Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022

'B++' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Geology

Name of the Course: B.Sc. I (Sem.– I & II)

(Syllabus to be implemented from June 2022)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur,

Faculty of Science & Technology

Choice Based Credit System (CBCS)

(w.e.f. June 2022)

Choice Based Credit System: With the view to ensure worldwide recognition, acceptability, horizontal as well as vertical mobility for students completing undergraduate degree, Punyashlok Ahilyadevi Holkar Solapur University has implemented Choice Based Credit System (CBCS) at Undergraduate level.

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations.

Outline of Choice Based Credit System:

1. ***Core Course:*** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

2. ***Elective Course:*** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective.

3. ***Ability Enhancement Courses (AEC):*** The Ability Enhancement (AE) Courses may be of two kinds: **Ability Enhancement Compulsory Courses (AECC)** and **Skill Enhancement Courses (SEC).** "AECC" courses are the courses based upon the content that leads to Knowledge enhancement; (i) Environmental Science and (ii) English/MIL Communication. These are mandatory for all disciplines. SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

Credit: Credit is a numerical value that indicates students work load (Lectures, Lab work, Seminar, Tutorials, Field work etc.) to complete a course unit. In most of the universities 15 contact hours constitute one credit. The contact hours are transformed into credits. Moreover, the grading system of evaluation is introduced for B.Sc. course wherein process of Continuous Internal Evaluation is ensured. The candidate has to appear for Internal Evaluation of 20 marks and University Evaluation for 80 marks.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur:
Faculty of Science & Technology
Choice Based Credit System (CBCS), (w.e.f.2022-23) Structure for B. Sc. part – I

Subject/ Core Course	Name and Type of the Paper		No. of papers/ Practical	Hrs/week		Total Marks Per Paper	UA	CA	Credits
	Type	Name		T	P				
Class :	**B.Sc.- I Semester – I**								
Ability Enhancement Course(AECC)		English (communication skill)	Paper- I	4.0		50	40	10	2.0
Core (*Students can opt any Four Subjects from the Twelve Subjects Listed below. Out of these Four Subjects One Subject will be CORE and other Three will be ELECTIVE Subjects.)		DSC 1A	Paper-I	2.5	--	50	40	10	4.0
			Paper -II	2.5	--	50	40	10	
		DSC 2A	Paper-I	2.5	--	50	40	10	4.0
			Paper -II	2.5	--	50	40	10	
		DSC 3A	Paper-I	2.5	--	50	40	10	4.0
			Paper -II	2.5	--	50	40	10	
		DSC 4A **Physical Geology**	Paper-I	2.5	--	50	40	10	4.0
		DSC 4A **Palaeontology**	Paper-II	2.5	--	50	40	10	
Total				**24**	--	**450**	**360**	**90**	**18**
Class :	**B.Sc.- I Semester - II**								
Ability Enhancement Course(AECC)		English (communication skill)	Paper- II	4.0		50	40	10	2.0
Core (*Students can opt any Four Subjects from the Twelve Subjects Listed below. Out of these Four Subjects One Subject will be CORE and other Three will be ELECTIVE Subjects.)		DSC 1B	Paper -III	2.5		50	40	10	4.0
			Paper -IV	2.5		50	40	10	
		DSC 2B	Paper -III	2.5		50	40	10	4.0
			Paper -IV	2.5		50	40	10	
		DSC 3B	Paper -III	2.5		50	40	10	4.0
			Paper -IV	2.5		50	40	10	
		DSC 4B **Structural Geology**	Paper -III	2.5		50	40	10	4.0
		DSC 4B **Crystallography**	Paper -IV	2.5		50	40	10	
		Democracy, Elections and Good Governance		3.0		50	40	10	NC
Total (Theory)				**24**		**450**	**360**	**90**	**18**
Core		DSC 1 A & 1B	Practical I and II	--	4	100	80	20	4.0
		DSC 2 A & 2B	Practical I and II	--	4	100	80	20	4.0
		DSC 3A & 3B	Practical I and II	--	4	100	80	20	4.0
		DSC 4A & 4B **Geology**	Practical I and II	--	4	100	80	20	4.0
Total (Practical)					**16**	**400**	**320**	**80**	**16**
Grand Total				**48**	**16**	**1300**	**1040**	**260**	**52**

***Core Courses:**
Chemistry/Physics/Electronics/Computer Science/Mathematics/Statistics/Botany/Geology/ Microbiology/ Geography/Psychology/ etc.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Science & Technology
Choice Based Credit System (CBCS)
(W.e.f. June 2022)

Title of the Course: B.Sc. Part-I

Subject: Geology

Introduction: The goal of this course is to equip students with the fundamental knowledge of the diverse fields of Geology and to produce students with sufficient scientific knowledge and expertise and to apply the scientific method in their coursework and in their lives. The course structure is basic science centric where students learn core science and are taught necessary fundamental subject for that purpose.

