

UNIVERSITY OF MUMBAI



Syllabus for the F.Y.B.Sc.

Program: B.Sc.

Course : GEOLOGY

**(Credit Based Semester and Grading System with
effect from the academic year 2011–2012)**

F.Y.B.SC. CREDIT SYSTEM WITH EFFECT FROM ACADEMIC YEAR 2011-2012

PROGRAM : B.Sc

COURSE : GEOLOGY

SEMESTER I

COURSE CODE: USGE101 & USGE102

THEORY COURSE: USGE101

UNIT I : 15 LP
UNIT II : 15 LP
UNIT III : 15 LP
CREDITS = 2.0

THEORY COURSE: USGE102

UNIT I : 15 LP
UNIT II : 15 LP
UNIT III : 15 LP
CREDITS = 2.0

SEMESTER II

COURSE CODE: USGE201 & USGE202

THEORY COURSE: USGE201

UNIT I : 15 LP
UNIT II : 15 LP
UNIT III : 15 LP
CREDITS = 2.0

THEORY COURSE: USGE202

UNIT I : 15 LP
UNIT II : 15 LP
UNIT III : 15 LP
CREDITS = 2.0

SEMESTER I PRACTICAL

COURSE CODE: USGEP1

CREDIT : 1 + 1 = 2

SEMESTER II PRACTICAL

COURSE CODE: USGEP2

CREDIT : 1 + 1 = 2

SYLLABUS

PROGRAM : B.SC. SEMESTER I

COURSE : GEOLOGY

COURSE CODE : USGE101 : INTRODUCTION TO GEOLOGY – I
(MINERALOGY, CRYSTALLOGRAPHY AND STRATIGRAPHY)

UNIT - I: (15 Lectures)

MINERALOGY:

Minerals: Definition, Chemical bonds and formation of compounds; Isomorphism; Polymorphism; Pseudomorphism, chemical composition, classification.

Physical properties of minerals: color, lustre, form, habit, diaphaneity, fracture, cleavage, streak, hardness, sp.gravity. Magnetic and electrical properties of minerals.

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

UNIT - II: (15 Lectures)

CRYSTALLOGRAPHY:

States of matter: Crystalline state, elementary idea 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, axial angles/planes, parameters, indices and rational indices

Classification of crystals: into seven systems, Study of the NORMAL classes belonging to the following systems: Isometric, Tetragonal, Hexagonal, Trigonal, Orthorhombic, Monoclinic, Triclinic

UNIT - III: (15 Lectures)

STRATIGRAPHY:

Principles of Stratigraphy: 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:

- . Age of fishes
- . Permo carboniferous period
- . Age of Reptiles
- . Evolution of birds
- . Age of Mammals
- . Evolution of Man
- . Ice ages
- . Major Phanerozoic orogenic events

LIST OF RECOMMENDED BOOKS: USGE101

1. Rutley's Mineralogy; Read H.H. (CBS)
2. Fundamentals of Historical Geology & Stratigraphy of India; Ravindra Kumar (Wiley Eastern India)
3. Text Book of Geology P. K. Mukherjee

SYLLABUS
PROGRAM : B.SC. SEMESTER I
COURSE : GEOLOGY
COURSE CODE : USGE102 : INTRODUCTION TO GEOLOGY – II
(STUDY OF EARTH, ATMOSPHERIC CIRCULATION, STRUCTURAL GEOLOGY)

UNIT – I **(15 Lectures)**

Earth in the Solar System: Origin, size, shape, mass, density, rotational parameters
Earth's Internal Structure and Age: Core, Mantle and crust; convection in the earth's core and production of its magnetic field; Radioactivity; Age of the earth
Hydrosphere, Atmosphere and Biosphere: Characteristics and elemental abundance in each constituent.

