

BIOMATH 2025 Program

International Conference on Mathematical Methods and Models in Biosciences and a School for Young Scientists 15-20 June 2025, Sofia, Bulgaria

with financial support of

- Bulgarian Science Research Fund through Contract KP-06-MNF-49/16.12.2024 (BG-175467353-2024-03-0048-C01)¹
- Society for Mathematical Biology (International grant)
- European Society for Mathematical and Theoretical Biology (grant for the School for Young Scientists)

Activities by Location

- ◆ Lecture Hall in the [Institute of Mechanics](#) (IMech) - 5th floor, Room 510:
 - **Conference Opening:** Monday, June 16, 8:30
 - **Conference Registration:** Sunday, June 15, 16:00 to 17:30; Monday, June 16, from 8:00; Tuesday, June 17, from 8:30
 - **Coffee Breaks:** Daily at 10:30 and 15:30
 - **Poster session:** Monday, June 16, 17:30
 - **School for Young Scientists (SYS) Organisational Meeting:** Sunday, June 15, 17:45
 - **SYS Lectures:** Brown – Sunday, June 15, 18:00; Byrne – Tuesday, June 17, 18:00
 - **Keynote Talks:** Monday, June 16 (9:00, 14:00), Tuesday, June 17 (9:00, 14:00), Wednesday, June 18 (9:00) and Thursday, June 19 (9:00)
 - **Session-1 Talks:** Daily throughout the conference
- ◆ Lecture Hall in the [Institute of Mathematics and Informatics](#) (IMI) - 5th floor, Room 503:
 - **Open ISG meeting:** Tuesday, June 17, 17:30
 - **SYS Lecture:** Lorenzi – Monday, June 16, 18:30
 - **Special Session Talks: Mathematical Models of the Immune System in Human Disease:** Daily, from Monday, June 16 to Wednesday, June 18
 - **Session-2 Talks:** Daily throughout the conference
- ◆ Restaurant at the [Hotel of Bulgarian Academy of Sciences](#):
 - **Meeting of SYS with the Keynote Speakers and ISG:** Sunday, June 15, 19:00
 - **Welcome cocktail:** Monday, June 16, 19:30
 - **Lunch:** Daily from 12:30 to 14:00
- ◆ Meeting point: [Patriarchal Cathedral St. Alexander Nevsky](#) at the Sofia City Centre:
 - **Guided Sightseeing Tour of Sofia:** Wednesday, June 18, 17:00
- ◆ [Restaurant Chevermeto](#) at the Sofia City Centre:
 - **Official dinner:** Wednesday, June 18, 19:00-23:00

¹ The Science Research Funds is not responsible for the content of the conference presentations or the content of advertising and other materials related to the conference.

Scientific Program (SYS): Sunday, June 15

@Institute of Mechanics, Room 510

16:00 – 17:30 **Registration**

17:45 – 18:00 **School for Young Scientists (SYS) Organisational Meeting**

18:00 – 19:00 **SYS Lecture (Joel Brown)**

19:00 – 20:30 **Meeting of SYS with the Keynote Speakers and ISG**

Scientific Program (Session-1): Monday, June 16

@Institute of Mechanics, Room 510

08:00 – 08:30 **Registration**

08:30 – 09:00 **Opening**

Chairman: Peter Rashkov

09:00 – 10:00 **Bob Rink**, *Detecting multiple timescales and computing high-order phase reductions*

10:00 – 10:30 **Miroslaw Lachowicz**, *Mathematical Aspects of Organization and Disorganization in Biology*

10:30 – 11:00 Coffee

Chairman: Miroslaw Lachowicz

11:00 – 11:30 **Ekaterina Auer**, *Comparing Different Interpretations of the Set-Based Dempster-Shafer Theory for Explainable and Fair Prediction of Hereditary BRCA1/2 Mutations*

11:30 – 12:00 **Ivanka Stamova**, *On the practical stability of h -manifolds for impulsive fractional-order gene regulatory networks*

12:00 – 12:30 **Emma Fairbanks**, *Comparing methods for novel insecticide-treated net evaluation for malaria control*

12:30 – 14:00 Lunch

Chairman: Yves Dumont

14:00 – 15:00 **Clair Poignard**, *Numerical challenges for peroperative liver tumor ablations by electroporation*

15:00 – 15:30 **Gergely Röst**, *Evolution of the maturation period in insect populations*

15:30 – 16:00 Coffee

Chairman: Gergely Röst

16:00 – 16:30 **Tsvetomira Zlatkova**, *Migration in branching processes: An overview with open problems*