Objectives of the course: The objectives of B. Sc. Geology course are:

a. To provide an intensive and in-depth learning to the students in field of Geology.
b. Beyond simulating, learning, understanding the techniques, the course also addresses the underlying recurring problems of disciplines in today's scientific and changing world.
c. To develop awareness & knowledge of different organization requirement and subject knowledge through varied branches and research methodology in students.
d. To train the students to take up wide variety of roles like researchers, scientists, consultants, entrepreneurs, academicians, industry leaders and policy.

Course outcome and Advantages:

a) Students can demonstrate competence in geological skills including: identification of crystals, minerals, ores and rocks visually as well as microscopically; interpretation of topographic maps and construction of geologic maps and cross sections; three-dimensional conceptualization; and various rock attitudes and structures; and collection of organized field, survey (hydrogeology and engineering), imagery, digital and laboratory data as well as understand Indian geologic time and earth history.
b) Students can make reasoning about Earth systems; and Readily solve problems, especially those requiring spatial and temporal interpretation; and Work with uncertainty, non-uniqueness, incompleteness, ambiguity, and indirect observations; and Integrate information from different disciplines and apply systems thinking
c) Gain an understanding of the societal and environmental relevance of earth systems.
d) Effectively communicate ideas, research results, and interpretations using written, oral, and graphical design skills both on a formal and extemporaneous basis.

Eligibility and Admission: A Candidate passing 10+2 in science stream and passed from state syllabus / CBSE / equivalent with minimum passing percentage of as per the directives of the higher education and Punyashlok Ahilyadevi Holkar Solapur university, Solapur.

Duration: The duration for this program is of 3 years with semester pattern (06 Semesters)

Medium of Instruction: English

Syllabus Structure:

The University follows semester system. An academic year shall consist of two semesters. Each B.Sc. course shall consist of three years i.e. six semesters.

B.Sc. Part-I Geology shall consist of two semesters: Semester I and Semester II. In semester I, there will be two core papers; paper I and paper II of 100 marks (80 marks for university external examination and 20 marks for internal examination for each paper).

Similarly in Semester II there will be two core papers; paper III and paper IV of 100 marks (80 marks for university external examination and 20 marks for internal examination for each paper).

At the end of academic year i.e. semester II the practical examination will be conducted.

The Weightage of practical is of 80 marks for university external practical examination and 20 marks for internal practical examination.

The scheme of evaluation of performance of candidates shall be based on University Assessment (UA) as well as College internal Assessment (CA) as given below. For B.Sc. Part-I Geology sem I & II the internal assessment will be based on Internal tests, Home assignment, Tutorials, Seminars, Group discussion, Brain storming sessions etc. as given below. Practical course examination is of 100 marks shall be conducted at the end of semester II. The practical examination of 100 marks shall also consist of 80 marks for University practical assessment and 20 marks for college internal assessment.

Scheme of Evaluation

As per the norms of the grading system of evaluation, out of 100 marks, the candidate has to appear for college internal assessment of 20 marks and external evaluation (University assessment) of 80 marks.

Semester	**Paper No.**	**Title of paper**	**No. of Lectures**	**Examinations**			**Total credit**
				University Examination	Internal Examination	Total Marks	
I	I	Physical Geology	30	40	10	50	2
	II	Palaeontology	30	40	10	50	2
II	III	Structural Geology	30	40	10	50	2
	IV	Crystallography	30	40	10	50	2
Practical	--	Geology		80	20	100	4

- **University Examination**

1. Theory Paper I : 40 Marks
2. Theory Paper II : 40 Marks
3. Theory Paper III : 40 Marks
4. Theory Paper IV : 40 Marks
5. Practical : 80 Marks

Practical paper has 80 marks for external university practical examination. Duration of practical examination is one **day**

- **Continuous Internal Assessment for Geology:**
  1. Each theory paper has 10 marks for internal examination. There will be 05 marks for unit test and 05 marks for home assignment.
  2. Practical paper has 20 marks for internal examination.

Passing Standard

The student has to secure a minimum of 4.0 grade points (Grade C) in each paper. A student who secure less than 4.0 grade point (39% or less marks, Grade FC/FR) will be declared fail in that paper and shall be required to reappear for respective paper. A student who failed in University Examination (theory) and passed in internal assessment of a same paper shall be given FC Grade. Such student will have to reappear for University Examination only. A student who fails in internal assessment and passed in University examination (theory) shall be given FR Grade. Such student will have to reappear for both University examination as well as internal assessment.

