, impaired glucose tolerance and type 2 diabetes, Molecular aspects of medicine 42, 61-77 , 2015 April, Journal Impact Factor=7.850
Leslie Satin, Peter Butler, Joon Ha and Arthur Sherman.

2014-

33) Frequency switching in the two-compartmental model of the dopaminergic neurons, Journal of Computation Neuroscience, 2011 Apr;30(2):241-54. Journal Impact Factor=1.62
Joon Ha and Alexey Kuznetsov.

34) Interaction of NMDA Receptor and Pacemaking Mechanisms in the Midbrain Dopaminergic Neuron, PLoS One 8 (7), e69984, Journal Impact Factor=2.87
Joon Ha and Alexey Kuznetsov.

Theses

1) Ph.D. Thesis: *Roles of Gap Junctions in Neuronal Networks*, May 2008, New Jersey Institute of Technology.
2) Master's Thesis: *On a Representation of Certain Operators on Continuous Functions*, Hanyang University, Korea.

Collaborations

1) Machine learning approach of predicting glucose during Continuous Glucose Monitoring (With Dr. Junyup Lee, Catholic University Hospital, Seoul, South Korea and Jae-Hun Jung, Center of AI and Data Science, POSTECH, South Korea
2) Early Detection of Type 2 Diabetes Risk (With Dr. Michael Bergman, NYU Medical School and Dr. Ram Jagannathan, Medical School of Emory University)
   Research led to the submission of *Staging Schema for Early Diagnosis of Prediabetes* to *The Lancet Diabetes & Endocrinology* (Impact Factor: 44)
3) Mathematical Modeling for Diabetes Research (NSF Funded Project)
   Collaboration with Prof. Choongseok Park, Dept. of Mathematics and Statistics, NCAT
4) AI and Machine Learning for Metabolic Parameters, Center for AI and Data Science, Prof. Jae-Hun Jung, POSTECH, South Korea
5) Mathematical Models for Beta-Cell Function (NIH-funded project, dkNET New Investigator Pilot Program)
   Collaboration with Dr. Gail Nunlee-Bland, Howard University Hospital
6) NIH African and African American Diabetes Study Collaborations
   With Drs. Anne Sumner & Stephanie Chung (NIDDK, NIH), clinical data collaboration since 2017

TEACHING

Courses taught:

1) Howard University:
   a) Probability and Statistics I (Undergraduate, Spring 2025 and Spring 2022)
   b) Applied Calculus (Undergraduate, Fall 2024)
   c) Topics in Applied Mathematics (Graduate, Fall 2021 and Spring 2024)
   d) Probability and Statistics II (Undergraduate, Fall 2022 and Fall 2023)
   e) Actuarial Science Lab I (Spring 2023)
   f) Undergraduate Research in Mathematics (math 175 and 165, Fall 2023, Spring 2024)
2) George Washington University:
   Calculus II (Undergraduate, Spring 2019, Fall 2019, Spring 2020, Fall 2020)
3) Indiana University Purdue University Indianapolis:
   Ordinary Differential Equation (Undergraduate Fall 2009 and Spring 2010)
4) New Jersey Institute of Technology:
   Applied Linear Algebra (Undergraduate, Spring 2007 and Fall 2007)
5) State University of New York at Stony Brook:
   Linear Algebra (Undergraduate, Spring 2003, Fall 2003, and Spring 2004)
6) Brown University (Recitation Instructor):
   Ordinary Differential Equation (Undergraduate, Fall 2000 and Spring 2001)
7) Hanyang University (Recitation Instructor):

Real Analysis and General Topology (Undergraduate, 1992, 1995, 1996)

Course Development:

Statistics with R for Probability and Statistics II, supported by NIH AIM-AHEAD Subaward grant, Fall 2022 – Spring 2023

STUDENT SUPERVISION

Undergraduate Research Program by a Funded NIH Grant (dkNET bioinformatics)