16:30 – 17:00 **Lorentz Jäntschi**, *Cramér-von Mises statistic for continuous distributions: A Monte-Carlo study for calculating its associated probability*

17:00 – 17:30 **Sandip Banerjee**, *Modeling the dynamics of leptospirosis in India*

17:30 – 18:30 **Poster session**

19:30 – 21:30 **Welcome cocktail**

Scientific Program (Session-2): Monday, June 16

@Institute of Mathematics and Informatics, Room 503

Special Session Mathematical Models of the Immune System in Human Disease

Chairman: Peter Rashkov

- 11:00 – 11:30 **Georgi Bazlyankov**, *Numerical analysis of a Keller–Segel model describing immune cell dynamics*
- 11:30 – 12:00 **Torkel Enok Loman**, *Catalyst: Fast and flexible modeling of reaction networks*
- 12:00 – 12:30 **Ivan Dimitrov**, *Application of the Information Entropy and Machine Learning Algorithms for the Prediction of Peptide Binders to the HLA-DRB1*03:01 Allele*
- 12:30 – 14:00 Lunch

Chairman: Torkel Enok Loman

- 16:00 – 16:30 **Anastas Pashov**, *Application of Graphs for System Level Analysis of the Repertoire of Antibody Reactivities*
- 16:30 – 17:00 **Lotta Eriksson**, *Sensitive detection of copy number alterations in low-quality liquid biopsy sequencing data*
- 17:00 – 17:30 **Achille Landri Pokam Kakeu**, *Mathematical Insights into Alzheimer's Disease: A Multiscale Modeling Approach*
- 18:30 – 19:30 **SYS Lecture (Tommaso Lorenzi)**

Scientific Program (Session-1): Tuesday, June 17

@Institute of Mechanics, Room 510

08:30 – 09:00 **Registration**

Chairman: Sandip Banerjee

09:00 – 10:00 **Mette Olufsen**, *Combining image analysis with dynamic models to improve understanding of vascular disease*

10:00 – 10:30 **Maíra Aguiar**, *Modeling Dengue Dynamics: Unraveling the Impact of Homologous Reinfections*

10:30 – 11:00 Coffee

Chairman: Maíra Aguiar

11:00 – 11:30 **Benjamin Ivorra**, *Modeling Malaria Transmission with Age Structure: Insights from Case Studies in Senegal*

11:30 – 12:00 **Akhil Kumar Srivastav**, *Impact of Age-Structure Dependent Control During the First Two Years of COVID-19 Pandemic in the Basque Country*

12:00 – 12:30 **Hayriye Gulbudak**, *Multi-Scale Models of Infectious Disease Dynamics and Validating with Data*

12:30 – 14:00 Lunch

Chairman: Maya Mincheva

14:00 – 15:00 **Tommaso Lorenzi**, *PDE models for the growth of phenotypically heterogeneous cell populations*

15:00 – 15:30 **Yves Dumont**, *New results on the combination of Sterile Insect Technique and entomopathogenic fungi*

15:30 – 16:00 Coffee

Chairman: Francesca Acotto

16:00 – 16:30 **Ilham Ait El Harch**, *Bioeconomic Modeling for the Sustainable Exploitation of Three Key Marine Species in Morocco*

16:30 – 17:00 **Mapundi Banda**, *Mathematical analysis of coupled one-dimensional blood flow in an artery*

17:00 – 17:30 **Slavi Georgiev**, *Inverse Modelling of Honeybee Hives Weight Dynamics*

Scientific Program (Session-2): Tuesday, June 17

@Institute of Mathematics and Informatics, Room 503

Special Session Mathematical Models of the Immune System in Human Disease

Chairman: Tommaso Lorenzi

- 11:00 – 11:30 **Mehtap Lafci Büyükkahraman**, *Mathematical Modeling of Innate Immune Response Dynamics in Early-Stage Inflammation*
- 11:30 – 12:00 **Bechara Saade**, *Stability and Bifurcation Analysis in Mathematical Models for Oscillating Pregnane X Receptor Levels*
- 12:00 – 12:30 **Vladimira Suvandjieva**, *Mathematical study of NETosis in early Systemic Lupus Erythematosus*

