

Gülsemay Yiğit

Bahçeşehir University, Faculty of Engineering and Natural Sciences,
Department of Mathematics, Istanbul, Türkiye
Email: gulsemay.yigit@bau.edu.tr

Education

- 2012 – 2019 **Yıldız Technical University**
Graduate School of Natural and Applied Sciences, Istanbul, Türkiye
Ph.D. in Mathematical Engineering
- 2010 – 2012 **Yıldız Technical University**
Graduate School of Natural and Applied Sciences, Istanbul, Türkiye
MS.c. in Mathematical Engineering
- 2006 – 2010 **Eskişehir Osmangazi University**
Faculty of Sciences, Department of Mathematics, Eskişehir, Türkiye
BS.c. in Mathematics

Appointments

- Feb 2025 – Feb 2026 **Postdoctoral Fellow**
Visiting Assistant Professor, University of British Columbia, Department of Mathematics, Vancouver, Canada
- Mar 2020 – Present **Assistant Professor**
Bahçeşehir University, Faculty of Engineering and Natural Sciences, Department of Mathematics, Istanbul, Turkey
- Oct 2013 – Mar 2020 **Lecturer in Mathematics**
Altınbaş University, Faculty of Engineering and Natural Sciences, Department of Basic Sciences, Istanbul, Turkey

Research Interests

Computational biology, partial differential equations (PDEs), numerical analysis, spatiotemporal analysis, pattern formation in cross-diffusive reaction-diffusion systems, mathematical models of pattern formation, single and collective cell migration.

Grants and Funding

- 2025 Funded by The Scientific and Technological Research Council of Türkiye (TÜBİTAK 2219) through the International Postdoctoral Research Fellowship Program, awarded for a 12-month postdoctoral position at the University of British Columbia, Canada.
- 2024 Funded by the International Center for Mathematical Sciences (ICMS) for the participation of “3MC+PIMS+ICMS Winter school - Multiscale Modeling: Infectious Diseases, Cancer and Treatments”. International Center for Mathematical Sciences, Edinburgh, UK, Dec 2- 13, 2024.
- 2024 Funded partially by the Newcastle University for the participation of 65th British Applied Mathematics Colloquium, (BAMC2024), Newcastle, United Kingdom, 9-11 April 2024.
- 2023 Funded by the Isaac Newton Institute for Mathematical Sciences, for the participation of programme “Mathematics of movement: an interdisciplinary approach to mutual challenges in animal ecology and cell biology” Isaac Newton Institute for Mathematical Sciences, Cambridge, United Kingdom, December 3 2023 - December 17, 2023.

- 2022 Funded by the International Center for Mathematical Sciences (ICMS) for the participation of programme “Formulating new poro-elastic models for nuclei deformation and cell migration through complex non-isotropic environments”. International Center for Mathematical Sciences, Edinburgh, United Kingdom, September 3 2022 - September 10, 2022.
- 2022 Funded by the South African Staff Development Program for the visit to University of Sussex, Department of Mathematics, Brighton, United Kingdom, September 10, 2022- September 17, 2022.

