

I. Subject Specification**1. Basic Data***1.1 Title***IT TECHNOLOGIES***1.2 Code***BMEEOFTMSFGG03-00***1.3 Type*

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	1
Lab	2

1.5 Evaluation

Midterm grade

1.6 Credits

5

1.7 Coordinator

name	Dr. Kapitány Kristóf
academic rank	Associate professor
email	kapitany.kristof@emk.bme.hu

1.8 Department

Department of Photogrammetry and Geoinformatics

1.9 Website

epito.bme.hu
<https://edu.epito.bme.hu/course/view.php?id=5297>

1.10 Language of instruction

hungarian

1.11 Curriculum requirements

Compulsory in the Land Surveying and Geoinformatics (MSc) programme

*1.12 Prerequisites**1.13 Effective date*

1 September 2025

2. Objectives and learning outcomes

2.1 Objectives

The aim of the course is to provide students with a comprehensive overview of the toolkit of modern information technology, with a particular focus on geoinformatics and engineering applications. Throughout the course, students will become familiar with advanced data acquisition technologies, methods for structured data storage, processing, and analysis, as well as effective techniques for data visualization. Students will acquire fundamental principles and tools that can enhance the efficiency of geoinformatics and civil engineering design processes through the application of technologies such as Building Information Modeling (BIM), Big Data, the Internet of Things (IoT), and Artificial Intelligence (AI). The course supports students in developing a broad understanding of the evolution of digital technologies and their practical applications in construction, infrastructure planning, and geoinformatics. Moreover, special emphasis is placed on information security, version control, and collaborative technologies, which are essential for effective teamwork and project management. The course also aims to prepare students to independently acquire knowledge about emerging technologies.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. Understands information technologies relevant to surveyors and geoinformatics professionals. 2. Understands modern data acquisition methods and tools. 3. Is familiar with the principles of database management, data storage, and processing. 4. Understands the operation and application of Big Data and IoT systems. 5. Has a foundational understanding of artificial intelligence and machine learning. 6. Understands web-based geospatial data visualization technologies. 7. Understands the role of version control and collaborative tools. 8. Understands the operation of computing clusters and cloud computing. 9. Understands the applications of virtual and augmented reality in geoinformatics.

B. Skills

1. Is able to select appropriate IT tools for solving engineering problems. 2. Is able to use complex IT systems to increase the efficiency of engineering work. 3. Is able to securely transmit and store collected data using network systems. 4. Is able to process and analyze data with the help of modern IT tools. 5. Is able to present results in a clear and visually effective manner. 6. Is able to communicate and publish findings in an accessible way for non-experts. 7. Is able to process professional topics and present them in the form of a presentation. 8. Is able to work in a team and effectively use collaborative tools.

C. Attitudes

1. Collaborates with instructors and fellow students to expand their knowledge. 2. Continuously develops their knowledge through ongoing learning. 3. Is open to exploring and applying new information technology tools. 4. Strives for accurate and error-free task completion. 5. Pays attention to the secure handling of data. 6. Develops their digital competencies and adapts to new technologies.

D. Autonomy and Responsibility

1. Independently processes topics related to information technology. 2. Applies a systems-based approach in their thinking. 3. Takes responsibility for the accuracy and security of the data they handle. 4. Is capable of making independent decisions in selecting IT tools and methods.

2.3 Methods

Lectures, practical sessions, use of IT tools and techniques, and independently prepared presentations.

2.4 Course outline

1. Computer fundamentals and components 2. Network communication 3. Security and encryption 4. Version control and collaboration tools 5. Cloud computing for civil engineers 6. The world of Big Data and IoT 7. Virtualization (virtual machines) – Linux and related systems 8. Computing clusters and botnets 9. Utilizing the computing power of graphics cards 10. Artificial intelligence – Deep learning, convolutional neural networks, image processing 11. WebGIS 12. BIM (Building Information Modeling) 13. Virtual and augmented reality 14. Course overview and summary

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

Lecture slides available in the Educational Framework (Learning Management System - LMS).

2.6 Other information

0

2.7 Consultation

As specified on the department's website, or by prior arrangement via email: kapitany.kristof@emk.bme.hu

This Subject Datasheet is valid for:

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The learning outcomes defined in point 2.2 are assessed based on a written test, a homework assignment, and a presentation on a topic independently researched by the student. The minimum attendance requirement for students at contact hours is 70%.

3.2 Assessment methods

Assessment Name (Type)	Code	Assessed Learning Outcomes
Midterm test (summative assessment)	MT1	A.1-A.9; B.1-B.7
Independent topic research and presentation	PR1	B.4-B.8; C.1-C.6; D.1-D.4
Home work	HW1	A.1-A.9; B.1-B.7; C.1-C.6; D.1-D.4

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

3.3 Evaluation system

Code	Weight
MT1	33%
PR1	34%
HW1	33%
Total	100%

3.4 Requirements and validity of signature

No signature can be obtained for this course.

3.5 Grading system

Grade	Score (P)
excellent (5)	$85 \leq P$
good (4)	$75 \leq P < 85\%$
satisfactory (3)	$65 \leq P < 75\%$
pass (2)	$50 \leq P < 65\%$
fail (1)	$P < 50\%$

3.6 Retake and repeat

The in-class midterm test can be retaken once; in the case of a retake, the better of the two results will be taken into account. The homework assignment may be submitted late—subject to the payment of the fee specified in the regulations—by 23:59 on the last day of the retake period, in electronic form.

3.7 Estimated workload

Activity	Hours/Semester
Participation in contact (in-person) classes	$14 \times 3 = 42$
Preparation for practical sessions during the semester	$14 \times 1 = 14$
Preparation for assessments	30
Completion of the homework assignment	24
Independent study of the assigned written materials	40

3.8 Effective date

1 September 2025

This Subject Datasheet is valid for: