



St. Xavier's College – Autonomous Mumbai

Syllabus For Ist Semester Courses in Geology (June 2010 onwards)

Contents:

Theory Syllabus for Courses:

S.Geo.1.01 - Introduction to Mineralogy, Crystallography And Stratigraphy.

S.Geo.1.02 - Introduction To Earth, Atmospheric Sciences, Cartography And Structural Geology.

Practical Course Syllabus for: S.Geo.1.PR.

Evaluation and Assessment guidelines.

F.Y. B.Sc. Geology

Course: S.Geo.1.01

Title: Introduction To Mineralogy, Crystallography And Stratigraphy

Learning Objectives: Develop an ability to understand and identify various minerals along with their characteristic crystallographic properties and to understand the evolution of life through geological ages.

Number of lectures: 45

UNIT 1

Mineralogy:

(15 Lectures)

Chemical bonds and formation of compounds.

Minerals: definition, chemical compositions, classification and silicate structures.

Physical properties of minerals: colour, streak, luster, diaphaneity, form, habit, cleavage, fracture, hardness, specific gravity, and electrical and magnetic properties.

Isomorphism, polymorphism and pseudomorphism.

Mineral groups

Introduction to rock forming minerals: Feldspars, Silica, Pyroxene, Amphibole, Mica, Olivine.

Ore-forming and industrial minerals

UNIT 2

Elementary Crystallography:

(15 Lectures)

States of matter: crystalline state.

Elementary ideas about the crystal structure.

External characteristics of crystals: face, form, edge, solid angle, interfacial angle and its measurement, zone.

Crystal symmetry: planes, axes and center of symmetry.

Crystallographic axes and axial angles, parameters, indices and rational indices.

Classification of crystals into seven systems.

Study of the normal classes belonging to following systems:

Isometric, Tetragonal, Hexagonal, Trigonal, Orthorhombic, Monoclinic and Triclinic.

UNIT 3

Principles of Stratigraphy:

(15 lectures)

Principles, correlation of strata

Standard stratigraphic scale, Indian stratigraphic scale.

Study of the general geographical and climatic conditions and life during the various eras of earth history with brief reference to the lithology of Indian formations of those eras and special reference to:

- a) Age of fishes
- b) Permocarboniferous period
- c) Age of reptiles
- d) Evolution of birds
- e) Age of mammals

- f) Evolution of man
- g) Ice ages
- h) Major Phanerozoic orogenic events.

List Of Recommended Reference Books

1. Read H.H. (Rev. ed. C.D. Gribble) (1988), Rutley's Elements of Mineralogy" (27TH Edition), CBS Publications.
2. Cornelius K. and Hurlbut Jr. S. (1994), Manual of Mineralogy, Twenty first Edition and Minerals and Rocks Exercises in Crystallography, J. Wiley & Sons.
3. Dana J.D. and Ford W.E. (rev. ed.) (2010), Dana's Manual of Mineralogy, J. Wiley & Sons.
4. Weller J.M. (1960), Stratigraphic Principles and Practice, Harper.
5. Kumar Ravindra (1996), Fundamentals of Historical Geology and Stratigraphy of India, 4th ed., New Age International Limited.

Practical Course:

- I. Study of crystal models representing forms of seven normal classes of symmetry.
- II. Identification and description of the physical properties, composition, occurrences and uses of 30 rock forming minerals.

F.Y. B.Sc. Geology

Course: S.Geo.1.02

Title: Introduction To Earth, Atmospheric Sciences, Cartography And Structural Geology

Learning Objectives:

Develop an understanding about the internal and external processes on our planet and how various structures within rocks form due to earth's internal forces.

Number of lectures: 45

Unit-1:

15 Lectures

Earth in the Solar System:

Geology and its perspectives.

Earth in the Solar System: Earth's Origin, size, shape, mass, density, rotational parameters.

Earth's Internal structure: core, mantle, and crust.

Hydrosphere, Atmosphere and Biosphere: characteristics and elemental abundance in each constituent. Convection in the earth's core and production of its magnetic field.

Age of the earth.

Unit-2:

15 Lectures

Atmospheric circulation and Global climatic changes:

Atmospheric circulation, weather and climate changes.

Land-air-sea interaction.

Earth's heat budget and global climatic changes.