Publications

- 2025 **Parameter spaces for a cross-diffusive-driven instability in a reaction-diffusion system on an annular domain**
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A.
In Press by International Journal of Bifurcation and Chaos.
- 2025 **Analysis of the spatiotemporal dynamics of Rho-GEF-H1-Myosin reaction-diffusion system**
Mapfumo K., Juma V.O., Yigit G., Muchatibaya G., Madzvamuse A.
In Press by Royal Society Open Science.
- 2024 **Understanding the dual effects of linear cross-diffusion and geometry on reaction-diffusion systems for pattern formation**
Sarfaraz, W., Yigit, G., Barreira, R., Remaki, L., Alhazmi, M., Madzvamuse, A.
Chaos, Solitons and Fractals, 186, 115295.
- 2024 **A domain-dependent stability analysis of reaction-diffusion systems with linear cross-diffusion on circular domains**
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A.
Nonlinear Analysis: Real World Applications, 77, 104042.
- 2024 **A computational method for nonlinear Burgers’ equation using quartic-trigonometric tension B-splines**
Yigit, G., Hepson, O.E. Allahviranloo, T.
Mathematical Sciences, 18(1), 17-28.
- 2022 **A numerical scheme for the Wave Simulations of the Kuramoto-Sivashinsky model via quartic-trigonometric tension B-spline**
Hepson, O. E., Yiğit, G.
Wave Motion, 114, 103045.
- 2021 **Numerical simulations of reaction–diffusion systems in biological and chemical mechanisms with quartic-trigonometric B-splines**
Hepson, OE., Yiğit, G., Allahviranloo, T
Computational and Applied Mathematics, 40(4), 1-23.
- 2021 **Quartic-trigonometric tension B-spline Galerkin method for the solution of the advection-diffusion equation**
Hepson, OE., Yiğit, G.
Computational and Applied Mathematics, 40(4), 1-15.
- 2020 **Chebyshev differential quadrature for numerical solutions of third-and fourth-order singular perturbation Problems**
Yiğit, G., Bayram M.
Proceedings of the National Academy of Sciences, India Section A: Physical Sciences, 90, 429-436.
- 2019 **Polynomial based differential quadrature for numerical solutions of Kuramoto-Sivashinsky equation**
Yiğit, G., Bayram M.
Thermal Science, 23(1), S129-S137.
- 2016 **Modeling of Vibration for Functionally Graded Beams**
Yigit, G., Sahin, A., Bayram, M.
Open Mathematics, 14, 661-672.

Book Chapters

- 2020 **Numerical investigations of physical processes for regularized long wave equation**
Hepson, O.E., Yigit, G.
Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 1301), Springer, Cham, pp. 710-720.
- 2020 **Numerical solution of fractional Cauchy reaction-diffusion equation by differential quadrature**
Yigit, G., Salahshour, S.
Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 1301), Springer, Cham, pp. 725-737.

Conference Participation & Contributed Talks

- December 2024 Multiscale modeling and simulation of signaling processes
Yigit, G., Silva, M., Nouri FZ., Mothibi, D. , Foko, S. *Project Presentation at the event "3MC+PIMS+ICMS Winter school - Multiscale Modeling: Infectious Diseases, Cancer and Treatments". International Centre for Mathematical Sciences (ICMS), Edinburgh, UK, 02- 13 December 2024.*
- September 2024 Evolution of biological patterns on annular domains
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A. *Approximation Theory and Special Functions ATSF 2024 Conference - 8th Series, Ankara, Türkiye, 04-07 September 2024.*
- Aug 2024 Pattern formation in reaction-diffusion systems with CompuCell3D
Yigit G., Mahmoud A., Mehraei H.,
2024 CompuCell3D Multicell Virtual Tissue Modeling Online Summer School & Hackathon", organized by James Glazier, Indiana University, Bloomington, USA, 09-11 August 2024.
- Aug 2024 Participation in workshop "2024 CompuCell3D Multicell Virtual Tissue Modeling Online Summer School & Hackathon", organized by James Glazier.
Indiana University, Bloomington, USA, 28 July-04 August 2024.
- July 2024 The influence of the geometry and domain size for a reaction-diffusion system with cross diffusion
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A.
13th European Conference on Mathematical and Theoretical Biology (ECMTB24), Toledo, Spain, 22-26 July 2024.
- June 2024 Spatiotemporal domain-dependent dynamics of a cross-diffusive model in biological pattern generation
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A.
Networking Event: Empowering Healthcare with Automated Analysis, Bahçeşehir University, İstanbul, Türkiye, 03-05 June 2024.
- May 2024 Spatiotemporal dynamics of a cross-diffusive reaction diffusion model for biological pattern formation
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A.
9th Turkish Woman Mathematicians Society Workshop, İzmir Economy University, Izmir, Turkey, 03-05 May 2024, pp 23.
- April 2024 Understanding the role of geometry and cross-diffusion in pattern formation
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A.
65th British Applied Mathematics Colloquium (BAMC 2024), Newcastle University, Newcastle, United Kingdom, 09-11 April 2024, pp 64.
- Dec 2023 Participation in programme "Mathematics of movement: an interdisciplinary approach to mutual challenges in animal ecology and cell biology"
Isaac Newton Institute for Mathematical Sciences, Cambridge, United Kingdom, 01-19 December 2023.

