

Dr. Ayşe Borat

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Education

- 2007–2013 **PhD in Mathematics**, *University of Aberdeen, UK*
Advisor: Jarek Kedra
Thesis: [Remarks on Symplectically Aspherical Manifolds](#)
- 2005–2007 **MSc in Mathematics**, *Ege University, Türkiye*
- 2001–2005 **BSc in Mathematics**, *Ege University, Türkiye*

Employment

- Mar 2022–present **Associate professor**, *awarded by the Inter-University Council of Türkiye*
- Feb 2016–Mar 2022 **Assistant professor**, *Bursa Technical University, Türkiye*
- Sep 2014–Feb 2016 **Lecturer**, *Bursa Technical University, Türkiye*
- Oct 2013–May 2014 **Lecturer (part time)**, *Zirve University, Türkiye*
- Sep 2007–May 2010 **Tutor**, *University of Aberdeen, UK*

Visits

- Feb 2022 **Invited visiting researcher**, *University of Santiago de Compostela (1 week)*
Host: Enrique Macias-Virgos & David Mosquera-Lois
- Jul 2019 **Invited visiting researcher**, *METU (1 week)*
Host: Mehmetcik Pamuk
- Jun 2018–Aug 2018 **Visiting research fellow**, *University of Aberdeen (3 months)*
Host: Mark Grant
- Jan 2007–Jun 2007 **Visiting graduate student**, *University of Aberdeen (5 months)*
Host: Jarek Kedra

Grants, Scholarships & Funding

- 2023–2024 **TÜBİTAK 1002 Scientific and Technological Research Projects Grant**
*"On discretisation of homotopic distance", 75000 ₺, **Principal Investigator***
- 2022–2023 **TÜBİTAK 1002 Scientific and Technological Research Projects Grant**
*"Higher discrete topological complexity", 60000 ₺, **Principal Investigator***
- 2015–2018 **Bursa Technical University Scientific Research Projects Coordination Unit Grant**
*"Motion planners on $F(S^2, k)$ ", 4500 ₺, **Principal Investigator***
- 2007–2010 **PhD scholarship**, *funded by University of Aberdeen*
- 2007 **Postgraduate visit funding**, *funded by ERASMUS*
- 2006–2007 **MSc scholarship**, *funded by TÜBİTAK*

Papers & Preprints

- (15) **(Injective) Facet-complexity between simplicial complexes** (with C. A. Ipanaque-Zapata), submitted. [arXiv](#)
- (14) **Higher contiguity distance** (with N. Ekiz Yazıcı), submitted. [arXiv](#)
- (13) **Higher analogues of discrete topological complexity** (with H. Alabay, E. Cihangirli, E. Dirican Erdal), *Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales. Serie A. Matemáticas*, Vol 118:125 (2024). [pdf](#) [arXiv](#)
- (12) **Contiguity distance between simplicial maps** (with M. Pamuk, T. Vergili), *Turkish Journal of Mathematics*, Vol 47, No 2 (2023), 664-677. [pdf](#) [arXiv](#)
- (11) **Topological spaces induced by homotopic distance** (with T. Vergili), *Journal of Linear and Topological Algebra*, Vol 11, No 02 (2022), 85-91. [pdf](#) [arXiv](#)
- (10) **A randomized greedy algorithm for piecewise linear motion planning** (with C. Ortiz, A. Lara, J. Gonzalez), *Mathematics*, Vol 9, Issue 19 (2021), 2358. [pdf](#) [arXiv](#)
(**Simplicial distance**, preprint - improved and merged into the above paper. [arXiv](#))
- (9) **Higher homotopic distance** (with T. Vergili), *Topological Methods in Nonlinear Analysis*, Vol 57, No 2 (2021), 525-534. [pdf](#) [arXiv](#)
- (8) **Digital homotopic distance between digital functions**, *Applied General Topology* Vol 22, No 1 (2021), 183-192. [pdf](#)
- (7) **Higher dimensional simplicial complexity**, *New York Journal of Mathematics*, Vol 26 (2020), 1130-1144. [pdf](#)
- (6) **Digital Lusternik-Schnirelmann category of digital functions** (with T. Vergili), *Hacettepe Journal of Mathematics and Statistics*, Vol 49, No 1 (2020), 1414-1422. [pdf](#)
- (5) **Directed topological complexity of spheres** (with M. Grant), *Journal of Applied and Computational Topology*, Vol 4, No 1 (2020), 3-9. [pdf](#) [arXiv](#)
- (4) **Digital Lusternik-Schnirelmann category** (with T. Vergili), *Turkish Journal of Mathematics*, Vol 42, No 4 (2018), 1845-1852. [pdf](#)
- (3) **Motion planning algorithms for configuration spaces in the higher dimensional case**, *Topological Methods in Nonlinear Analysis*, Vol 47, No 2 (2016), 763-767. [pdf](#)
- (2) **Symplectically aspherical manifolds with nontrivial Flux groups**, *Acta Mathematica Hungarica*, Vol 149, No 2 (2016), 523-525. [pdf](#)
- (1) **A characterisation of symplectically aspherical manifolds**, *Journal of Fixed Point Theory and Applications*, Vol 17, No 3 (2015), 477-482. [pdf](#)

