

Byungdo Park

Department of Mathematics Education, College of Education, Chungbuk National University
1 Chungdaero Seowon-Gu, Cheongju 28644, Republic of Korea
byungdo@cbnu.ac.kr • +82-43-261-2721

RESEARCH INTERESTS

Differential geometry and algebraic topology. Secondary characteristic classes, geometric structures on higher bundles, generalized cohomology theories and their equivariant, differential, and twisted refinements, higher categories and sheaves, index theory, noncommutative geometry, and topology of matters.

ACADEMIC APPOINTMENTS

Chungbuk National University, Cheongju, Korea September 2023 – Present
Associate Professor at the Department of Mathematics Education

Chungbuk National University, Cheongju, Korea September 2019 – August 2023
Assistant Professor at the Department of Mathematics Education

Korea Institute for Advanced Study (KIAS), Seoul, Korea October 2017 – August 2019
Research Fellow (Postdoc) at School of Mathematics

The City University of New York (CUNY), New York NY, USA January 2017 – May 2017
Adjunct Assistant Professor (Hunter College and the Bronx Community College) of Mathematics

Max Planck Institute for Mathematics, Bonn, Germany October 2016 – December 2016
Postdoctoral Fellow

VISITING POSITIONS

The Hebrew University of Jerusalem, Jerusalem, Israel February 2020
Host: Zachary McGuirk

Hausdorff Research Institute for Mathematics, Bonn, Germany May 2017 – August 2017
Guest (Postdoc)
Trimester program “K-Theory and Related Fields”

Hausdorff Research Institute for Mathematics, Bonn, Germany August 2015
Guest (PhD Student)
Trimester program “Homotopy theory, manifolds, and field theories”

EDUCATION

CUNY Graduate Center, New York NY, USA August 2010 – September 2016
Doctor of Philosophy in Mathematics
Thesis title: A geometric model of twisted differential K -theory
Advisor: Mahmoud Zeinalian

CUNY Graduate Center, New York NY, USA February 2015
Master of Philosophy in Mathematics
Advancement to candidacy.

Yonsei University, Seoul, Korea March 2001 – February 2009
Bachelor of Science in Mathematics
Senior Thesis: Notes on L-Infinity algebras
Advisor: Jae-Suk Park
Member of honor program in sciences
On Leave from October 2002 to February 2006 for a mandatory military service.