12:30 – 14:00 Lunch

Chairman: Vanessa Steinforf

- 16:00 – 16:30 **Ján Eliaš**, *Mathematical Modelling in Preclinical Drug Development in Oncology: A Perspective from the Industry Side*
- 16:30 – 17:00 **Ellen Tanaka Kahiya**, *Modeling activation of pregnane X receptor and mRNA expression of cytochromes P450 in 3D primary human hepatocytes*
- 17:00 – 17:30 **Nida Ansari**, *Predicting Cleavage Sites of Cathepsin-V using Machine Learning Models*
- 17:30 – 18:00 **Open ISG meeting** (Opinions and contributions for the present and future Biomath conferences from all interested participants are invited)

Scientific Program (Session-1): Wednesday, June 18

@Institute of Mechanics, Room 510

Chairman: Cameron Browne

- 09:00 – 10:00 **Helen Byrne**, *Mathematical insights into tumour-immune dynamics: Navigating a shifting landscape*
- 10:00 – 10:30 **Nico Stollenwerk**, *Import Driven Large Fluctuations in Critical and Subcritical Percolation, State of the Art and Future Perspectives*
- 10:30 – 11:00 Coffee

Chairman: Nico Stollenwerk

- 11:00 – 11:30 **Vanessa Steindorf**, *Beyond the biting: a comparative study of dengue modeling approaches areas*
- 11:30 – 12:00 **Mattia Sensi**, *A general kinetic model for the spread of infectious diseases in continuously structured compartments*
- 12:00 – 12:30 **Claudia Timofte**, *Asymptotic analysis for a class of heat diffusion problems in composites with non-standard imperfect contact conditions*
- 12:30 – 14:00 Lunch

Chairman: Claudia Timofte

- 14:00 – 14:30 **Sarah Serhal**, *Numerical methods for the controlled degenerate chemotaxis model in a weak formulation*
- 14:30 – 15:00 **Maya Mincheva**, *Oscillations and the cycle structure of reaction networks*
- 15:00 – 15:30 **Jhoana Romero-Leiton**, *Mathematical modelling of human-domestic animals AMR spread: Exploring the use of colistin in livestock farming in rural areas*
- 15:30 – 16:00 Coffee
- 17:00 – 19:00 **Guided Sightseeing Tour of Sofia**,
Meeting point: Patriarchal Cathedral St. Alexander Nevsky at 17:00.
- 19:00 – 23:00 **Official dinner**,
Venue: Restaurant Chevermeto

Scientific Program (Session-2): Wednesday, June 18

@Institute of Mathematics and Informatics, Room 503

Special Session Mathematical Models of the Immune System in Human Disease

Chairman: Helen Byrne

- 11:00 – 11:30 **Elisa Pettinà**, *A multi-scale PBPK model for predicting mRNA-encoded therapeutic trafficking in mice*
- 11:30 – 12:00 **Giulia Lupi**, *Mathematical and numerical methods for understanding immune cell motion during wound healing*
- 12:00 – 12:30 **Francesco Albanese**, *Modeling radiotherapy response to tumor heterogeneity and its microenvironment*
- 12:30 – 14:00 Lunch

Chairman: Anastas Pashov

- 14:00 – 14:30 **Marco Menale**, *A nonconservative kinetic model for the medical treatment of autoimmune response*
- 14:30 – 15:00 **Peter Rashkov**, *A mathematical model of Methotrexate's Effect on Adalimumab Immunogenicity in Axial Spondyloarthritis*
- 15:00 – 15:30 **Vidhi Vidhi**, *Statistical approach for quantifying the evolution of tumor heterogeneity in chronic lymphocytic leukemia (CLL)*

Scientific Program (Session-1): Thursday, June 19

@Institute of Mechanics, Room 510

Chairman: Mapundi Banda

09:00 – 10:00 **Joel Brown**, *Stackelberg evolutionary games for managing evolving resources, pests and cancer*

10:00 – 10:30 **Pierre-Alexandre Bliman**, *Reinfection induced multistability in an epidemic model*

10:30 – 11:00 Coffee

Chairman: Pierre-Alexandre Bliman

11:00 – 11:30 **Cameron Browne**, *Dynamics of prey-predator network model with application to virus and immune response evolution*

11:30 – 12:00 **Nadezhda Bunzarova**, *A model for biological transport gTASEP with OBC: some recent rigorous results*

12:00 – 12:30 **Vincenzo Luongo**, *Mathematical Modeling of biofouling formation on a membrane filtration system*

12:30 – 14:00 Lunch

Chairman: Roumen Anguelov

14:00 – 14:30 **Teodora Baci**, *Stabilization of a prey-predator system via targeted control in space and across populations*