19 undergraduate students (paid) with diverse background recruited from *COAS Honors Program, College from Engineering,* and the department of *Mathematics* have participated the projects of mathematical modeling of diabetes, statistical analyses of diabetes, underlying physiology of diabetes, clinical studies of diabetes over a period of Fall 2023 – Summer 2025

1) Mathematical Modeling and Statistical Validation of Mathematical Model-Derived Parameters:
    a. Janae Tucker (Health, Human Performance, and Leisure Studies, COAS), and Jordan Green (Mathematics), Spring 2024
2) Fitting Mathematical Models of Type 2 Diabetes to Clinical data:
    a. Keith Cort (Mechanical Engineering), Daniel Reckord (Mechanical Engineering) and Taliyah Griffin (Mathematics), Fall 2023
3) Clustering of Diabetes Parameters by Machine Learning:
    a. Surangana Aryal (Computer Science), and Jordan Banks (Mathematics), Fall 2023
4) Personalized Therapy of Type 2 Diabetes by Mathematical Modeling:
    a. Rahmah Abdulkarim (Mathematics), Roberlie Jercois (Mathematics), and Rashyan Defoe (Mathematics), Fall 2023
5) Underlying Physiology of Type 2 Diabetes:
    a. Charis Haynes (Biology, COAS), Ayomidipupo Fadaka (Biology, COAS), Kelaiah Carey (History, COAS), Ebun-oluwa Popoola (Health, Human Performance, and Leisure Studies, COAS), Fall 2023
    b. Janae Tucker (Health, Human Performance, and Leisure Studies, COAS), and Katlyn Havlin (Biology, COAS), Fall 2023

Progress:

1) Presented at Howard University Research Week, Janae Tucker, Dept of Health, Human Performance, and Leisure Studies, COAS, April 2025
Title: Mathematical Modeling for Glucose Regulation: Evaluating the Predictive Power of the Model-Derived Disposition (mDI)
2) Presented at the Undergraduate Seminar of Math Dept, November 2023, and April 2024
Titles and Presenters:

    a. Reproducibility of Type 2 Diabetes Tests (April 2024):
    Janae Tucker (Health, Human Performance, and Leisure Studies), and Jordan Green (Mathematics)

b. Parameter fitting and clinical validation during an oral glucose tolerance test (Nov 2023):
Keith Cort (Mechanical Engineering), Daniel Reckord (Mechanical Engineering) and Taliyah Griffin (Mathematics)

c. Novel clusters of Type 2 Diabetes (Nov 2023):
Surangana Aryal (Computer Science), and Jordan Banks (Mathematics)

d. Personalized Therapy of Type 2 Diabetes (Nov 2023):
Rahmah Abdulkarim (Mathematics), Roberlie Jercois (Mathematics), and Rashyan Defoe (Mathematics)

e. Two Main Factors of Type 2 Diabetes: Insulin Resistance and Beta-cell Function (Nov 2023):
Charis Haynes (Biology), Ayomidipupo Fadaka (Biology), Kelaiah Carey (History), Ebun-oluwa Popoola (Health, Human Performance, and Leisure Studies)

f. Glucose Challenge Tests and a novel marker (Fall 2023): Janae Tucker (Health, Human Performance, and Leisure Studies), and Katlyn Havlin (Biology)

Ph. D. Student: Jazmin Jones (Fall 2022 - current)
Thesis Title: Parameter Estimation during Continuous Glucose Monitoring

Progress:

1) Presented at a mini symposium of Annual meeting of "Society for Mathematical Biology" (a main conference for mathematical biologist), July 2024, Seoul, South Korea
Title: A Mathematical Model-Derived Parameter During Continuous Glucose Monitoring
2) Award of ERNEST JUST-PERCY JULIAN Graduate Research Assistantship, April 2023

Undergraduate Thesis Advisor: Janae Tucker (Fall 2023 – Spring 2025), Dept of Health, Human Performance, and Leisure Studies, COAS
Title: Mathematical Modeling for Glucose Regulation: Evaluating the Predictive Power of the Model- Derived Disposition Index