- Sep 2023 İki boyutlu geometriler üzerinde çapraz difüzyonlu reaksiyon-difüzyon sistemlerinin alan bağımlı kararlılık analizi ve nümerik simülasyonları
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A.
35th National Mathematics Symposium 2023 (UMS 2023), Trakya University, Edirne-Turkey, 04-08 September pp 55.
- Aug 2023 Turing type of pattern formation in reaction-diffusion Systems with CompuCell3D: Digit Patterning
Yigit G., Ng M., Famotire A., Tzouvaras LM., Dada M.
2023 CompuCell3D Multicell Virtual Tissue Modeling Online Summer School & Hackathon”, organized by James Glazier, Indiana University, Bloomington, USA, 31 July-13 August 2023.
- Aug 2023 Participation in workshop “2023 CompuCell3D Multicell Virtual Tissue Modeling Online Summer School & Hackathon”, organized by James Glazier.
Indiana University, Bloomington, USA, 31 July-13 August 2023.
- July 2023 Domain-dependent stability analysis and numerical simulations for a reaction-diffusion system with cross-diffusion on two dimensional geometries
Yigit, G., Sarfaraz, W., Barreira, R., Madzvamuse, A.
International Conference on Nonlinear Science and Complexity (ICNSC23) 10-15 July 2023, Istanbul, Turkey, pp 89.
- Sep 2022 Participation in research-in-groups project titled “Formulating new poro-elastic models for nuclei deformation and cell migration through complex non-isotropic environments”
Supervised by Prof. Anotida Madzvamuse at ICMS Bayes Centre Edinburgh, Scotland, UK, 01-10 September 2022.
- Aug 2020 Numerical investigations of physical processes for regularized long wave equation
Hepson OE, Yiğit G.,
The 4-th International Conference on Intelligent Decision Science (IDS2020), İstanbul, Turkey, 07 - 08 August 2020, pp.710-720.
- Aug 2020 Numerical solution of fractional Cauchy reaction-diffusion equation by differential quadrature
G., Yiğit, S. Salahshour
The 4-th International Conference on Intelligent Decision Science (IDS2020), İstanbul, Turkey, 07 - 08 August 2020, pp.725-737.
- July 2019 Numerical treatment of linear and nonlinear diffusion equations based differential quadrature
G. Yiğit, M. Bayram
International Conference on Computational Methods in Applied Sciences (ICCMAS 2019), Istanbul, Turkey, 12-16 July 2019, pp.138-143.
- April 2019 Numerical simulations of Kuramoto-Sivashinsky equation by Chebyshev based differential quadrature
G. Yiğit, M. Bayram
Poster presentation at 6th Turkish Woman Mathematicians Society Workshop, Konya, Turkey, 26-28 April 2019, pp.36.
- June 2018 Chebyshev differential quadrature for quasilinear hyperbolic equations
G. Yiğit, M. Bayram
7th International Conference on Applied Analysis and Mathematical Modeling (ICAAMM 2018), Istanbul, Turkey, 20-24 June 2018, pp.82.
- Sep 2017 Polynomial based differential quadrature for numerical solution of Kuramoto-Sivashinsky equation
G. Yiğit, M. Bayram
International Conference on Scientific Computation and Differential Equations (SciCADE 2017), University of Bath, 11-15 September 2017, Bath, United Kingdom, 2017.
- July 2017 Chebyshev differential quadrature for advection diffusion Equation
G. Yiğit, M. Bayram
International Conference on Applied Analysis and Mathematical Modeling (ICAAMM 2017), İstanbul Gelişim University, 03-07 July 2017, İstanbul, Turkey, 2017.