Electronic Lecture Notes

- (5) Simplicial Homology, 1st edition, Jun 2022 (in Turkish)
- (4) Elementary Knot Theory, 1st edition, Jun 2022 (in Turkish)
- (3) Topology, 3rd edition, Jun 2025 (in Turkish)
- (2) Algebraic Topology I, 2nd edition, Sep 2025 (in Turkish)
- (1) Introduction to Real Analysis, 2nd edition, Jan 2025 (in Turkish)

(all the e-books can be found [here](#))

Talks at Conferences and Workshops (selected)

- Oct 2025 AMS Special Session on LS-Category and Topological Complexity: Theory and Appl.
"Remarks on Higher Contiguity Distance", **Invited speaker**
- Jan 2024 [Advances in Homotopy Theory V](#), Southampton University, UK

- “On the properties of higher discrete topological complexity”, **Invited speaker**
- Sep 2022 Algebra, Topology and Related Fields, Dokuz Eylul University, Izmir, Türkiye
 “A survey on homotopic distance”, **Invited speaker**
- Jul 2022 Applied Topology in Bedlewo 2022, Bedlewo, Poland
 “Contiguity distance”, **Semi-plenary speaker**
- Sep 2021 [Algebraic and Applied Topology Workshop III](#), Galatasaray University, Istanbul, Türkiye
 “Simplicial analogues of homotopic distance”, **Invited speaker**
- Sep 2021 33th National Mathematics Symposium, Istanbul University, Türkiye
 “Homotopic distance as pseudometric”
- Sep 2020 Workshop on Topological Complexity and Motion Planning, BIRS-CMO, Mexico
 “A simplicial analog of homotopic distance”, **Invited speaker**
- Aug 2019 32th National Mathematics Symposium, Ondokuz Mayıs Üniversitesi, Samsun, Türkiye
 “Directed motion planners for directed spheres”
 “Relation between higher homotopic distance with TC_n and with LS-category”
- Apr 2019 [Algebraic and Applied Topology Workshop](#), Dokuz Eylul University, Izmir, Türkiye
 “A survey on topological robotics”, **Invited speaker**
- Jun 2018 International Conference on Manifolds, Groups and Homotopy, Isle of Skye, UK
 “n-Dimensional Topological Complexity in the Simplicial Realm”
- Apr 2017 [IV. Workshop of Association for Turkish Women in Mathematics](#), METU, Türkiye
 “A survey on topological robotics”
- Jun 2015 [DyToComp 2015 Conference](#), Bedlewo, Poland
 “Higher dimensional motion planners for $F(R^n, k)$ ”
- Aug 2013 II. Turkish Women in Mathematics Summer School, IMBM, Türkiye
 “Remarks on symplectically aspherical manifolds”
- Jun 2013 Workshop on Symplectic Manifolds, Dokuz Eylul University, Türkiye
 “A Characterisation of Symplectically Aspherical Manifolds”, **Invited speaker**
- Dec 2009 MAGIC Postgraduate Conference 2009, Leeds, UK
 “Flat Bundles” (poster presentation)