PUBLICATIONS	On the smoothness of the geodesic spray for the Camassa-Holm equation , with Jae Min Lee, <i>J. Math. Anal. Appl.</i> , 516 (1) (2022) 126472 1–12.	
	Noncommutative differential K-theory , with Arthur Parzygnat, Corbett Redden, and Augusto Stoffel, <i>J. Geom. Phys.</i> , 174 (2022) 104446 1–40. arXiv:2106.12073.	
	A note on Venice lemma in differential K-theory , <i>Arch. Math.</i> , 118 (2) (2022) 215–224.	
	A classification of equivariant gerbe connections with Corbett Redden, <i>Commun. Contemp. Math.</i> , 21 (2) (2019) 1850001 1–40. arXiv:1709.06003.	
	Geometric models of twisted differential K-theory I , <i>J. Homotopy and Relat. Struct.</i> , 13 (1) (2018) 143–167. arXiv:1602.02292	
	A smooth variant of Hopkins-Singer differential K-theory , <i>New York J. Math.</i> , 23 (2017) 655–670. arXiv:1607.08686	
PREPRINTS	Generalizations of the Thistlethwaite–Tsvietkova method , with Alice Kwon and Ying Hong Tham, (2023) arXiv:2309.01282.	
	Geometric families define differential K-theory , with Jae Min Lee, (2022).	
	Brown representability for directed graphs , with Zachary McGuirk, (2020) arXiv:2003.07426.	
WORK IN PROGRESS	Cycle maps in twisted differential K-theory , with Daniel Grady	
	Equivariant arithmetic Chow groups and equivariant differential cohomology , with Sreedhar Bhamidi	
	Equivariant eta forms in local index theory , with Jae Min Lee.	
	The Euler–Arnold theory via algebraic topology: Sullivan’s methodology , with Jae Min Lee.	
BOOKS	Knowledge and education in the era of new media (in Korean), with Jin Choi, Seung-Hyun Choi, Hye-Jee Gil, Yeungyu Ha, Jiyoung Hwang, Gail Jeon, Jieun Lim, Sein Shin, Kyung Chan Son, Kyungwon Son, Jooho Song, and Hyun Wi Yoon, <i>Pakyounghsa</i> , (2022) ISBN-13: 9791165192730 Contributed a chapter “How can we be good at mathematics?” Available to purchase at Kyobo, Aladin.	
BOOK PROJECTS IN PROGRESS	Gelfand’s Geometry (in Korean) <i>Kyungmoon Publishing Co.</i> Korean translation of the monograph <i>Geometry</i> by Israel M. Gelfand and Tatiana Alekseyevskaya (Gelfand), <i>Birkhäuser</i> , (2020) ISBN-13: 9781071602997	
	Calculus (in Korean), Elementary Calculus (in Korean) and College Mathematics (in Korean), with Daewoong Cheong, Sukjung Hwang, Un Cig Ji, Sangdon Jin, Sejong Kim, Sun Kwang Kim, Doowon Koh, Ohsang Kwon, Eunjeong Lee, Jaemin Shin, Changhun Yang, Mee Sue Yoo, Youngho Yoon, <i>Kyungmoon Publishing Co.</i>	
SELECTED PRESENTATIONS	Mathematics Department Colloquium Pusan National University, Busan, Korea <i>An introduction to differential K-theory</i> Host: Donghoon Jang	May 2022
	Three W’s Seminar Korea Institute for Advanced Study (KIAS), Seoul, Korea <i>The Atiyah–Jänich theorem and its twisted refinement</i> Host: Sreedhar Bhamidi	December 2020
	Mathematics Department Colloquium Chungbuk National University, Cheongju, Korea <i>The Atiyah–Jänich theorem and its twisted refinement</i> Host: Sejong Kim	November 2020
	KIAS Topology Seminar Korea Institute for Advanced Study (KIAS), Seoul, Korea <i>Twisted differential K-theory, geometric models, and sheaves of spectra</i> Host: Hsuan-Yi Liao	December 2019

DG Seminar

Korea Institute for Advanced Study (KIAS), Seoul, Korea
What is an ∞ -category? (1), (2), (3)
 Host: Bumsig Kim

February 2019

2018 Seoul – Tokyo Conference in Mathematics

Korea Institute for Advanced Study (KIAS), Seoul, Korea
Cycle maps in differential K-theory
 Host: Jinsung Park

December 2018

Topology in Australia and South Korea 2018

IBS Center for Geometry and Physics (IBS-CGP), Pohang, Korea
A classification of equivariant gerbe connections
 Host: Gabriel C. Drummond-Cole

April 2018

The 13th KIAS Winter School on Differential Geometry

Korea Institute for Advanced Study (KIAS), Seoul, Korea
Introduction to differential cohomology (3 lectures)
 Host: Insong Choe and Jaigyoung Choe
 Conference venue: Hill Condominium, High 1 Resort, Jeongseon, Korea

January 2018 – February 2018

Higher Categories and Mirror Symmetry

Korea Institute for Advanced Study (KIAS), Seoul, Korea
A classification of equivariant gerbe connections
 Host: Bumsig Kim and Gregory Ginot

December 2017

Topology Workshop – Cohomology Theories, Categories, and Applications

University of Pittsburgh, Pittsburgh, PA USA
A geometric model of twisted differential K-theory
 Host: Hisham Sati

March 2017

Research Seminar

The Bronx Community College, CUNY, Bronx NY USA
Aspects of equivariant gerbes with connection
 Host: Cormac O’Sullivan

February 2017

Algebraic Topology Seminar

Princeton University, Princeton NJ USA
A geometric model of twisted differential K-theory
 Host: Tony Bahri and Martin Bendersky