Master Committee member:

1) Allen Brown, Dept of Mathematics, Howard University, May 2024, The Evolution of Alzheimer's Disease Diagnosis

Ph. D. Committee member

1) Dewayne Dixon, Dept of Mathematics, Howard University, July 2024, Core Epigenetic Module Biomarkers among Various PTSD Subtypes
2) Luan Chip Nguyen, Dept of Mathematics and Statistics, UMBC, December 2023, STOCHASTIC MODELING OF CHEMICAL SYSTEMS

Summer Intern Ph.D. Students Advisor:

1) Ph.D. student, Joe McKenna, Florida State University, Summer 2014 during NIH

SERVICE

University Level

STEM Complex Committee member, College of Arts and Sciences, Fall 2022 – Spring 2024

College Level

1) The Distinguished Faculty and Outstanding Departments Award Committee member (Fall 2025 – Spring 2027)
2) Organizer and Supervisor: NIH Lab Tour for COAS Honors Program Students, N=40, Mar. 19, Wednesday 2025 (Postponed to Fall 2025)
3) Organizer and Supervisor: NIH Lab Tour for COAS Honors Program Students, N=30, Sep. 2023
4) The Honors Council Committee member, College of Arts and Sciences, Fall 2022 – Spring 2024

Department Level

1) Committee member and Initiator of MOU with the Math Dept and the center of AI and Data Science, POSTECH, South Korea to build up the resource of AI and Machine learning at the Math Dept, Howard, Nov. 2024 - Current
2) The Lead Organizer of Mathematical Biology Seminar, Sept 2024 - Current
3) Senior Comprehensive Exam Committee: Fall 2023 - Current
4) The ODE Qualifying Exam committee: Summer 2024 - Current
5) Faculty Search Committee for Five Positions: Computation and Numerical Analysis, Dynamical System and Mathematical Biology, Statistical Machine Learning, Mathematical Data Science, and Statistics, Dec. 2022 – May 2024
6) Local organizing committee members for the American Mathematical Society Sectional Meeting in Spring 2024, March 2022 – April 2024
7) Conference Co-organizer, Howard University Mathematical Modeling in Biology and Medicine on Mitigation of Future Pandemics (virtual), April. 2022
8) Conference Co-organizer, Howard University Mathematical Modeling in Biology and Medicine on Wound Healing (virtual), Dec. 2021

Professional

Conference Organizing Outside Howard

1) Special session organizer with Dr. Jinsu Kim, POSTECH, South Korea, Mathematical Approaches to Understanding Biological and Medical Systems, *Joint Mathematics Meetings (JMN)* Jan. 2026, D.C,
2) Mini-symposium organizer with Jae-Hun Jung, Mathematical Institute for Data Science and Dept. of Mathematics, POSTECH, South Korea, Machine learning in medical research and its application, *SIAM Applied Dynamical Systems*, Denver, CO, May 2025.

