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SAULT COLLEGE
of Applied Arts and Technology
Sault Ste. Marie

COURSE OUTLINE

GEOPHYSICS II

GEO 211-4

revised June 1982 by G. MacInnis

COURSE OUTLINE GEO 211-4 GEOPHYSICS II

Electromagnetic Methods

Periods	Topic Description
1	-Introduction and description of electromagnetic induction
1	-Geometry and Theory of secondary EM fields caused by currents induced in long buried wire.
1	-The Vertical Loop EM method,resultant field dip angles on surface in vicinity of buried conductor.
1	-VLEM survey methods,in-line broadside
2	detail pinpointing treatment of data-plotting conventions.
6	-Field practice on buried pipeline and sulphide VLEM and VLF
2	-Radio frequency surveys - theory and fiedl work.
1	-Amplitude,period of electromagnetic wave;phase and amplitude comparisons between a primary and secondary wave.
1	-The horizontal loop electromagnetic technique;principle of operation; in-phase and out-of-phase ratios.
1	-Horizontal Loop survey procedures;depth penetration;orientation of loops
6	-Field practice on buried pipeline and sulphide conductors.
2	-Treatment of data-plotting conventions
2	-Interpretation of VLEM and HLEM results;determination of length,dip width,and depth of conductor ; case histories.
1	-Comparison of vertical and horizontal loop methods
1	-Airborne EM systems--general outline
2	-Test

Electromagnetic Methods

1. Describe the principles of electromagnetic induction associated with alternating current and the associated electromagnetic field around a wire.

2. Describe the procedure for orienting a search coil in a secondary field to locate a null.

3. Draw a diagram of, and state the relationships between a primary field, secondary field and resultant field, associated with a sulphide conductor placed in a primary field.

4. Given one line of electromagnetic readings from a vertical E.M.Survey, plot the results in graphical form.

5. Describe the optimum conditions for a conductor.

6. List the materials and conditions which cause conductors.

7. State the causes of the strength of resultant fields associated with conductors.

8. List the dip angles associated with conductors of various strengths.

9. State why we use more than one frequency when surveying with a vertical E.M. unit.

10. Explain null width.

11. Explain why tone factor is used in discriminating good conductivity.

12. Explain how the dip angle is calculated from the null width.

13. Describe the field procedures for four types of surveys;stationary method,broadside method,in-line method,ans search square.

14. To describe and use various graphical relationships from field data to interpret the results of V.E.M. surveys.

15. State the ground follow-up procedures necessary to start a V.E.M. survey.

16. Complete 240 lines of V.E.M. in the field,and plot the results.

17. Complete a V.E.M. survey from field notes handed out in class and interpret the results.

18. Write out and draught in the map legend the information necessary to the understanding of the survey.

20. Explain the theory of electromagnetic induction as applied to horizontal electromagnetic surveys. (H.E.M.)

21. Explain the phase relationships of the primary,secondary and resultant fields.

22. Explain the effect of inductance and reactance in a sulfide conductor.

23. Explain and use a diagram to show how the in-phase and out-of-phase relationships of an H.E.M. field instrument are compared when surveying a conductive body.

24. Compare the in-phase and out-of-phase measurements graphically to indicate comparative conducting.

25. Graphically determine the width of a conductor from plotted field results.

25A. State the errors which occur in field work due to improper field procedures.

25B. Determine the direction of dip of a conductive body from plotted field results.

26. Compare the performance, field techniques, and results of V.E.M. and H.E.M. surveys.

27. Survey two lines of H.E.M. in the field and plot the results.

28. List and draught the information required in the legend of H.E.M. surveys.

29. Describe the source of the AFMAG field. (Audio Frequency Magnetics)

30. State the periods of strongest reception of the AFMAG field as to diurnal and seasonal variations.

31. Describe the nature of the AFMAG field around conductive zones.

32. Describe the advantages and disadvantages of using an AFMAG survey.

33. State the source of Very Low Frequency (V.L.F.) field.

34. Give the range of frequencies transmitted by V.L.F. stations.

35. Draw the field induced by V.L.F. stations around a conductive body.

36. Draw a sketch of the coil orientation in an EM-16 survey unit.

37. Orient and take a reading with the EM-16 unit in the field.

38. List the advantages and disadvantages of the EM-16 unit.

39. Take readings in the field on two survey lines and plot the results.

40. Draw a sketch of the coil configuration of a Radem (V.L.F.) unit.

41. Orient and take readings with the Radem unit in the field.

42. Complete ywo lines of Radem surveys and plot the results.

43. State the purpose of airnorne surveys.

44. State the limitations of airboren surveys.

45. Draw and describe the coil configurations used in airborne surveys.

46. Classify airborne electromagnetic systems (A.B.E.M.) as to types.

47. List the measurements made in each of the A.B.E.M. systems in Specific Objective #46.

48. List the range of frequencies used in A.B.E.M. systems.

49. State the factors which affect the interpretable results of A.B.E.M. surveys.

50. State the controls used in A.B.E.M. surveys to locate and plot the survey results.