February 2017

K-theory Seminar

Hausdorff Research Institute for Mathematics, Bonn, Germany
Models of differential K-theory and comparison problems
 Host: Kristian Jonsson Moi

November 2016

Higher Differential Geometry Seminar

Max Planck Institute for Mathematics, Bonn, Germany
A geometric model of twisted differential K-theory
 Host: Christian Blohmann

November 2016

Geometry and Physics (GAP) Seminar

Pennsylvania State University, University Park, PA USA
A geometric model of twisted differential K-theory
 Host: Ping Xu and Mathieu Stiénon

September 2016

GAP XIV: Geometry and Physics “Séminaire itinérant” — Graded geometry and applications to physics

University of Sheffield, Sheffield, UK
A geometric model of twisted differential K-theory
 Poster presentation

August 2016

Deformation Theory Seminar

University of Pennsylvania, Philadelphia PA USA
A geometric model of twisted differential K-theory
 Host: James Stasheff

June 2016

2016 Lehigh University Geometry and Topology Conference

Lehigh University, Bethlehem PA USA
A geometric model of twisted differential K-theory

May 2016

GRANTS**Basic Research Program in Science and Engineering**

The National Research Foundation of Korea (NRF)
 The Ministry of Science and ICT, Republic of Korea
 Project title: A study on differential cocycles via higher sheaves on manifolds
 Principal Investigator. Amount KRW 90,000,000 (equivalent to \$80,000)
 Grant No. 2020R1G1A1A01008746

March 2020–August 2023

National University Forstering Project – Creativity of next-generation researchers

Chungbuk National University
 Project title: An approach on Euler-Arnold equations via algebraic topology: Sullivan’s methodology
 Principal Investigator. Amount KRW 9,000,000 (equivalent to \$8,000)
 Documents: Research Support Division-3768 (2022.05.11.)

May 2022–December 2022

Research Grant for New Faculty

Chungbuk National University
 Project title: Geometry and topology of directed graphs
 Principal Investigator. Amount KRW 17,000,000 (equivalent to \$15,111)
 Documents: Research Foundation-11099 (2019.08.28.)

September 2019–August 2020

Development of New Leading Scientists**KIAS School of Mathematics Group Seminar**

Korea Institute for Advanced Study
 The Ministry of Science and ICT, Republic of Korea
 Project title: KIAS Topology Seminar
 Co-organizer. Annual grant KRW 7,500,000 (equivalent to \$6,667)
 Project title: Three W’s Seminar
 Co-organizer. Annual grant KRW 7,500,000 (equivalent to \$6,667)

January 2019–August 2019

Development of New Leading Scientists

Korea Institute for Advanced Study
 The Ministry of Science and ICT, Republic of Korea
 Project title: Differential cocycles in algebraic topology and their applications
 Principal Investigator. Amount KRW 25,917,000 (equivalent to \$23,037)

October 2017–August 2019

Doctoral Student Research Grant

CUNY Graduate Center
 Project title: Twisted differential K -theory, infinity categories, and mathematical physics
 Principal Investigator. Amount \$1,000

June 2015–May 2016

CUNY Doctoral Students’ Council Grant

A grant for organizing seminars and conferences
 Project title: The Homotopy Theory Learning Group
 Principal Investigator. Amount \$700

Fall 2015

CUNY Doctoral Students’ Council Grant

A grant for organizing seminars and conferences
 Project title: The Algebraic Topology Student Seminar
 Principal Investigator. Amount \$600

Fall 2014

SERVICE

Scholarly Service

Referee for Journal of Geometry and Physics.
Reviewer for Mathematical Reviews June 2018 – Present
Reviewer for Zentralblatt Math March 2016 – Present
Editor of Newsletter of the Korean Mathematical Society. January 2023–December 2024
Reviewer for the National Research Foundation (NRF) of Republic of Korea 2023
External reviewer for tenure-track faculty hiring process. June 2020 – Present
6 national universities and 8 private universities in Korea (counted with multiplicity).
External interviewer for tenure-track faculty hiring process. January 2021
1 national university in Korea.
PhD thesis reader (Committee vice chair) for 1 PhD in Mathematics Education.
Organizer for Geometry Seminar at CBNU Mathematics Education dept. October 2020–Present
Organizer for Topology Seminar at KIAS January 2018–August 2019
Organizer for the three W's Seminar at KIAS January 2019–August 2019
Postdocs' seminar addressing Was, Warum, Wie (what, why, and how in German) on each research topic.
Organizer for the Homotopy Theory Learning Group at CUNY Fall 2015
Organizer for the Algebraic Topology Student Seminar at CUNY Fall 2014

University Service (at Chungbuk National University)

Representative of Faculty Assembly September 2022 – August 2024
legislation subcommittee – statute, regulations, and human resources affairs
Steering committee member of the Education Research Institute December 2019 – Present
Internal admission officer 2021, 2022
Member of the Curriculum committee of the College of Education May 2020 – May 2022
Member of the Task-Force Committee for Future Education Center construction and pilot operation project August 2020 – February 2021

Departmental Service (at Chungbuk National University)

Member of the departmental scholarship committee August 2020 – February 2024
Member of the curriculum committee March 2020 – August 2023
Member of the tenure-track faculty search committee Fall 2021, Fall 2022
Member of the department officer hiring committee Feb. 2021, Feb. 2022
Interviewer and question designer for undergraduate admission Fall 2019 – Present
Transfer admissions (interviewer 3 times / question designer 3 times), internal transfers (interviewer 1 time / question designer 1 time), personality and aptitude interviewer (4 times).
Interviewer and question designer for graduate admission Spring 2023 – Present
The Graduate School of Education – (interviewer 1 time / question designer 3 times).

Outreach and Community Service

Invited speaker for a public lecture for high school students
9 high schools via online (in Chungbuk Province) July 2023
8 high schools on-site, 17 high schools via online (in Chungbuk Province and Sejong City)
May 2022 – August 2022
5 high Schools (in Chungbuk Province) December 2021
1 high School (in Chungbuk Province) July 2020
Advisory panel for an expansion plan of Chungbuk Mathematics Experience Center, Chungbuk
Natural Sciences Education Center November 2019 – December 2019

SUPERVISION EXPERIENCES

A study on differential cocycles via higher sheaves on manifolds (2 students)

May 2020 – June 2021

Mentoring a undergraduate student for reading Atiyah, Bott, and Shapiro, *Clifford Modules* and a Master's student for Freed and Hopkins *Chern-Weil forms and abstract homotopy theory*.

Geometry and topology of directed graphs (2 students)

September 2019 – February 2020

Mentored undergraduate students for learning algebraic tools for research, providing support for participating conferences, and teaching \LaTeX .

Characteristic Classes Learning Group (2 students)

May 2013 – February 2014

Lecturing and mentoring in a learning group of Milnor and Stasheff's Characteristic Classes.

**TEACHING
EXPERIENCES**

At Chungbuk National University

Advanced Topics in History of Mathematics and Mathematics Education (graduate course)
 Foundation of Mathematics II (graduate course)
 Foundation of Mathematics I (graduate course)
 Topics in Geometry I (3 semesters; graduate course)
 Geometry and Education (Undergraduate topics course on teaching geometry, 2 semesters)
 Differential Geometry II (5 semesters; incl. Fall 2023)
 Differential Geometry I (4 semesters)
 Complex Analysis II
 Complex Analysis I
 Geometry for Teachers II (2 semesters. Introduction to Euclidean, non-Euclidean, and projective geometries)
 Geometry for Teachers I (4 semesters. Conics and the classification theorem)
 Introduction to geometry (Currently teaching)
 Calculus II (2 semesters; incl. Fall 2023)
 Calculus I (2 semesters)

At the City University of New York

Vector Analysis (Multivariable calculus and differential forms)
 Calculus III (Multivariable calculus)
 Calculus II (Integral calculus, 2 semesters)
 Calculus II Lab (MAPLE simulation)
 Calculus I (Differential calculus, 3 semesters)
 Calculus I Lab (MAPLE simulation)
 Precalculus
 Trigonometry and College Algebra (Community College teaching experience)
 College Algebra
 Tasks Involved: Lecturing, grading, and writing and administering exams.

