

# DC Resistivity Methods – Course Syllabus

## Course Information

Semester	UEF 3.1 – Applied Geophysics
Teaching Hours	52h30 (Lecture: 1h30, Tutorial: 1h30)
Credits	5
Coefficient	3

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## Course Objectives

The course aims to introduce students to the **fundamental concepts and field techniques** of electrical geophysical prospecting.

These methods are essential for identifying subsurface structures by measuring the **resistivity of rocks**.

Applications include:

- **Mineral exploration**
- **Archaeological site detection**
- **Groundwater exploration**

## Prerequisites

A solid foundation in **mathematics** and **physics** is required for effective understanding of the course material.

## Course Content

### Introduction

#### I. Generalities on Electrical Prospecting (EP)

1. Electrical properties of rocks
2. Electrical resistivity
3. Relation between resistivity and facies
4. Soil properties influencing resistivity
5. Resistivity variation with facies
6. Resistivity of different rock types
7. Soil properties: homogeneity, heterogeneity, isotropy, anisotropy
8. Sources of noise

#### II. Basic Principles of DC Electrical Prospecting

1. Potential distribution in a homogeneous medium
2. Potential perturbation in DC current
3. Apparent resistivity concept

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4. Boundary conditions
5. Principles of similarity, superposition, and reciprocity
6. Depth of investigation
7. Electrode configurations

## III. Calculation of Electric Potential

1. Theory of electrical images
2. S. Stefanescu's theory

## Practical Work

1. Plotting and interpreting natural electric potential (SP) data
2. Calculation and plotting of potential and field for point electrodes
3. Calculation and plotting for linear electrodes
4. Depth of penetration: current density in a homogeneous isotropic soil
5. Resistivity profiling and electrical imaging
6. Resistivity mapping
7. Interpretation of VES curves (two-layer case)
8. Interpretation of VES curves (three-layer case)
9. VES interpretation using S-method
10. Construction of geo-electrical cross-sections
11. Pseudo-section of resistivity
12. Pseudo-section of chargeability
13. Time-domain IP data interpretation

## Evaluation Method

Assessment is based on **continuous evaluation** and a **final written examination**.

## References

- Bhattacharya, P.K., Patra, H.P. (1968). *Direct Current Geoelectric Sounding: Principles and Applications*. Elsevier, Amsterdam.
- Keller, G.V., Frischknecht, F.C. (1966). *Electrical Methods in Geophysical Prospecting*. Pergamon Press, London, 519 p.
- Telford, W.M., Geldart, L.P., Sheriff, R.E. (1998). *Applied Geophysics*. Cambridge University Press.