

I. Tantárgyleírás

1. Alapadatok

1.1 Tantárgy neve

Geophysics Msc

1.2 Azonosító (tantárgykód)

BMEEOAFMF51

1.3 Tantárgy jellege

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	2

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Félévközi érdemjegy

1.6 Kreditszám

3

1.7 Tárgyfelelős

név	Dr. Bence Toronyi
beosztás	Adjunktus
email	toronyi.bence@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Általános- és Felsőgeodézia Tanszék

1.9 A tantárgy weblapja

<https://epito.bme.hu/BMEEOAFMF51>

<https://edu.epito.bme.hu/course/view.php?id=3478>

1.10 Az oktatás nyelve

magyar és angol

1.11 Tantárgy típusa

Kötelező a Földmérő- és térinformatikai mérnök (MSc) szakon

1.12 Előkövetelmények

1.13 Tantárgyleírás érvényessége

2021. szeptember 1.

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

Geophysics has three basic objectives.

The most important thing is to supply and complete the knowledge about the Earth, to know the interaction that exists between geodesy discussing the geometry of the Earth and geophysics discussing the physics of the Earth. Since the geoid (the theoretical shape of the Earth) is defined by a physical concept (the [gravity](#)), geophysics is in close connection to the geodesy and cosmic geodesy. An important aim of the course is to get knowledge of students about the physical structure and processes inside the Earth by seeing the connections between the shape of the Earth and the inner processes and material structure of our planet. The subject seeks to provide the physical background and explanation of the most important contexts and phenomena that students encounter in learning of the different subjects. Another important goal of the course is to draw attention to the dynamism of our Earth; that everything is constantly changing around us.. Surveyors need to be aware of where, under what circumstances, and for how long our control points can be considered to be motionless. To do this, we need to know to what extent the shift of our control points is caused by different causes e.g. movements caused by temperature changes, tectonic movements of the earth's surface, or e.g. the displacement of the coordinate system (displacement of the center of mass or the precession and nutation motion of the Earth). The Earth must therefore not be seen as a boring empty body, not as some abstract mechanical concept, but as a constantly evolving, exciting, changing living planet. This is important for geodesy, because most of the changes due to the physical processes that take place exceed the accuracy of today's modern geodetic measurements. Finally, surveyors need to know and understand the language of earth science professionals just as much as civil engineers, as they have an increasing role to play in this field as well.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése után a hallgató

A. Tudás

1. is familiar with the terminology of earth sciences and geophysics,
2. understands the relationship and interdependence of geodesy and geophysics,
3. informed about the structure, time change and geodetic significance of the geomagnetic field,
4. knows the geothermal conditions and radioactive phenomena of the Earth,
5. has a comprehensive knowledge of earthquakes, the internal structure of the Earth,
6. knows in detail the structure of the Earth's [gravity](#) field, the mathematical and physical basis of the [force](#) field,
7. be able to apply spherical harmonics to describe the Earth's [gravity](#) field,
8. knows the concept, geodetic significance and use of the normal [gravity](#) field, disturbed potential and various [gravity](#) anomalies,
9. knows the Earth's tide phenomenon in detail,
10. is aware of the physical basis of [rotation](#) movements, knows exactly the phenomenon of precession and nutation,
11. understands the phenomenon, geodetic and astronomical effects of lunisolar and planetary precession, and understands the essence of disturbing precession and astronomical nutation,
12. knows the phenomenon of free nutation, forced nutation, polar motion, polar wandering, and its geodetic and astronomical effects,
13. knows the global tectonics of the Earth.

B. Képesség

1. is able to understand the following geodetic subjects on the basis of his basic knowledge of geophysics,
2. is able to understand the relationship between geodesy and different earth sciences,
3. is able to mathematically describe the Earth's [gravity](#) field, the geodetic application of potential disturbance and gravitational anomalies,
4. is able to understand the changes in geodetic and astronomical coordinate systems and time changing of the coordinates by knowing the phenomena of the Earth's [rotation](#)..

C. Attitűd

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

D. Önellőség és felelősség

1. carry out his studies with appropriate responsibility,
2. openly accepts well-founded critical remarks,
3. assists fellow students in preparation in necessary situations.

2.3 Oktatási módszertan

Lectures, written and oral communication.

2.4 Részletes tárgyprogram

Week	Topics of lectures and/or exercise classes
1.	The role and significance of geophysics in earth sciences and geodesy.
2.	Basic concepts of Earth's magnetic field, normal geomagnetic field and anomalies.
3.	Time variation of geomagnetic field, the origin of the magnetic field, the explanation of the changes.
4.	Basic seismological concepts, formation, propagation and registration of earthquake waves, spatial and temporal distribution of earthquakes.
5.	Free oscillations of the Earth, the inner structure of the Earth based on earthquake waves.
6.	Radioactivity and geothermics and their significance in geodynamics

7.	Base concepts of the gravity and gravitation, description of the gravity field by spherical harmonics
8.	Normal gravity field, spheroids and gravity anomalies
9.	Applying of gravity anomalies in geophysics and geodesy.
10.	Time variation of gravity field, the Earth's tide
11.	The rotation of the Earth: Motion of a heavy and a free gyroscope, lunisolar and planetary precession, general precession, disturbing precession.
12.	Earth's rotation : Euler's free nutation, forced nutation, polar motion, polar wandering.
13.	Geotectonics : continental drift, ocean floor spreading, plate tectonics.
14.	Geoscientific foundation of 4D geodesy

A félév közbeni munkaszüneti napok miatt a program csak tájékoztató jellegű, a pontos időpontokat a tárgy honlapján elérhető "Részletes féléves ütemterv" tartalmazza.

2.5 Tanulástámogató anyagok

On-line materials will be available in the homepage of the subject

2.6 Egyéb tudnivalók

2.7 Konzultációs lehetőségek

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

Jelen TAD az alábbi félévre érvényes:

Inactive courses

II. Tárgykövetelmények**3. A tanulmányi teljesítmény ellenőrzése és értékelése****3.1 Általános szabályok**

The assessment of the learning outcomes specified in clause 2.2 above and the evaluation of student performance occurs via a midterm tests.

3.2 Teljesítményértékelési módszerek

Evaluation form	Abbreviation	Assessed learning outcomes
Midterm test	MT1	A.1-A.8
Midterm test	MT2	A.1-A.13; B.1-B.4; C.1-C.3; D.1-D.3

A szorgalmi időszakban tartott értékelések pontos idejét, a házi feladatok ki- és beadási határidejét a "Részletes féléves ütemterv" tartalmazza, mely elérhető a tárgy honlapján.

3.3 Teljesítményértékelések részaránya a minősítésben

Abbreviation	Score
MT1	50%
MT2	50%
Sum	100 %

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

Active participation in 70% of the presentations is required to obtain a signature. The signature obtained is valid for 2 semesters. [Unless otherwise specified, the period of validity is that specified in the TVSZ.]

3.5 Érdemjegy megállapítása

Grade	Points (P)
excellent (5)	85-90%
good (4)	72,5-85%
satisfactory (3)	65-72,5%
passed (2)	50-65%
failed (1)	50% below

3.6 Javítás és pótlás

1) It is possible to retake MTs, which are for the first time - free of charge.

2) If the student fails to obtain a mark other than unsatisfactory by making up the grade according to point 1), he/she may make a second attempt on the completion week to correct the first unsuccessful retake, subject to payment of the fee specified in the regulations.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

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

3.8 A tárgykövetelmények érvényessége

2025. január 25.

Jelen TAD az alábbi félévre érvényes:

Inactive courses