Ocean currents:

Generation of oceanic currents, surface currents and global ocean conveyor system.

Ocean as a thermostat for the earth's surface heat balance.

Cartography:

Maps and Topographical maps; latitude – longitude concepts, Datum, map projections, types of maps, SOI map index, Contours and contour reading: Scales and Compass bearings, map grids (UTM).

Unit-3:

15 Lectures

Structural Geology:

Stratification; Dip and Strike; Clinometer compass its use.

Outcrop pattern of horizontal, dipping and vertical strata on various types of topography.

Outliers, Inliers.

Folds: Definition, Morphology, anticline and syncline.

Types of folds: symmetrical, asymmetrical, recumbent, overturned, isoclinal, plunging, doubly plunging, structural dome and basin, monocline, structural terrace, chevron, fan, anticlinorium, synclinorium, Importance of folds.

Joints: Definition, geometric classification and importance.

Faults: morphology; geometric classification based on relation to affected rocks, angle of dip, apparent movement and relative movement; distributive faulting: horst, graben and step faults; nappes.

Unconformities: nature, types and importance; overlap and off-lap.

List Of Recommended Reference Books

1. Compton R.R. (1985), Geology in The Field., J. Wiley & Sons
2. Skinner B.J., Porter S.C. and Botkin D.B. (1999), The Blue Planet., 2nd edn. J. Wiley & Sons.
3. Holmes A. (1993), Principles of Physical Geology., ed by David Duff, Nelson Thornes Ltd
4. Billings M.P. (1987), Structural Geology., 3rd edn, Prentice-Hall, India Pvt. Ltd
5. Robinson. A, Morrison. J, Muehrcke. P, Kimerling. A, Guptill. S (1995), Elements of Cartography, 6 ed, J. Wiley & Sons.
6. Siddhartha K., (1999), Oceanography - A Brief Introduction., Kosalaya Publ., India
7. Butz S. (2007) Science of Earth Systems., 2nd edn., Thomas Delmar.

Practical Course:

- I. Use of Clinometer and Brunton compasses
- II. Description and drawing of vertical cross section of simple geological maps involving horizontal or dipping strata with vertical faults, folded (non-plunging and non-faulted) strata and strata involving angular unconformity.
- III. Graphical solution of structural geology problems involving
 - a. Strike, true dip and apparent dip
 - b. Thickness and width of outcrop.

Evaluation and Assessment: S.Geo. 1.01 and 1.02 courses

Evaluation (Theory): Total marks per course - 100.

Continuous Internal Assessment (CIA) - 40 marks

CIA 1: Written test -20 marks

CIA 2: One day Geological Field work around Mumbai with field report and viva on the fieldwork. -20 marks

End Semester Examination – 60 marks

One question from each unit for 20 marks, with internal choice. Total marks per question with choice -28 to 30.

Evaluation of S.Geo.1.PR (Practicals) Total marks per Practical course - 50.

CIA: 20 marks: Lab test/viva on performed experiment.

End Semester Practical Examination – 30 marks.

Template for S.Geo courses End Semester examination in Semester 1

UNITS	KNOWLEDGE	UNDERSTANDING	APPLICATION and ANALYSES	TOTAL MARKS-Per unit
1	10	06	04	20
2	10	06	04	20
3	10	06	04	20
-TOTAL - Per objective	30	18	12	60
% WEIGHTAGE	50	30	20	100%

St. Xavier's College, Mumbai

Course: S.GEO.1.01/1.02

Department of Geology

Roll Number: _____

UID Number: _____

MARKS: ____/20

Date: _____

Assessment Grid for Course: S.GEO.1.01/1.02 CIA 2 (Field Work)

Parameters Category	Details of Assessment	80 – 100 % Excellent	60 – 80 % Good	40 – 60 % Satisfactory	20 –40 % Poor	0 - 20 % Very Poor
Field Work (60 %)	1. Equipment – field diary, hammer, chisel, hand lens, map					
	2. Field Discipline					
	3. Sample Collection					
	4. Prior Preparation					
	5. Instrument Handling Skills					
Field Report (30 %)	1. Content & Presentation					
	2. Technical Correctness					
	3. References and Citations					
Viva Voce (10 %)	1. Ability to answer questions.					
Total Marks/20						

Name, Signature of Course Instructor

Date:

