**Content**

| Course Code | Course Name | Semester | Theory | Practice | Lab | Credit | ECTS |
|---|---|---|---|---|---|---|---|
| MAT408 | Topological Data Analysis | 7 | 3 | 0 | 0 | 3 | 5 |

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| Prerequisites | |
| Admission Requirements | |

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| Language of Instruction | |
| Course Type | Elective |
| Course Level | Bachelor Degree |
| Objective | The aim of the course is to explore the fundamental concepts, techniques, and results in Topological Data Analysis. |
| Content | Simplicial complexes, Homology<br>Persistent Homology<br>Complexes on point clouds<br>Reeb Graphs<br>Mapper Algorithm |
| References | -Herbert Edelsbrunner, John L. Harer, Computational Topology An Introduction,<br>-Topology For Computing, Afra Zomorodian |

**Theory Topics**

| Week | Weekly Contents |
|---|---|
| 1 | Simplicial complexes |
| 2 | Complexes from Point Cloud Data |
| 3 | Complexes from Point Cloud Data |
| 4 | Simplicial Homology |
| 5 | Chains, Cycles, Boundaries, and Homology Groups |
| 6 | Matrix View and Algorithm for Calculation |
| 7 | Computing Simplicial Homology of Topological Spaces |
| 8 | Exam |
| 9 | Persistent homology |
| 10 | Filtrations |
| 11 | Matrix View and Reduction-Based Algorithm |
| 12 | Computing Persistent Homology |
| 13 | Analysis of Point Cloud Data |
| 14 | Analysis of Point Cloud Data |