- May 2017 Numerical solutions for nonlinear advection problems by Chebyshev differential quadrature
G. Yiğit
International Conference on Mathematics and Engineering (ICOME 2017), Istanbul, Turkey, 10-12 May 2017, pp.187.
- Feb 2017 Numerical solutions for higher order singular perturbation problems by polynomial based differential quadrature
G. Yiğit, M. Bayram
3rd International Conference on Pure and Applied Sciences (ICPAS 2017), Dubai, UAE, 02-06 February, 2017, page 25.

Seminars & Public Talks

- June 2024 Rigorous mathematical analysis and simulations of reaction-diffusion systems with linear cross-diffusion on convex and non-convex domains.
Seminar at Analysis and Applied Mathematics Weekly Online Seminar, Bahçeşehir University, İstanbul, Turkey, 25 June 2024
<https://sites.google.com/view/aam-seminars>
- Mar 2024 Being a Woman in the Science World- *International Women's Day.*
Bilim Dünyasında Kadın Olmak –*Dünya Kadınlar Günü.*
Public talk at Doğa Koleji, Beykent Campus, İstanbul, Turkey, 14 March 2024.
- Dec 2023 Analysis of the effects of geometry and cross-diffusion in pattern formation.
Seminar at programme "Mathematics of movement: an interdisciplinary approach to mutual challenges in animal ecology and cell biology" at Isaac Newton Institute for Mathematical Sciences, Cambridge, United Kingdom, 7 December 2023.
<https://www.newton.ac.uk/seminar/41397>
- Mar 2023 Domain-dependent analysis and simulations of cross-diffusive reaction-diffusion systems on two dimensional geometries
Online Mathematical Biology Weekly Seminar Series in Mathematics Department, University of British Columbia, Vancouver, Canada, 27 March 2023.

Teaching experience

- Fall 2024 **Course Instructor, MAT2043: Linear Algebra with Applications**
Course Instructor, MAT1041: Linear Algebra
Bahçeşehir University, *Coordinating multi-sections, exceeding 500 number of students.*
- Summer 2024 **Course Instructor, MAT1041: Linear Algebra**
Bahçeşehir University.
- Spring 2024 **Course Instructor, MAT1052: Calculus II**
Bahçeşehir University, *4 sections with exceeding 300 number of students.*
- Fall 2023 **Course Instructor, MAT2043: Linear Algebra with Applications**
Course Instructor, MAT2045: Numerical Methods for Engineers
Bahçeşehir University, *Coordinating multi-sections, exceeding 500 number of students.*
- Spring 2023 **Course Instructor, MAT2062: Differential Equations**
Bahçeşehir University, *Coordinating multi-sections, exceeding 400 number of students.*
- Summer 2022 **Course Instructor, MAT2062: Differential Equations**
Bahçeşehir University.
- Spring 2022 **Course Instructor, MAT2062: Differential Equations**
Course Instructor, MAT1051: Calculus 1
Bahçeşehir University, *Coordinating multi-sections exceeding 400 number of students.*
- Fall 2021 **Course Instructor, MAT2062: Differential Equations**
Course Instructor, MAT1015: Mathematics for Biological Sciences
Bahçeşehir University, *Coordinating multi-sections, 530 total number of students.*

