Advanced Physical Geodesy - BMEEOAFDT72

I. Subject Specification

1. Basic Data

1.1 Title

Advanced Physical Geodesy

1.2 Code

BMEEOAFDT72

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	Dr. Völgyesi Lajos
academic rank	Professor emeritus
email	volgyesi.lajos@emk.bme.hu

1.8 Department

Department of Geodesy and Surveying

1.9 Website

https://epito.bme.hu/BMEEOAFDT72
https://fiek2.mywire.org/course/view.php?id=3400

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Compulsory in the Specialization in Structural Engineering (BSc) programme

1.12 Prerequisites

1.13 Effective date

1 September 2022

2. Objectives and learning outcomes

2.1 Objectives

Physical and Theoretical Geodesy is the science of the figure of the Earth, which studies the large-scale figure and gravity field of the Earth, which are closely related. The figure of the Earth is approximated by an ellipsoid of revolution, after which the precise figure is described by small deviations from this ellipsoid. Vertical reference systems are discussed in this context. Extending the approach to the Earth's gravity field yields small difference quantities, such as the disturbing potential and gravity anomalies. This course covers such modern techniques that were not covered in the previous BSc and MSc geodesy and physical geodesy courses due to lack of time.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. Is familiar with the terminology of physical geodesy
2. Understands the relationship and interdependence of physical geodesy and gravimetry
3. Knows the most important mathematical methods in geosciences
4. Acquires the modern views on the determination of figure of the Earth
5. Recognises the importance of gravity gradients data in physical geodesy
6. Learn about QDaedalus measurements
7. Knows the possibilities of the determination of fine structure of geoid anomalies
8. Understands the problem of geodynamic interpretation of repeated geodetic and gravity observations
9. Knows the time variations of geoid and heights

B. Skills

1. Is able to understand the relationship between physical geodesy and gravimetry
2. Is able to determine the fine structure of geoid

C. Attitudes

1. Considers importance attending lectures and continuous mid-year learning
2. Cooperates with the lecturer and fellow students in expanding the knowledge
3. In addition to the compulsory curriculum, it expands its knowledge through continuous acquisition of knowledge

D. Autonomy and Responsibility

1. Independently investigates problems raised in lectures
2. Carry out his studies with appropriate responsibility
3. Assists fellow students in preparation in necessary situations

2.3 Methods

Lectures

2.4 Course outline

Week	Topics of lectures and/or exercise classes
1.	Current status and challenges of the science of physical geodesy (problems and solutions)
2.	Mathematical geosciences
3.	Significance of gravimetry in physical geodesy (new possibilities)
4.	Modern views on the determination of figure of the Earth
5.	Space methods
6.	Significance of torsion balance in physical geodesy
7.	Determination of fine structure of the geoid using torsion balance measurements
8.	Astrogeodetic observations by the QDaedalus system
9.	Determination of fine structure of the geoid using QDaedalus measurements
10.	Time variation of height and gravity
11.	Geodynamic interpretation of repeated geodetic observations
12.	Geodynamic interpretation of repeated gravity observations
13.	Seasonal variations of geoid (4D geodesy)
14.	Summary, consultation

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

- Bernhard Hofmann-Wellenhof, Helmut Moritz: Physical Geodesy. Springer, 2006. ISBN: 3-211-33544-7
- Torge: Geodesy. Walter de Gruyter, 1991. ISBN: 3-11-017072-8
- P. Biró: Time variation of height and gravity. Akadémiai Kiadó 1983. ISBN: 963-05-3231-X
- P. Biró, J. Ádám, L. Völgyesi, Gy.Tóth: Geodesy theory and practice. 2013. (In Hungarian) ISBN 978-963-257-248-2, p. 508.

2.6 Other information

1. Attendance at the lectures is compulsory. Students who miss four or more lectures will not receive ECTS

for the course.

2.7 Consultation

As indicated on the department's website or by e-mail with the lecturer; e-mail: volgyesi.lajos@emk.bme.hu

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
		A.1-A.9; B.1-B.2; C.1-C.3; D.1-D.3

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
Exam	100°%
Sum	**100%**

3.4 Requirements and validity of signature

Active attendance at lectures

3.5 Grading system

Grade	Points (P)
excellent (5)	
good (4)	
satisfactory (3)	
passed (2)	
failed (1)	

3.6 Retake and repeat

In case of retaking an assessment the second result will be taken into account from the new and previous results.

3.7 Estimated workload

Activity	Hours/semester
contact hours	14×2=28
mid-year learning	14×3=42
preparation for the exam	20
Sum	**90**

3.8 Effective date

1 September 2022

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