UNIT – II **(15 Lectures)**
ATMOSPHERIC CIRCULATION:

Atmospheric circulation and Global climatic changes: Atmospheric circulation, weather and climate changes, Land-Air-Sea Interaction; Earth's heat budget; Global climatic changes
Ocean Currents: Generation of Ocean currents, surface currents and global ocean conveyor system. Ocean as a thermostat for the earth's surface heat balance

UNIT – III **(15 Lectures)**
STRUCTURAL GEOLOGY:

Stratification; Dip and Strike; Outcrop pattern of horizontal, dipping and vertical strata on various types of topography, **inliers, outliers**
Folds: Definition, morphology, anticline & syncline; importance of folds
Types of Folds: symmetrical, asymmetrical, recumbent, overturned, isoclinal, plunging, doubly plunging, structural dome and basin, monocline, structural terrace, chevron, fan, synclorium, anticlinorium,
Joints: Definition, geometric classification and importance
Faults: Definition, morphology

Faults 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 BOOKS: USGE102

1. The Blue Planet 2nd Ed. Skinner B.J., Porter S.C and Botkin D.B. (J.Wiley & Sons)
2. Oceanography – A brief Introduction, Siddhartha K. Kisalya Publications, India
3. Structural Geology Billings M.P Prentice Hall
4. Text Book of Geology P.K.Mukherjee
5. Engineering Geomorphology Theory and Practice P.G.Fookes, E.M.Lee and J.S.Griffiths
6. Physical Geography Richard H. Bryant 1st Ed. Rupa Publishers
7. Text book of Physical Geology D.L.Satyanarayana and K.Kondayya Rao
BrothersEducational Publishers
8. Fundamentals of Geomorphology R.J.Rice Longman Publishers

SEMESTER I

PRACTICAL COURSE CODE (USGEP1): 2 Credit

PRACTICAL – I (USGEP1) (30 practical)

STUDY OF:

1. Twenty Five crystal models representing forms (open, closed, combination), of seven normal classes of symmetry
2. Thirty Four minerals - Identification and description of Physical properties, chemical composition, occurrence and uses of the following : Rock forming minerals; Industrial minerals; Ore Minerals
3. Description and drawing of vertical cross sections of simple geological maps involving horizontal and/or dipping strata with vertical faults, folded (non plunging and non faulted) strata and strata involving angular unconformity.
4. Graphical solution of structural geology problems involving a) Strike, True Dip and Apparent dip b) Thickness and width of outcrop

PROGRAM : B.SC. SEMESTER II
COURSE : GEOLOGY
COURSE CODE : USGE201 : INTRODUCTION TO GEOLOGY – III
(PETROLOGY, GEOTECTONICS, ECONOMIC MINERAL DEPOSITS)

UNIT – I **(15 Lectures)**

IGNEOUS PETROLOGY

Magma: definition, composition, origin, Bowen's Reaction Series, magmatic differentiation and assimilation

Rocks: definition, classification; mode of occurrences, textures and structures
Rock classification: Based on grain size and mineral composition

METAMORPHIC PETROLOGY

Metamorphism: definition, agents and types of metamorphism

Metamorphic minerals: stress and anti stress minerals, textures and structures,
Metamorphic facies and isograds, Rock cycle

UNIT - II: **(15 Lectures)**

GEOTECTONICS

Earthquakes: causes, effects, measurement of earthquakes, seismic belts, seismic zonation in India Tsunamis

SEDIMENTARY PETROLOGY

Sediments: Weathering, transport, deposition, consolidation, diagenesis, textures and structures

Classification: Terrigenous and Chemical sedimentary rocks

UNIT – III **(15 Lectures)**

MINERAL DEPOSITS

Classification and brief study of following mineral deposits: Hydrothermal, Magmatic, Sedimentary (evaporates, strata bound bedded iron formations), Placer, Residual

Methods of mineral exploration

Surface methods: grid sampling; **Sub surface methods:** seismic, electrical

LIST OF RECOMMENDED BOOKS: USGE201

1. The Principles of Petrology Tyrell G.W
2. Principles and Practices of Mineral Exploration P.K.Raman (Geol.Soc. India, Bangalore 1989)
3. Mining of Ores and Non Metallic Minerals M.Agoskhov, S.Borisov, & V Layansky (Mir Publications, Moscow) (1988) CH2 & CH17.
4. Courses in Mining Geology Arogyaswami (Oxford & IBH)

PROGRAM : B.SC. SEMESTER II
COURSE : GEOLOGY
COURSE CODE : USGE202 : INTRODUCTION TO GEOLOGY – IV
(WEATHERING & EROSION, PALAEOLOGY)