Talks at Seminars

- 2022 Gebze Technical University
 2021 Selçuk University; Bilkent University
 2020 University of Southampton
 2019 Koç University; Yeditepe University; MSGSU
 2018 IZTECH
 2017 Applied Topology Seminar Series (Ege University)
 2016 Geometry/Topology Working Days (METU)
 2015 Bilkent University; Dokuz Eylul University; IZTECH
 2012 University of Aberdeen

Seminars/Workshops Organised

- Summer 2025 Member of Local Organising Committee of 11th Workshop on Rings, Modules and Algebras, Bursa Technical University
- Autumn 2019 Organiser of [Algebraic and Applied Topology Workshop II](#), Bursa Technical University

2019 Co-founder of [Algebraic and Applied Topology Workshops](#)

Students Supervised

PhD Students (Bursa Technical University)

2025–present Hilal Alabay

2023–present Nilay Ekiz Yazıcı

MSc Students (Bursa Technical University)

2025–present Sude Aksu

2022–2025 Hilal Alabay, *Simplicial Lusternik Schnirelmann Category*

2022–2025 Esra Cihangirli, *On Parametrised Topological Complexity*

2022–2023 Özge Genç Kara, *On Homotopic Distance*

Senior Projects - selected (Bursa Technical University)

2025 Berna Kaya, *Classification of Surfaces*

2023 Ceyda Ceren Ay, *Simplicial Complexes*

2022 Hilal Alabay, *Homotopy and Homotopic Distance*

2022 Esra Cihangirli, *Rips and Čech Complexes*

2022 Şevval Güleç, *Introduction to Knots and Braids*

2022 Gülay Bahar, *Introduction to Basic Knot Theory*

Teaching Experience

POSTGRADUATE TEACHING

Instructor

2021–present **Bursa Technical University**

Algebraic Topology I

Differential Topology

Algebraic Topology II

Selected Topics in Algebraic Topology I

Category Theory

Examiner

2023 **External examiner for** MSc thesis of Maram Almahariq (Karadeniz Technical University)

2019 **External examiner for** MSc thesis of Mehmet Ali Batan (METU)

2018 **External examiner for** MSc thesis of Mustafa Akkaya (Ege University)

UNDERGRADUATE TEACHING

Instructor

2014–present **Bursa Technical University**

Project

Introduction to Algebraic Topology

Elementary Knot Theory

Topology

Real Analysis

Vector Analysis

Analysis III-IV

Linear Algebra

Differential Equations

Business Mathematics

Calculus I-II

Career Planning

Engineering Mathematics

2013–2014 **Zirve University**

Tutor2007–2010 **University of Aberdeen**

Calculus

Advanced Calculus

Introduction to Analysis

Algebra

Sets and Algebraic Structures

Engineering Mathematics

Introductory Mathematics

Service to the Profession**Evaluation Jury for** TÜBİTAK project proposals**Referee for** Homology, Homotopy and Applications

Journal of Applied and Computational Topology

Hacettepe Journal of Mathematics

Applied General Topology

Bulletin/Journal of International Mathematical Virtual Institute

Reviewer for Mathematical Reviews

Departmental Services

2023–present & 2017–2018 Supervisor of the Maths Club, Bursa Technical University

2016–present Department of Mathematics web officer, Bursa Technical University

2022–2023 Departmental ERASMUS exchange coordinator, Bursa Technical University

Membership

2025–present SIAM membership

2008–2012 Edinburgh Mathematical Society, PhD student membership

Public Talks (invited)May 2023 3rd Topology Workshop*“Motion Planning Problem & Topological Complexity”*Oct 2021 10th Bahar Mathematics Meetings, hosted by Bursa Technical University*“Robotics and Topology”*

Feb 2021 Mathematics Club Workshop VI, Istanbul University

“Illusion, Robots and Topology”

Languages

Turkish Native

English Fluent