3) Min-symposium organizer with Sangsoo Kim, Dept of Endo and Metab, Pusan National University Hospital, Diabetes Studies by Mathematicians, Statistician, Data Scientist, and Clinicians., *Society for Mathematical Biology Annual Meeting*, Seoul, South Korea, 06/30/2024 – 07/05/2024.
4) Min-symposium organizer with Katie Gurski and Yeona Kang, Dept of Mathematics, Howard University, Mathematics in Medicine, Society for Mathematical Biology Annual Meeting, Seoul, South Korea, 06/30/2024 – 07/05/2024.
5) Mini-symposium organizer with Cecilia Diniz Behn, Colorado School of Mines, Mathematical Models of Diabetes and Clinical Applications (On behalf of Arthur Sherman's 70th Birthday), SIAM Life Science, Pittsburgh, PA, July. 2022.
6) Mini-symposium organizer with Cecilia Diniz Behn, Colorado School of Mines, Mathematical modeling for diagnosing and managing metabolic disease, SIAM Life Science, Garden Grove, CA, Aug. 2020.
7) Min-symposium organizer with Richard Bertram, FSU, Dept of Mathematics Modeling and Analysis of the Endocrine and Neuroendocrine Systems, Society For Mathematical Biology Annual Meeting, Montreal, Canada, July 2019.
8) Mini-symposium organizer with Cecilia Diniz Behn, Colorado School of Mines, Combining Mathematical Models and Data for Clinical Studies of Diabetes, SIAM Life Science, Minneapolis, MN, Aug 2018.
9) Mini-symposium organizer, Modeling Insulin and glucagon secretion and their roles in diabetes, SIAM Life Science, Boston, MA, July 2016
10) Mini-symposium organizer with Richard Bertram at Florida State University, Modeling pancreatic islets and diabetes from the cellular level to the whole body, Society for Mathematical Biology, annual meeting, Atlanta GA, July 2015
11) Local Organizing Committee Chair: Dynamics in Neural, Endocrine and Metabolic Systems-A Symposium in Honor of Arthur Sherman, June 7-8, 2012, Bethesda, MD

Journal Editorial Board

- Main Editor, *Frontiers in Physiology*, Aug. 2021 – Jan. 2023
- Review Editor, *Frontiers in Computational Physiology and Medicine*, May 2020 – Current

Journal Reviewer

Applied Mathematics:

- *SIAM Applied Mathematics (May 2025 – current)*

Mathematical Biology Journals:

- *Bulletin of Mathematical Biology*
- *Mathematical Biosciences* (Outstanding Reviewer, June 2018)
- *Journal of Theoretical Biology* (Outstanding Reviewer, April 2018)

Biological Journals:

- *Nature Communications*
- *Journal of American Physiology - Endocrinology and Metabolism*
- *PLOS ONE*
- *PLOS Computational Biology*

Medical Journals:

- *Journal of Clinical Endocrinology and Metabolism*
- *Metabolic Syndrome and Related Disorders*
- *Diabetic Medicine*
- *Physiological Reports*
- *PLOS Medicine*
- *Journal of Korean Medical Science*

Grant Reviewer

- NIH Grant Reviewer, AI Pilot Funding Program (*dkNET_PPAI2024*), NIDDK/NIH, Dec 2024 – Jan 2025
- PEPFAR Grant Reviewer, HIV Non-Communicable Disease Modeling for Sub-Saharan Africa, 2016

Professional Memberships

- Society for Industrial and Applied Mathematics (SIAM)

Invited and Contributed Talks

2025

1) Estimation of metabolic parameters using machine learning, invited speaker for Mini-symposium, SIAM Applied Dynamical System, Denver, CO, May 2025
2) Prediction of insulin sensitivity and beta-cell function with fasting measurements; A machine learning approach, Selected Oral Talk, Annual meeting of Japanese Diabetes Society, Okayama, Japan, May 2024

2024

3) A reliable biomarker derived from a mathematical model for predicting future diabetes, invited symposium speaker (virtual), Graduate School of Convergence Science and Technology, POSTECH, South Korea, Nov. 2024
4) Applications of model-derived metabolic parameters to type 2 diabetes, Invited Talk, Society for Mathematical Biology annual meeting, Seoul, South Korea, July 2024.
5) Identifying the most common pathway to diabetes in Koreans with a mathematical model and a k-means clustering, Invited Talk, Center for AI and Data Science, POSTECH, South Korea, May 2024
6) Estimating a metabolic parameter during continuous glucose monitoring, Invited Talk, Center for Mathematical Machine Learning, POSTECH, South Korea, May 2024.
7) Mathematical model-derived parameters and Novel clustering of non-diabetes phenotypes for clinical applications, Invited Talk, virtual, NIH, Jan 2024.

