Construction Information Technology Engineering Project - BMEEODHMB5P

I. Subject Specification

1. Basic Data

1.1 Title

Construction Information Technology Engineering Project

1.2 Code

BMEEODHMB5P

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Consultation	2

1.5 Evaluation

Midterm grade

1.6 Credits

6

1.7 Coordinator

name	Dr. Laszlo Dunai
academic rank	Professor
email	dunai.laszlo@emk.bme.hu

1.8 Department

Dean's Office

1.9 Website

https://epito.bme.hu/BMEEODHMB5P
https://fiek2.mywire.org/course/view.php?id=3564

1.10 Language of instruction

english

1.11 Curriculum requirements

Compulsory in the Construction Information Technology Engineering (MSc) programme

1.12 Prerequisites

1.13 Effective date

1 September 2022

2. Objectives and learning outcomes

2.1 Objectives

The aim is to develop the competences needed for complex construction projects. Students will learn how IT technologies support engineering processes. They will learn the basics of building IoT networks, basic hardware components, development techniques for control, and basic requirements for smart homes. Students will get insights into practical applications of sensor networks monitoring the energy-efficiency, safety, and comfort of buildings. Students will understand how smart monitoring systems support building energy performance analysis, and sustainability goals. They will learn the basics of point cloud processing in their own development environment. Students will gain knowledge of BIM-based building surveying. The course will provide a solid basis for the complex project assignment that will follow, where students will build an IoT network and collect data in a real environment.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. Knows the architecture of microcontroller-based IoT devices.
2. Knows the components of smart homes.
3. has an overview of the data types and formats that can be acquired through IoT networks.
4. knows the info-communication background of IoT devices and smart homes.
5. understands the benefits regarding sustainability goals of smart home systems and facility management.
6. understands the principles of monitoring various environmental characteristics using sensor networks.
7. understands how point clouds can support particular engineering applications.
8. knows basic point cloud processing workflows.
9. has an overview of building survey technologies.
10. knows how to build a basic BIM model.

B. Skills

1. creates a basic IoT system.
2. able to set the parameters of an IoT device.
3. applies the methods of numerical methods in the control and data acquisition of sensor networks.
4. able to acquire data for building energy performance or comfort analysis.
5. able to carry out basic point cloud processing workflows.
6. derives data from point clouds that enables engineering analysis.
7. performs indoor building surveys.
8. able to create a simple BIM model that is able to support smart home applications.

C. Attitudes

1. collaborates with the teacher and fellow students in gaining knowledge,
2. is continuously gaining knowledge,
3. looks for the latest, most suitable technological solutions in order to implement the design in a high-quality,
4. is open to the use of IT tools and equipment,
5. makes effort to understand and use the tools in use,
6. aims accuracy in his/her calculations/solutions,
7. aims understanding the criticism,
8. applies self-checking of his/her calculations, corrects the mistakes,
9. has a need for the use of optimal, durable and safe technologies,
10. strives to take into account the principles of energy efficiency and environmental awareness and to expand his knowledge of such subjects.

D. Autonomy and Responsibility

1. is independent in problem statements and solutions based on given resources,
2. in some situations - e.g. in team-based home assignments - collaborates with fellow students in solving tasks,
3. aims to understand the complexity, and comprehensiveness of the problems and recognize the synergies,
4. in the case of teacher and fellow student criticism of his work, he accepts the well-founded critical comments and incorporates them into his further tasks,
5. actively participates in the professional debate, and expresses his opinion with justification.

2.3 Methods

Under continuous supervision individually solves homework, communication in oral and written form, and uses IT tools and equipment.

2.4 Course outline

Week	**Topics of lectures and/or exercise classes**
1.	demonstration - microcontroller-based sensors
2.	demonstration - microcontroller-based sensors
3.	development environment of IoT devices
4.	development environment of IoT devices
5.	practical applications of sensor networks in buildings
6.	building microcontroller-based IoT device
7.	building microcontroller-based IoT device
8.	building microcontroller-based IoT device
9.	building microcontroller-based IoT device

10.	point cloud processing
11.	point cloud processing
12.	building survey
13.	building survey
14.	assessment

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

a) Textbooks, literature:

- project-specific, consult with the supervisor

b) Online materials: materials uploaded to the web site of the subject, e.g.:

- general presentation slides
- guidelines

2.6 Other information

2.7 Consultation

The instructors are available for consultation during their office hours, as advertised on the department website. Special appointments can be requested via e-mail.

This Subject Datasheet is valid for:

2023/2024 semester I

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes specified in clause 2.2. above and the evaluation of student performance will be carried out through home assignments and active consultation work.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
Home assignment	HA1	A.1-6., B.1-4., C.1-7., D.1-2.
Home assignment	HA2	A.7-8., B.5-6., C.1-7., D.1-2.
Home assignment	HA3	A.9-10., B.7-8., C.1-7., D.1-2.
activity	A	A.1-10., B.1-8., C.1-7., D.1-2.

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
HA1	60%
HA2	20%
HA3	10%
A	10%
Sum	**100%**

3.4 Requirements and validity of signature

No signature can be obtained.

3.5 Grading system

Grade	Points (P)
excellent (5)	80<=P
good (4)	70<=P<85%
satisfactory (3)	60<=P<70%
passed (2)	50<=P<60%
failed (1)	P<50%

3.6 Retake and repeat

1. Each home assignment can be resubmitted one week after the normal deadline, free of charge.
2. “Activity” A cannot be repeated, cannot be substituted with other forms of activity.

3.7 Estimated workload

Activity	**Hours/semester**
consultation hours	14x2=28
preparing HA1	110
preparing HA2	34
preparing HA3	18
Sum	180

3.8 Effective date

1 September 2022

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2023/2024 semester I