- Summer 2021 **Course Instructor, MAT1052: Calculus II**
Bahçeşehir University.
- Spring 2021 **Course Instructor, MAT1052: Calculus II**
Bahçeşehir University, *Coordinating multi-sections exceeding 800 number of students.*
- Fall 2020 **Course Instructor, MAT1051: Calculus I**
Bahçeşehir University, *Coordinating multi-sections exceeding 800 number of students. Online teaching during Covid-19 pandemic.*
- Summer 2020 **Preparing lecture videos for the flipped-learning activity for Calculus I lectures during Covid-19 pandemic**
Bahçeşehir University.
<https://www.youtube.com/playlist?list=PLmtd1ARJwdnQ4qAx8tZhhzMPgPeTpJpaj>
- Spring 2020 **Course Instructor, MAT1052: Calculus II**
Course Instructor, MAT1051: Calculus I
Bahçeşehir University, *Coordinating multi-sections exceeding 300 number of students. Online teaching during Covid-19 pandemic.*
- I have thought 12 different Mathematics courses in Altınbaş University between Oct 2013-Mar 2020, with a teaching load of approximately 18-20 hours per week each semester.
- Fall 2019 **Course Instructor, MAT 317: Numerical Analysis**
Course Instructor, MATH 155: Mathematics for Health Sciences
Course Instructor, MAT 125: Mathematics for Architecture
Altınbaş University. *Coordinating multi-sections exceeding 500 number of students.*
- Summer 2019 **Course Instructor, MATH 317: Numerical Analysis**
Altınbaş University.
- Spring 2019 **Course Instructor, MAT 152: Calculus II (TR)**
Course Instructor, MAT 126: Mathematics for Architecture II (TR)
Altınbaş University.
- Fall 2018 **Course Instructor, MATH 155: Mathematics for Health Sciences**
Course Instructor, MATH 125: Mathematics for Social Sciences I
Course Instructor, MAT 125: Mathematics for Architecture (TR)
Altınbaş University *Coordinating multi-sections exceeding 500 number of students.*
- Summer 2018 **Course Instructor, MATH 155: Mathematics for Health Sciences**
Altınbaş University.
- Spring 2018 **Course Instructor, MATH 152: Calculus II**
Course Instructor, MATH 126: Mathematics for Social Sciences II
Altınbaş University. *Coordinating multi-sections exceeding 500 number of students.*
- Fall 2017 **Course Instructor, MATH 151: Calculus I**
Course Instructor, MATH 125: Mathematics for Architecture I
Altınbaş University. *Coordinating multi-sections exceeding 500 number of students.*
- Summer 2017 **Course Instructor, MATH 151: Calculus I**
Course Instructor, MATH 102: Mathematics for Social Sciences II
Course Instructor, MATH 155: Mathematics for Health Sciences
Altınbaş University.
- Spring 2017 **Course Instructor, MATH 102: Mathematics for Social Sciences II**
Course Instructor, MATH 151: Calculus I
Teaching Assistant, MATH 151: Calculus I
Altınbaş University. *Delivering problem solving sessions.*
- Fall 2016 **Course Instructor, MATH 101: Mathematics for Social Sciences**
Teaching Assistant, MATH 151: Calculus I
Altınbaş University.

Summer 2016	Course Instructor, MATH 151: Calculus I Course Instructor, MATH 102: Mathematics for Social Sciences II Altınbaş University.
Spring 2016	Teaching Assistant, MATH 151: Calculus I Teaching Assistant, MATH 152: Calculus II Altınbaş University. <i>Delivering problem solving sessions.</i>
Fall 2015	Course Instructor, MATH 101: Mathematics for Social Sciences Teaching Assistant, MATH 151: Calculus I Altınbaş University.
Summer 2015	Course instructor, MATH 101: Mathematics for Social Sciences I Altınbaş University.
Fall 2013-Spring 2015	Teaching assistant, MATH 151: Calculus I Teaching assistant, MATH 152: Calculus II Teaching assistant, MATH 101: Mathematics for Social Sciences I Teaching assistant, MATH 102: Mathematics for Social Sciences II Teaching assistant, MATH 125: Mathematics for Architecture I Teaching assistant, MATH 126: Mathematics for Architecture II <i>Delivering problem solving sessions as a course assistant during this period in Altınbaş University.</i>

Professional Memberships

2024 – Present	Member of Society for Mathematical Biology– <i>SMB</i>
2023 – Present	Member of European Society for Mathematical and Theoretical Biology– <i>ESMTB</i>
2019 – Present	Member of Turkish Woman Mathematicians Society– <i>TKMD</i>

Skills

Programming languages

MATLAB, Maple, FEniCS, Mathematica, Python

Software

L^AT_EX

Languages

English (fluent in spoken and written English), Turkish (native)

Additional

Coordinator of Mathematics Courses for Accreditation of Engineering Education (MÜDEK) in Bahçeşehir University (2020-2024)

Vice Head of Department of Mathematics in Bahçeşehir University (2022-2024)

Turkish Swimming Federation Licensed Swimmer (2021-Present)

Yoga practitioner (2022-Present)

Flexible communication and presentation skills in both verbal and written