SAULT COLLEGE
of APPLIED ARTS and TECHNOLOGY
Sault Ste. Marie

COURSE OUTLINE

STRUCTURAL GEOLOGY
GEO 277-5

revised November, 1977 by J. Denholm

STRUCTURAL GEOLOGY

GEO 277

Topic No.	Periods	Topic Description	Reference
1	8	True and Apparent Dips - Terminology - Graphical methods of finding true dip from two apparent clips, and apparent dip from true dip. - Trigonometric methods of finding true dip from two apparent dips. - Use of alignment diagrams - Practical exercises	
2	8	Thickness Determinations - Terminology - Solutions for simple cases horizontal beds and vertical beds - Traverse perpendicular to strike of dipping beds. - Traverse not perpendicular to strike of dipping beds. - Practical exercises	
3	8	Depth to Dipping Strata - Depth to planar units - Strata with changing dip - Use of nomogram for calculating depth to strata - Bed thickness in a well - Distance along inclined hole - Practical Exercises	
4	8	Outcrop Patterns and Three-Point Problems - Rule of the V's - Three-point problem - Plotting outcrop patterns - Practical exercises	
5	8	Faults - Terminology - Apparent and actual fault movements - Intersection of a fault and a plane - Net slip and rotation - Practical exercises	
6	8	Folds - Terminology - Geometrical reconstruction of folds - Practical exercises	

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Topic No.	Periods	Topic Description	Reference
7	20	Structure Sections - Terminology - Basic construction of structure sections - Vertical exaggeration of scale - Alteration of horizontal scale - Practical exercises	
8	7	Seminars - Study of selected geological reports and maps	

The general objectives of the course are as follows:

1. To cause the student tc visualize geological structures in three dimensions.

2. To teach the student the necessary graphical techniques and methods related to descriptive geometry. To describe, measure, plot and reconstruct certain geological structures.

3. To teach the student to relate geological structures on maps to the shape and size of structures at depth.

4. Upon completion of the course the Technician will have developed his geological thinking to the point that upon being presented with certain known facts he can form a working multiple hypothesis that is consistent with them.

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SPECIFIC OBJECTIVES

Topic No. 1 - True and Apparent Dips

Upon completion of the objectives listed below the student will be able to solve certain geological problems using descriptive geometry, trigonometry and allignment diagrams.

5 0-1 Define a strike line or lines

5 0-2 Define and construct a graphical representation of true dip, apparent dips and strike of planar features as related to geological structures.

5 0-3 The student will be able to solve problems related to 5 0-2 using graphical, trigonometric and allignment diagrams as follows:

i Given the true dip and strike of a bed, determine the apparent dip in a specified direction

ii Given the strike of a bed and two apparent dips, determine the true dip

iii Using strike lines determine the amount and direction of dip of a bed

iv Use a side elevation to determine the amount of true dip of a bed

v Use three points on a plane to determine the altitude of a bed

vi The student will be able to construct a geological profile or section at 90° to the strike of beds from surface geology and topographical information.

Topic No. 2 - Thickness Determinations

Upon completion of the following objectives the student will be able to plot or calculate the true thickness of geological beds having been given or having measured their altitudes in the field.

- Define the true thickness of a bed

5 0-4 Define the meaning of superface and subface.

- Define map distance and traverse distance.
- Measure map distance between two points of different elevation on the same bed.
- Determine the difference in elevation between two points of the same formation, one point being on the superface, and one on the subface at 90° to the strike on a geological map.

- Measure slope distance and determine map distance from the upper and lower faces of a bed.

- Determine graphically or by trigonometry the true thickness of a bed being given the geological log of the hole.

Topic No. 3 - Depth to Dipping Strata

The following objectives involve the determination of the vertical depth to dipping strata from surface. ( ) is again used in this topic. However, the geometric relationships are different. All problems will be solved using similar graphical and trigonometric relationships.

- Determine the depth to the surface of a bed having been given the strike of the bed and having been given some or all of the following information:

  i Strike and dip of surface outcrop
  ii Map distance from outcrop to point of depth determination
  iii Map distance and difference in elevation of outcrop and point of depth determination

Topic No. 4 - Outcrop Patterns

The following objectives are to teach the student to interrelate between topographical expression and the true altitude of geological structures.

- State the rule of the V's as related to:

  i Horizontal beds
  ii Vertically dipping beds
  iii Beds dipping into a hill
  iv Beds dipping with the slope of a hill

- Given a geological map with topographic elevations, determine the direction of dip of the beds

- Given a geological map with topographic elevations, use strike lines to determine the strike, amount of dip, and direction of dip of the beds

- Given a geological map with topographic elevations and the altitude of one contact, extend the geological contact across the map area

- Given a geological map with topographic elevations, the location of one outcrop of each formation, the strike and dip of the formations. By means of a geological section locate the contacts of the formations on the map.

- Determine the strike and amount of dip of a bed, having been given a topographical map of the area with three outcrop contacts located on it.

Topic No. 5 - Structure Contours and Isopach Maps

Upon completion of this section of objectives, the student will be able to:

- Explain the use of isopleths
- Explain the different uses of isopleths with regard to mechanical contouring and parallel contouring.
- Construct a topographical map of the surface of a number of beds.
- Construct structure contour maps of the superface and subface of a bed.
- Construct an isopach map of a geological bed given certain points of thickness of the bed.

Topic No. 6 - Folded Structures

Upon completion of this section of objectives the student will be able to:

- Name, recognize and draw the parts of folds.
- Recognize, name and draw different types of folds.
- Construct a structure section of folds given a line of section across a geological map.
- Construct a geological section using the "Busking" Technique.

Topic No. 7 - Faults

Upon completion of this section of objectives the student will be able to:

- Draw graphically the components of fault movement
- Construct graphically different types of faults according to their classification
- Calculate or measure accurately the amount of fault movement by employing both graphical and trigomonetric techniques
- Recognize the criteria of faulting as implied by the discontinuity of structures and linements on maps and aerial photographs

Topic No. 8 - Seminars

Upon completion of these objectives the student will be able to:

- Apply the objectives learned under topics 1 - 8 to the study and discussion of the structural setting of certain Mining Camps.