UNIT – I **(15 Lectures)**

WEATHERING AND EROSION

Introduction to weathering and erosion: definition of weathering and erosion,

Types of weathering: physical, chemical

Soil: definition, formation, functions, soil profile, soil types

Glaciers: types, formation, morphology

Rivers: development of a typical river system

UNIT – II **(15 Lectures)**

INTRODUCTION TO PALAEOLOGY

Definition and scope of Palaeontology; Processes of fossilization, preservation potential of organisms, uses of fossils, zone fossils, systematic classification of organisms, Elementary ideas about the origin of life, evolution and fossil record

Morphology of Fossils-I

Systematic study of morphological characters, classification, environmental factors and geological

distribution of the following groups

Arthropoda: Trilobites

Coelenterata: Corals (simple and compound hexa corals and octa corals)

Graptoloidea

UNIT – III **(15 Lectures)**

Morphology of Fossils-II

Systematic study of morphological characters, classification, environmental factors and geological

distribution of the **following groups**

Mollusca : Lamellibranchs, Gastropods, Cephalopods

Brachiopoda:

Echinodermata: Regularia, Irregularia

LIST OF RECOMMENDED BOOKS : USGE202

1. Invertebrate Palaeontology Wood (CBS)
2. Principles of Invertebrate Palaeontology Shrock & Twenhofel (CBS)
3. Principles of Palaeontology Raup & Stanley (CBS)
4. Principles of Physical Geology Holmes D.L (ELBS & Nelson)
5. Engineering Geomorphology Theory and Practice P.G.Fookes, E.M.Lee and J.S.Griffiths
6. Physical Geography Richard H. Bryant 1st Ed. Rupa Publishers
7. Text book of Physical Geology D.L.Satyanarayana and K.Kondayya Rao Brothers, Educational Publishers
8. Fundamentals of Geomorphology R.J.Rice Longman Publishers

F.Y.B.SC. GEOLOGY PRACTICAL (USGE201 & USGE202)

SEMESTER II

PRACTICAL COURSE CODE (USGEP2): 2 Credit

PRACTICAL – I I (USGEP2) (30 practical)

1. **Twenty Five common rocks:** Identification of their group characteristics, their classification into major rock groups, identification and systematic description, of the megascopic features of these rocks: Igneous rocks, Sedimentary rocks, Metamorphic rocks
2. **Twenty Five Fossils:** Identification, Classification, description and geological time range of fossils belonging to the Phyla included in the theory Syllabus

Scheme of Examination:

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part & by conducting the Semester End Examinations with 60% marks in the second part.

The Course having Practical training will have Practical Examination for 50 marks at the end of Semester, out of which 30 marks for the Practical task assigned at the time of examination. The 20 marks are allotted as Internal Assessment.

The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

Internal Assessment: It is defined as the assessment of the learners on the basis of continuous evaluation as envisaged in the Credit based system by way of participation of learners in various academic and correlated activities in the given semester of the programme.

Semester End Assessment : It is defined as the assessment of the learners on the basis of Performance in the semester end Theory/ written/ Practical examination.

Modality of Assessment :

Internal Assessment - 40%

40 marks.

a) Theory

40 marks

Sr No	Evaluation type	Marks
1	Two Assignments/Case study/Project	20
2	One class Test (multiple choice questions objective)	10
3	Active participation in routine class instructional deliveries(case studies/ seminars//presentation)	05
4	Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.	05

b) Practicals

20 marks

Sr No	Evaluation type	Marks
1	Two best practicals	10
2	Journal	05
3	Viva	05

B) External examination - 60 %

Semester End Theory Assessment - 60%

60 marks

- i. Duration - These examinations shall be of two hours duration.
- ii. Theory question paper pattern :-
 1. There shall be four questions each of 15 marks. On each unit there will be one question & fourth one will be based on entire syllabus.
 2. All questions shall be compulsory with internal choice within the questions. Each question will be of 20 to 23 marks with options.
 3. Questions may be sub divided into sub questions a, b, c, d & e only & the allocation of marks depends on the weightage of the topic.

Practical External Assessment

30 marks