



V. N. KARAZIN KHARKIV
NATIONAL UNIVERSITY



Deutscher Akademischer Austauschdienst
German Academic Exchange Service



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Fall School 2026

Topological Data Analysis: From Persistent Homology to Mapper

5–9 October 2026 · Dr. Barbara Mez-Starck-Haus, Ulm University

Programme

Monday, 5 October — Introduction

Time	Format	Activity / topic
9:00 – 10:20	Lecture	Introduction to Topology
10:20 – 10:50	 <i>Coffee break</i>	
10:50 – 12:10	Lecture	From geometry to topology: a gentle introduction to persistent homology
12:10 – 13:40	 <i>Lunch</i>	
13:40 – 15:00	Practical	Building simplicial complexes and computing persistence with GUDHI, Ripser and giotto-tda
15:00 – 15:30	 <i>Coffee break</i>	
15:30 – 15:45	Introduction	Opening / Preparation for contributed talks
15:45 – 16:00	Contributed Talk	Serhii Zhuravkov Beyond the Single Label: A Concept-Lattice and Persistent Homology Perspective on Job Matching
16:00 – 16:15	Contributed Talk	Victoria Portnaya Do Prediction Markets Have Memory? Persistent Hysteresis Between Polymarket and Options
16:15 – 16:30	Contributed Talk	Kateryna Chekhovskaia Topological vectorization methods, their integration with machine learning and deep learning architectures
16:30 – 17:30	 <i>Welcome reception</i>	

Tuesday, 6 October — Persistent Homology, DR & Preprocessing

Time	Format	Activity / topic
9:00 – 10:20	Lecture	Homology and Cohomology
10:20 – 10:50	 <i>Coffee break</i>	
10:50 – 12:10	Practical	Data types, features and targets; selecting distance and similarity measures
12:10 – 13:40	 <i>Lunch</i>	
13:40 – 15:00	Practical	Dimensionality reduction: PCA, t-SNE, UMAP, Isomap and MDS
15:00 – 15:30	 <i>Coffee break</i>	
15:30 – 16:00	Quiz	Formative, non-graded recap of Days 1–2
16:00 – 17:30	Project	Team formation and dataset brainstorming
18:30	 <i>Dinner</i>	Join us for a conference dinner to continue our discussions Drei Kannen – Historisches Brauhaus, Hafenbad 31/1, 89073 Ulm

Wednesday, 7 October — Persistent Homology & Mapper Graph

Time	Format	Activity / topic
9:00 – 10:20	Lecture	Mapper algorithm: filters, covers, clustering, and nerve construction
10:20 – 10:50	 <i>Coffee break</i>	
10:50 – 12:10	Lecture	Persistent homology theory II
12:10 – 13:40	 <i>Lunch</i>	
13:40 – 15:40	 <i>Campus tour</i>	Start at Dr. Barbara Mez-Starck-Haus, ends at the Botanical Garden
15:40 – 18:00	 <i>Free time</i>	
18:00 – 20:00	 <i>City tour</i>	Meeting point: Münsterplatz, in front of the Minster

Thursday, 8 October — Advanced Topics & Mapper Application

Time	Format	Activity / topic
9:00 – 10:20	Lecture	Toric Topology and TDA
10:20 – 10:50	☕ <i>Coffee break</i>	
10:50 – 12:10	Lecture	Persistent homology theory III: barcodes and stability
12:10 – 13:40	🍴 <i>Lunch</i>	
13:40 – 15:00	Practical	Building Mapper graphs with Kepler Mapper and giotto-tda; parameter tuning
15:00 – 15:30	☕ <i>Coffee break</i>	
15:30 – 16:00	Quiz	Formative, non-graded recap of Days 3–4
16:00 – 17:30	Project	Team project work and lecturer consultations

Friday, 9 October — Synthesis & Presentations

Time	Format	Activity / topic
9:00 – 10:20	Lecture	Investigating topological models
10:20 – 10:50	☕ <i>Coffee break</i>	
10:50 – 12:10	Discussion	Q&A, open problems, and research directions
12:10 – 13:40	🍴 <i>Lunch</i>	
13:40 – 15:40	Presentations	Team presentations and closing ceremony
15:40 – 16:10	☕ <i>Coffee break</i>	
From 16:10	🚶 <i>Participant departure</i>	

Within the DAAD-supported Double-Degree Programme Ulm–Kharkiv.

Lecturers:

V. Chernyshev · I. Limonchenko

O. Leonov · L. Poliakova

Organizing committee:

Dr. Mikhail Chebunin

Prof. Dr. Evgeny Spodarev

Website: <https://short-url.cc/1F0Kt>