14:30 – 15:00 **Antonella Capuozzo**, *A Double Free Boundary Model for Biofilm Growth and Microbially Induced Corrosion in Wastewater Concrete Pipes*

15:00 – 15:30 **Fabiana Russo**, *Modeling phototrophic biofilm growth: the role of phototaxis in microbial ecology*

15:30 – 16:00 **Olumuyiwa James Peter**, *Mathematical model of measles epidemiology with control strategies*

16:30 – 16:30 Coffee

Networking / Exploring Sofia

Scientific Program (Session-2): Thursday, June 19

@Institute of Mathematics and Informatics, Room 503

Chairman: Marco Menale

- 11:00 – 11:30 **Romina Travaglini**, *Spatial Patterning of Bacterial Colonization on Leaf Surfaces*
- 11:30 – 12:00 **Aniket Banerjee**, *Application of Mathematical Biology in Agriculture: The Case of the Soybean Aphid*
- 12:00 – 12:30 **Adriana De Mendoza**, *Beyond impaired DNA repair: Exploring the radiosensitizing mechanisms of hyperthermia through mathematical modeling and Monte Carlo simulations*
- 12:30 – 14:00 Lunch

Chairman: Mattia Sensi

- 14:00 – 14:30 **Afonso Dimas Martins**, *From guesswork to groundwork: a tool to quantify disease upscaling decisions*
- 14:30 – 15:00 **Rebeka Szabó**, *Oligooscillation in a closed system without autocatalysis*
- 15:00 – 15:30 **Jeff Moehlis**, *Controlling Populations of Neural Oscillators*
- 15:30 - 16:00
- 16:00 – 16:30 Coffee (IMech, Room 510)

Scientific Program (Session-1): Friday, June 20

@Institute of Mechanics, Room 510

Chairman: Akhil Kumar Srivastav

- 09:00 – 09:30 **Zdravka Ivanova**, *Mathematical modelling of the neuromuscular activity of a motor unit*
- 09:30 – 10:00 **Maria Rosaria Mattei**, *Modelling the Influence of Bacteriophage Activity and Horizontal Gene Transfer on the Spread of Bacterial Resistance*
- 10:00 – 10:30 **Francesca Acotto**, *Management of EBHSV-infected eastern cottontail invasion in Italy using Z-type control method*
- 10:30 – 11:00 Coffee

Chairman: Hristo Kojouharov

- 11:00 – 11:30 **Kim-Joao Grasse**, *On the robustness of oscillations in a mixed mechanism phosphorylation system against perturbations in the total amount of the processive enzyme*
- 11:30 – 12:00 **Thabo Nketsang**, *Analysis of the Effects of Rainfall Variability on Natural Forage Resources and the Corresponding Livestock Production: Climate Variability and Livestock Dynamics in Botswana*
- 12:00 – 12:30 **Roumen Anguelov**, *Nonsmooth dynamical systems: Application to a cell cycle model*
- 12:30 – 14:00 Lunch

Scientific Program (Session-2): Friday, June 20

@ Institute of Mathematics and Informatics, Room 503

Chairman: Romina Travaglini

- 09:00 – 09:30 **Hristo Kojouharov**, *A SIMPL Model of Phage-Bacteria Interactions Accounting for Mutation and Competition*
- 09:30 – 10:00 **Evans Kiptoo Korir**, *Understanding the Impact of Social Contact Patterns in Epidemiological Models*
- 10:00 – 10:30 **Alberto Tenore**, *A Mathematical Model of Plasmid Spread in Microbial Communities through Horizontal Gene Transfer Mechanisms*
- 10:30 – 11:00 Coffee (IMech, Room 510)

Chairman: Joel Brown

- 11:00 – 11:30 **Richard Pretorius**, *Exploring the Stability of a Generalised Lotka-Volterra Ecological Model*
- 11:30 – 12:00 **Alicja Kubik**, *Identifiability and observability of some epidemiological systems: SIR vs. SIRS*
- 12:00 – 12:30 **Yash Vats**, *Modelling Spike Frequency adaptation through Higher-order Fractional Leaky Integrate and Fire Model*
- 12:30 – 14:00 Lunch