**TEACHING
AWARDS**

Faculty Teaching Excellence, Chungbuk National University
 3 semesters: Fall 2021, Fall 2020, Fall 2019

**ACADEMIC
HONORS
& AWARDS**

Dissertation Year Fellowship, CUNY Graduate Center	Fall 2015 – Spring 2016
Quantitative Reasoning Fellowship, CUNY Graduate Center	Fall 2014 – Spring 2015
Graduate Teaching Fellowship, CUNY Graduate Center	Fall 2012 – Spring 2014
University Fellowship, CUNY Graduate Center	Fall 2013 – Spring 2014
Science Fellowship, CUNY Graduate Center	Fall 2010 – Spring 2012
Yonsei Special Awards, Yonsei University	Spring 2006, Fall 2006, Fall 2007, and Spring 2008
Highest Honors Student, High Honors Student, Honors Student, Yonsei University	Fall 2001, Spring 2001, and Fall 2007
University Designated Scholarship, Yonsei University	Fall 2002
The Kwanjeong Scholarship, Kwanjeong Educational Foundation	April 2002

**SELECTED
TRAVEL
SUPPORT
RECEIVED**

Workshop on gauge theory and Floer homology Peking University, Beijing, China. Full accommodation support.	December 2019
International Workshop on Algebraic Topology Southern University of Science and Technology, Shenzhen, China. Travel award \$ 500 and full accommodation support.	June 2018
Summer School “Coarse Index Theory” Albert-Ludwigs-Universität Freiburg, Freiburg, Germany. Travel and accommodation award €1,580.	September 2016

GAP XIV: Geometry and Physics “Séminaire itinérant” — Graded geometry and applications to physics August 2016

University of Sheffield, Sheffield, UK
Travel and accommodation award \$1,380.

Topology of Manifolds: A conference in honour of Machael Weiss’ 60th birthday June 2016

University of Lisbon, Lisbon, Portugal.
Travel and accommodation award \$2,340.

GAP XIII: Geometry and Physics “Séminaire itinérant” — Derived geometry July 2015

IBS Center for Geometry and Physics, Pohang, South Korea.
Travel award \$1,600 and full accommodation support.

LANGUAGES

Languages English: Fluent. Korean: Native. French and German: Basic proficiency.
Proficiency in Computer Languages C/C++, MATLAB, FORTRAN, MAPLE \LaTeX

SELECTED OFFERS

Korea Institute for Advanced Study (KIAS), Seoul, Korea March 2019
Research Fellow (Postdoc) in School of Mathematics
2-year extension of the contract (October 2019 – September 2021 – Resigned as of August 31, 2019).

Eduard Čech Institute for Algebra, Geometry and Physics, Prague, The Czech Republic
16-month postdoctoral position (Offer declined) April 2017
In the research group of Branislav Jurčo and Martin Markl

REFERENCES

Mahmoud Zeinalian (Doctoral advisor)
Professor of Mathematics
CUNY Graduate Center and Lehman College
mzeinalian@gc.cuny.edu

Józef Dodziuk (Teaching)
Visiting Professor of the Hebrew University of Jerusalem
Professor of Mathematics Emeritus at CUNY Graduate Center
jdodziuk@gmail.com

Martin Bendersky
Professor of Mathematics
CUNY Graduate Center and Hunter College
mbendersky1@gmail.com

James Stasheff
Visiting Faculty at University of Pennsylvania
Professor of Mathematics Emeritus at University of North Carolina at Chapel Hill
jds@math.upenn.edu

Corbett Redden
Associate Professor of Mathematics
Long Island University C. W. Post Campus
Corbett.Redden@liu.edu

Thomas Tradler
Professor of Mathematics
CUNY Graduate Center and New York City College of Technology
ttradler@citytech.cuny.edu

Jae-Suk Park
Professor of Mathematics
Pohang University of Science and Technology
jaesuk@postech.ac.kr

DATE

Last updated: 6 September 2023.