2023

8) A Mathematical Structure of Diabetes and its Clinical Applications, Invited Talk, National Institute of Mathematical Sciences, Daejon, South Korea, May 2023.
9) Precision Medicine Approaches for Classifying Diabetes Risk Based on Insulin Secretion and Resistance Profiles, Invited Talk, Korean Diabetes Prevention Study by Korean Diabetes Association, Seoul, South Korea, May 2023.
10) Estimating Relative Beta-Cell Function During Continuous Glucose Monitoring and Its Clinical Applications, Invited Plenary Talk, virtual, NIH, March 2023.

2022

11) A novel marker of Type 2 Diabetes, Invited Plenary talk, Annual Bioscience and Engineering Symposium by Korean Scientist Association at NIH, Gaithersburg MD, NIH, Nov. 2022
12) How to evaluate beta-cell function in high-risk subjects in Korea, Invited Plenary Talk, virtual, Korean Diabetes Prevention Study by Korean Diabetes Association, Virtual, Oct. 2022.
13) A reduced-mathematical model derived by data, not mathematical methods enhances diabetes research, Invited Talk, virtual, Department of Mathematical Sciences, New Jersey Institute of Technology, Sep. 2022 Newark, NJ.
14) Two-hour glucose criterion is first to detect diabetes in non-obese people from Korea, Selected Poster (virtual), Sep. 2022, Annual Mid-Atlantic Diabetes Meeting, NIH, Bethesda, MD.
15) How does mathematics enhance diabetes research, Invited Talk, Department of Mathematics, Pusan National University, Pusan, Aug. 2022, South Korea.
16) Relative Beta-Cell Function Estimation Without Insulin Measurements During Continuous Glucose Monitoring, Invited Mini-symposium Talk, SIAM LS, July 2022, Pittsburg, PA.
17) A simple mathematical tool enhances diabetes research, Invited Talk, Annual Korean SMB, June 2022, Yeosu, South Korea
18) Prediction and Estimation of Diabetes with a Mathematical Model, Invited Talk, Mathematical Institute for Data Science, Postech, May 2022, Pohang, South Korea
19) Two Types of Mathematical Models in Diabetes, Invited Plenary Talk, annual Korean SIAM meeting, May 2022, Daejeon, South Korea
20) A mathematical model estimates relative beta-cell function during continuous glucose monitoring, Invited Talk (virtual), virtual joint mathematics meetings, April 2022, Seattle.

2021

21) One-hour postload hyperglycemia: Implications for prediction and prevention of type 2 diabetes, plenary talk (virtual), Nov. 2021, clinician education program, Association of Endocrinology at Pusan, Ulsan, and Kyungnam, South Korea
22) Model Disposition Index (mDI) during an OGTT predicts glucose excursion of continuous glucose monitoring (CGM), selected poster (virtual), Sep. 2021, Annual Mid-Atlantic Diabetes Meeting, NIH, Bethesda, MD
23) Model disposition index is an early robust biomarker of type 2 diabetes, Invited talk (virtual), Sept 2021, Dept. of Endocrinology and Metabolism, Pusan National University Hospital, South Korea
24) Mathematical Model Disposition Index (mDI) Predicts Dysglycemia in Obese Youth, Young Investigator Award Talk (Virtual), American Diabetes Association Annual Meeting, June 2021, Washington DC

Before 2020

25) Finding early risk factors of diabetes with Artificial Intelligence and Mathematical Model of diabetes, Invited consultant (Virtual), Oct 2020, National Institute of Mathematical Sciences and Pusan National University Hospital, South Korea
26) Clinical Applications of Mathematical Model of Progression to Diabetes: Prediction and Estimation of Diabetes, Invited Institute seminar speaker (Virtual), Sept 2020, National Institute of Mathematical Sciences and Pusan National University Hospital, South Korea.

