

I. Subject Specification

1. Basic Data

1.1 Title

Spatial Temporal Databases

1.2 Code

BMEEOAFDT85

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2

1.5 Evaluation

Exam

1.6 Credits

3

1.7 Coordinator

name	Siki Zoltán
academic rank	Assistant professor
email	siki.zoltan@emk.bme.hu

1.8 Department

Department of Geodesy and Surveying

1.9 Website

<https://epito.bme.hu/BMEEOAFDT85>

<https://fiek2.mywire.org/course/view.php?id=3402>

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Ph.D.

1.12 Prerequisites

Basic SQL and Python programming knowledge is necessary.

1.13 Effective date

1 September 2022

2. Objectives and learning outcomes

2.1 Objectives

Extending database knowledge into the temporal and spatial direction. Analysis of time series data.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. has an overview of database systems storing spatio-temporal data
2. understands the basic of machine learning algorithms for time series
3. knows the special SQL extensions to handle spatial and temporal data

B. Skills

1. uses public Python packages, codes to handle spatio-temporal data
2. is able to organize spatio-temporal data into database
3. is able to apply spatial-temporal queries on database

C. Attitudes

1. is open to share program codes and algorithms with teammates and other researchers
2. adds valuable comments to source codes for researcher fellows
3. accepts comments, critics and updates in teamwork

D. Autonomy and Responsibility

1. is able to cooperate teammates

2.3 Methods

Lectures, consultations, individual or team projects. Presentation of project.

2.4 Course outline

Spatial Temporal Databases - BMEEOAFDT85

Week	Topics of lectures and/or exercise classes
1.	Handling date-time, time-zone data in databases
2.	Spatial data storing in databases, the SFS (Simple Feature for SQL) standard
3.	Spatial and temporal functions in PostgreSQL and PostGIS
4.	Creating and maintaining spatio-temporal databases from SQL using PostgreSQL and PostGIS
5.	Using spatio-temporal database from Python
6.	Time series databases (TSDB)
7.	NoSQL databases for spatio-temporal data
8.	Preprocessing and filtering of time series of observation data
9.	Spectral analysis of time series
10.	Machine learning and time series data
11.	Introduction to team/individual project
12.	Project consultation
13.	Project consultation
14.	Project presentation and evaluation

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

- Ben Auffarth: Machine Learning for Time-Series with Python, Packtpub 2021 October
- Andrew P. McMahon: Machine Learning Engineering with Python, Packtpub 2021 November
- Dominik Mikiewicz , Michal Mackiewicz , Tomasz Nycz: Mastering PostGIS, Packtpub 2017 May

2.6 Other information

2.7 Consultation

Appointments: As specified on the department's website, or in consultation with the course instructors via e-mail or Teams

This Subject Datasheet is valid for:

Inactive courses

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
exam	E	A.1, A.2, A.3
project	P	B.1, B.2, B.3; C.1, C.2, C.3; D.1

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Abbreviation	Score
E	50%
P	50%
Sum	100%

3.4 Requirements and validity of signature

submission of the individual project and acceptance by the course coordinator

3.5 Grading system

The final grade is the weighted average of the evaluations according to the clause 3.3.

3.6 Retake and repeat

1. Individual project can be submitted after the deadline specified in the detailed course programme until 11:59 pm on the last day of the completion week. In this case, the student must pay the pre-determined fee.
2. Submitted and accepted home works can be corrected until the deadline given in point 1) without paying a fee.

3.7 Estimated workload

Activity	Hours/semester
Contact hours	14×2=28
Preparation of the project	36
Preparation for the exam	26
Sum	90

3.8 Effective date

1 September 2022

This Subject Datasheet is valid for:

Inactive courses