Scientific Program (Poster Session): Monday, June 16

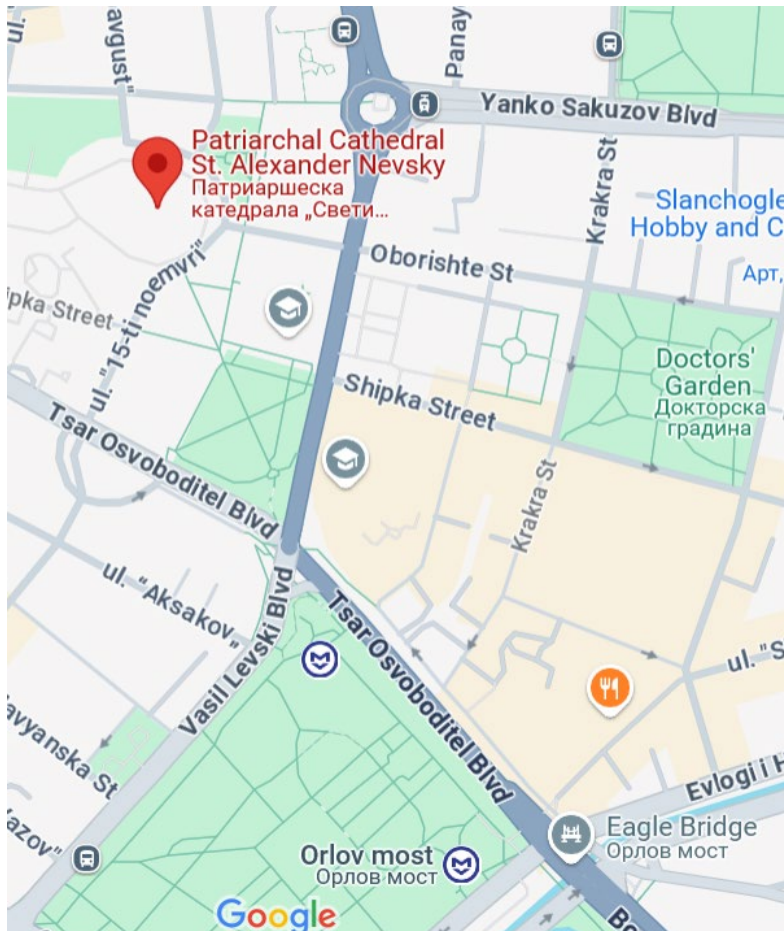
@Institute of Mechanics, Room 510, 17:30 – 18:30

Note: Posters remain displayed Wednesday, June 18, 11:00.

Name	Surname	Topic
Nissrin	Alachkar	Modelling CD8 T cell dynamics in adoptive T cell therapy of melanoma
Pierre-Alexandre	Bliman	Feasibility and optimisation of fly elimination by adult mass trapping and larval treatment: a stage-structured metapopulation approach
Yves	Dumont	Long term human-environment dynamics in a peri-forest context
Lotta	Eriksson	Sensitive detection of copy number alterations in low-quality liquid biopsy sequencing data
Emma	Fairbanks	Comparing methods for novel insecticide-treated net evaluation for malaria control
Albert	Güveniş	HPV Positivity Prediction for Head and Neck Cancer using CT images
Anna	Hlubinová	Matched asymptotic analysis of the Luria–Delbrück distribution in a reversible fluctuation assay
Elena	Keskinova	Exploring the Polyreactivity of Monoclonal Antibodies Using Igome Graphs
Torkel Enok	Loman	Catalyst: Fast and flexible modeling of reaction networks
Débora	Medeiros	Modeling dengue transmission with viral load and antibody levels
Tosin Samuel	Osikoya	Mathematical modelling of siderophores-mediated iron acquisition and cross-feeding in bacterial communities
Jakub Irina	Poljovka Zabaikina	Positive Feedback from Growth Burden in Stochastic Protein Expression
Miglena	Raykovska,	Blue Culture Technology Excellence Hubs in EU Widening Member States
Kaloian	Stoilov	Modelling the effects of mosquito repellent in a two patch system with mobility
Vladimira	Suvandjieva	Mathematical study of NETosis in early Systemic Lupus Erythematosus
Rebeka	Szabó	Geometric nanoparticle model
Boris	Vasilev	QSAR Modeling of Arylsulfonylhydrazones as Potential Anti-Breast Cancer Agents

Social Program

- ◆ **Welcome cocktail:** Monday, 16 June 2025, 19:30 - 21:00,
The restaurant at the [Hotel of Bulgarian Academy of Sciences:](#)
- ◆ **Guided Sightseeing Tour of Sofia:** Wednesday, 18 June 2025,
Meeting point: [Cathedral St. Alexander Nevsky](#) at 17:00.



- ◆ **Official dinner:** Wednesday, 18 June 2023, 19:00 - 23:00,
Venue: [Restaurant Chevermeto](#)