27) Estimating metabolic parameters with a standard oral glucose tolerance test, Invited speaker for Mini-symposium (Virtual), SIAM Life Science, Aug. 2020, Garden Grove, CA.
28) Prediction and Estimation of Diabetes with a Mathematical Model, Invited Colloquium speaker, Department of Mathematics and Statistics, Sept. 2019, Georgetown University, DC, Washington
29) A New Predictor of Diabetes from a Longitudinal Mathematical Model, Invited Mini-symposium speaker, Society for Mathematical Biology Annual Meeting SMB, July, 2019, Montreal, Canada.
30) A new Criterion of Prediabetes with a mathematical model, Invited speaker for Mini-symposium, SIAM Applied Dynamical System, May 2019, Snowbird, UT.
31) The Mathematical Structure of Type 2 diabetes on a slow manifold, Invited talk in Applied Math Seminar, March 2019, George Washington University, Washington, DC.
32) A new fitting model for evaluating oral glucose tolerance tests predicts future glycemic status, Invited speaker for Mini-symposium, SIAM Life Science, Aug. 2018, Minneapolis, MN.
33) A Unified Model of Pathways to Type 2 Diabetes, Invited speaker, Dept. Mathematics, Howard University, Washington DC, May 2018.
34) A mathematical model predicts a delayed insulin peak during an oral glucose tolerance test as a high risk factor for diabetes, selected for a mini-symposium talk "Pharmaceutical section", Frontier in Applied and Computational Mathematics, NJIT, Newark, NJ, June, 2017.
35) Diverse pathways to type 2 diabetes, SIAM Life Science, Mini-symposium speaker, Boston, MA, July, 2016.
36) A unified model of pathogenesis pathways of Type 2 diabetes, Biology and Medicine Through Mathematics, Selected Oral Speaker Virginia Commonwealth University, VA, May 2016.
37) Pathogenesis pathways to diabetes with a mathematical model, Mathematical Biology seminar, Invited speaker, Dept. of Mathematical Sciences, Indiana University Purdue University Indianapolis, Indianapolis, IN, May 2016.
38) Exploration of Pathways to Diabetes with a Mathematical Model, Applied Math Colloquium, Invited Speaker, Department of Mathematics, University of Maryland Baltimore County, Baltimore, MD, Nov. 6, 2015.
39) A Mathematical Model of the Pathogenesis, Prevention, and Reversal of Type 2 Diabetes, Society for Mathematical Biology annual meeting, Mini-symposium Speaker and organizer, Atlanta, GA, July 2015.
40) Adaptive currents increase the system robustness, US-KOREA Conference, Invited symposium speaker, East Rutherford, NJ, August 2013.
41) Firing pattern of Mid-brain dopaminergic neurons, Applied Dynamical System Conference, invited Mini Symposium speaker, May 2011, Snow Bird, UT.
42) in a two compartmental neuron model, SIAM conference on Life Science (Poster), July 2010, Pittsburg, PA.
43) Dynamical properties underlying frequency switching in a two-compartmental model of the dopaminergic neurons, Society For Neuroscience (Poster): October, 2009, Chicago, IL.

