GEOELECTRIC COLLEGE

Earth Science Engineering MSc course, Geophysical Engineering Specialization

2018/19 1st Semester

COURSE COMMUNICATION FOLDER

University of Miskolc
Faculty of Earth Science and Engineering
Institute of Geophysics and Geodesy

Course datasheet

Course Title: Geoelecric College (Optional subject group (2)) **Instructor:** Dr. Endre Turai, associate professor, CSc, PhD.	**Code:** MFGFT730010 **Responsible department/institute:** Department of Geophysics / Institute of Geophysics and Geoinformatics
	Type of course: Optional
Position in curriculum (which semester): 3	**Pre-requisites (if any):** -
No. of contact hours per week (lecture + seminar): 2+2	**Type of Assessment (examination/ practical mark / other):** examination
Credits: 4	**Course:** full time

Course Description:
In addition to curriculum of Geophysical Exploration Methods I.-II., Geophysical Data Processing and Technical Physics I.-II. the course teaches a field theory and practical curriculum that focuses on the special questions of interpretation of the geoelectric field and the examination of electromagnetic fields.
Competencies to evolve:
Knowledge: T1, T2, T3, T4, T5, T6, T7, T8, T9
Ability: K1, K2, K3, K12, K13
Attitude: A1, A2, A3, A4, A5, A7
Autonomy and responsibility: F1, F2, F3, F4, F5

The short curriculum of the subject:
Solve the direct problem of DC geoelectric methods. Solve the direct problem of electromagnetic methods. Calculation of electromagnetic field characteristics in inhomogeneous and anisotropic structures. Measuring systems for passive (natural field) electromagnetic methods. Measuring systems for active (artificial field) electromagnetic methods. Characteristics of 1D, 2D and 3D geoelectric numerical modelling. Differential equation modelling. The finite differential numerical modelling. Integral equation modelling. The finite element numerical modelling. Hybrid Numerical Modelling. The technique of analog modelling. Methods of geoelectric inversion. Imaging geoelectric inversion methods. Local and global geoelectric inversion methods. Geoelectric forward modelling and inversion software. Domestic and foreign case studies. Solving individual geoelectric tasks. Excerpts from the new results of the topic by processing special literature.

Assessment and grading:
Signature requirements: Participation on at least 51% of the lecture and practical lessons, on the terms of the study and examination regulations and the fulfillment of two individual assignments is subject to the signature.
scale:

% value	Grade
86 –100%	5 (excellent)
71 – 85%	4 (good)
61 – 70%	3 (satisfactory)
46 - 60 %	2 (pass)
0 – 45%	1 (failed)

Compulsory or recommended literature resources:

Kearey P., Brooks M., Hill I., 2002: An introduction to geophysical exploration. Blackwell

Publishong Co., Oxford.
Keller G. W., 1968: Electrical prospecting for oil. Quarterly of the Colorado School of Mines, Colorado.
Keller G. W., Frischknecht F. C., 1966: Electrical methods in geophysical prospecting. Pergamon Press, Oxford.
Sumner J. S., 1976: Principles of induced polarization for geophysical exploration. Elsevier Publishong Co., Amsterdam.
Wait J R. Overvoltage Research and Geophysical Applications. London: Pergamon Press; 1959.

Syllabus of the semester

(Megjegyzés: a tárgy kurzusa a 2018/2019 tanév 1. félévében jelentkezés hiányában nem indult.)

Week	Lecture and seminar
1	Direct problem of DC geoelectric methods.
2	Direct problem of electromagnetic methods.
3	Calculation of electromagnetic field characteristics in inhomogeneous and anisotropic structures I.
4	Calculation of electromagnetic field characteristics in inhomogeneous and anisotropic structures II.
5	Measuring systems for passive (natural field) electromagnetic methods.
6	Measuring systems for active (artificial field) electromagnetic methods.
7	Characteristics of 1D, 2D and 3D geoelectric numerical modelling.
8	Differential equation modelling. The finite differential numerical modelling.
9	Integral equation modelling. The finite element numerical modelling.
10	Hybrid Numerical Modelling. Analog modelling technique.
11	Imaging geoelectric inversion methods. Local and global geoelectric inversion methods.
12	Geoelectric forward modelling and inversion software.
13	Domestic and foreign case studies. Excerpts from the new results of the topic by processing special literature.
14	Presentations - individual geoelectric tasks. Semester closing.

Sample for the exam

1. Direct problem of DC geoelectric methods.
2. Direct problem of electromagnetic methods.
3. Calculation of electromagnetic field characteristics in inhomogeneous and anisotropic structures.
4. Measuring systems for passive (natural field) electromagnetic methods.
5. Measuring systems for active (artificial field) electromagnetic methods.
6. Characteristics of 1D, 2D and 3D geoelectric numerical modelling.
7. Differential equation modelling.
8. Integral equation modelling.
9. Finite differential numerical modelling.
10. Finite element numerical modelling.
11. Hybrid Numerical Modelling.
12. Analog modelling technique.
13. Imaging geoelectric inversion methods.
14. Local and global geoelectric inversion methods.
15. Geoelectric forward modelling and inversion software.
16. Domestic and foreign case studies. Excerpts from the new results of the topic by processing special literature.