44) Frequency switching in a two-compartmental model of the dopaminergic neuron, SIAM conference on Applications of Dynamical Systems (Contributed Talk): May 2009, snow bird, UT.
45) Roles of Gap Junctions in Neuronal Networks, Dynamical systems in physiological modeling at Purdue University (Contributed talk), October 2008, West Lafayete, Indiana.
46) Sustainment of activity in neuronal networks coupled by gap junctions, SIAM Conference on Applications of Dynamical Systems (Contributed Talk): May 2007, Snowbird, UT.
47) Detecting early risk of type 2 diabetes during an oral glucose tolerance test, Poster Presentation, Biophysical Meeting, Baltimore, MD, March 2019.
48) A Mathematical Model of Roux-en-Y Gastric Bypass, Poster presentation, Midwest Islet club meeting, Saint Louis, MO, May 2018.
49) How Adaptation Makes Low Firing Rates Robust, Computational Neuroscience Society (CNS), Poster presentation, Jeju, South Korea, July 2016.
50) Ethnic differences in insulin secretion tone may require different diagnostic indicators, American Diabetes Association Meeting, Poster presentation, Boston, MA, June 2015
51) Modeling ABCC8 inactivating mutations in mice and humans, Midwest Islet club meeting, Chicago, May 2015.
52) Ethnic differences in insulin secretion tone may require different diagnostic indicators, NIH-Korea NIH joint conference (Outstanding presentation award), Poster presentation, Bethesda, MD, April 2015
53) Beta Cells Respond to Hyperglycemia by Altering Surface Expression of K(ATP) Channels, American Diabetes Association Meeting, Poster presentation, San Francisco, CA, June 2014
54) Type 1 and Type 2 Diabetes: Long-lost Relatives, American Diabetes Association Meeting, Poster presentation, San Francisco, CA, June 2014.
55) Beta-cell Compensation: Form Follows Function, American Diabetes Association Meeting, Poster presentation, Chicago, IL, June 2013.
56) Modeling Beta-Cell Life and Death in Type 2 Diabetes, Midwest Islet meeting, Poster Presentation, Ann Arbor, MI, May 2013.
57) Driving Exocytosis with Dual Oscillator Model, Midwest Islet meeting, Poster presentation, Pittsburgh, PA, May, 2012
58) An interlocked oscillator model for firing of the mesencephalic dopaminergic neuron, Society For Neuroscience 2010 meeting, poster, Nov. 2010, San Diego, CA
59) An interlocked oscillator model for firing of the mesencephalic dopaminergic neuron, CNS 2010 meeting, an abstract selected with a travel award, July 2010, San Antonio, TX
60) Model Disposition Index (mDI): Assessing abnormal glucose tolerance, Selected for an oral talk (virtual), Mid Atlantic Diabetes meeting, Sept. 2020, Bethesda, MD.
61) Using Longitudinal Modeling to Find One-hour Glucose Alternatives to Two-hour Glucose for Prediction and Diagnosis of Glucose Tolerance, Selected Poster Moderated Discussions, American Diabetes Meeting, June 2019, San Francisco, CA.
62) Estimating beta-cell functions by fitting the mathematical model to oral glucose tolerance test data, Invited talk, Division of Endocrinology, School of Medicine, March 2019, George Washington University, Washington, DC.

63) Detecting Early Risk of Type 2 Diabetes During an Oral Glucose Tolerance Test, selected for a poster blitz, Mid Atlantic Diabetes meeting, Oct. 2018, Bethesda, MD.
64) Predicting Future Glycemic trajectories with a Mathematical Model, Poster Presentation, American Diabetes Association Meeting, June 2018, Orland FL.
65) Modeling the Shape of the Glucose Curve During an Oral Glucose Tolerance Test as a Risk Factor for Type 2 Diabetes, American Diabetes Association Meeting, Poster presentation, San Diego, CA, June 2017.
66) ABCC8: From Hypoglycemia to Hyperglycemia, Medical School, KAIST, Invited talk, Daejeon, South Korea, June 2016.
67) A unified model of pathogenesis pathways of Type 2 diabetes, Midwest Islet Club Annual Meeting 2016, Medical School, Indiana University, Indianapolis, IN, Poster Presentation, May 2016.
68) Exploration of pathways to diabetes with a mathematical model, International Conference of Diabetes and Metabolism, Invited Oral presentation, Seoul, Korea, Oct. 2014.
69) Why are undiagnosed Type 2 Diabetes as high as 25% to 40% in United States?, Korean American Medical Association (KAMA), D.C. Chapter, Invited symposium speaker, Cambridge, MD, July 2014.
70) Ethnic differences in insulin secretory tone may lead to different pathogenesis of diabetes, Invited seminar talk, Seoul National University Hospital, Seoul, Korea, Oct. 2014.
71) Ethnic differences in insulin secretion may account for differences in T2D risk, Invited seminar talk, Catholic University Hospital, Seoul, Korea, Oct. 2014

References

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