ATKT

Candidate passed in all papers, except **5 (five)** papers combined together of semester I and II of B.Sc. Part-I Geology examination shall be permitted to enter upon the course of Semester III of B.Sc. Part-II Geology

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

CBCS Pattern Syllabus of B. Sc. (Part-I), (w. e. f. June 2022)

GEOLOGY

SEMESTER – I

Title of the **Paper – I PHYSICAL GEOLOGY**

Contact hours – 30 Total Marks 50 (UA – 40 + CA – 10) (Credit 2)

UNIT – I	**Contact hrs**
Introduction to Geology and its scope. Earth's origin: Laplace and Kant Nebular Hypothesis; Buffon, Chamberlain and Moulton Planetesimal Theory, Jean and Jeffery's Tidal Theory. Earth's size, shape, mass, density and its atmosphere. Rock cycle.	**08**
Interior of the Earth: Use of seismic waves in understanding the internal structure of the Earth- Core – inner and outer, Mantle – upper and lower, Asthenosphere, Lithosphere- Sial and Sima (Crust) and major discontinuities	**07**
UNIT – II	
Weathering: Definition, Types (physical, chemical and biological), Agents, controlling factors and its products. Definition and processes of erosion and deposition.	**04**
Earthquake: Definition, Focus, Epicenter, Isoseismal lines and nature of Seismic waves,	**04**
Measurement of earthquakes -Seismographs and Seismograms, Intensity and Magnitude (Mercalli Scale and Richter) scales. Origin and causes of earthquakes.	**04**
Volcano: Types (Central and fissure), Products and Causes of Volcanism.	**03**

Course Learning Outcome: At the end of the course the student will acquire:

1. Knowledge of universe, galaxy and solar system with their origin, form and characters.
2. Exogenic processes and their causes and effects of earth surface
3. Endogenic processes and causes and their effects of earth surface.

Recommended Books

1. Arthur Holmes, 1992. Principles of Physical Geology. Chapman and Hall, London.
2. Miller, 1949. An Introduction to Physical Geology. East West Press Ltd.
3. Spencer, E.V., 1962. Basic concepts of Physical Geology. Oxford & IBH.
4. Mahapatra, G.B., 1994. A text book of Physical geology. CBS Publishers.

Title of the **Paper – II. PALAEONTOLOGY**

Contact hours – 30 Total Marks 50 (UA – 40 + CA – 10) (Credit 2)

UNIT – I:	**C. hrs.**
Palaeontology: definition, Fossils: definition, characters, binomial nomenclature in taxonomy, modes of preservation of fossils, condition of fossilization and significance of fossils.	**06**
Morphology of hard parts and geological distribution of:	
Brachiopoda – *Spirifer, Productus,* and *Terebratula*	**03**
Lamellibranchia: *Cardita, Cardium,* and *Pectene*	**03**
Cephalopoda: *Nautilus* and *Goniatites*	**03**
UNIT – II:	
Morphology of hard parts and geological distribution of:	
Trilobite: *Ogygia, Paradoxide,* and *Trinucleus*	**03**
Echinoidea: *Echinus, Micraster,* and *Hemiaster*	**03**
Gastropoda: *Conus, Turritella, Voluta,* and *Physa*	**03**
Coelenterata: *Tubipora* and *Favisite*	**03**
Evolutionary history of horse;	
Morphology, distribution and significance of Gondwana flora – *Glossopteris, Gangamopteris*, and *Ptilophyllum*	**03**

Course Learning Outcome: At the end of the course the student will acquire:

1. Knowledge of ancient and primitive organisms living on the earth.
2. Understand the evolutionary trends of various organisms
3. Apply knowledge of morphology to understand palaeo-environment.

Books Recommended:

1. Geology of India. Wadia, D., Mc Graw Hill Book co.
2. Geology of India and Burma, 6th Edition. Krishnan, M.S., CBS Publ.
3. Fundamentals of Historical Geology & Stratigraphy of India. Ravindra Kumar, Wiley Eastern.
4. Principles of Invertebrate Paleontology. Shrock, R.R. & Twenhoffel, W.H., CBS Publ.
5. Outlines of Paleontology. Swinerton, HH., Edward Arnold Publishers
6. Paleontology: Evolution & Animal Distribution. Jain, P.C. Vishal Publications.
7. Fossil Invertebrate. Lehmann, U., Cambridge Univ. Press.
8. Organic evolution. Rastogi, Kedarnath and Ramnath Publ.
9. Palaeontology Invertebrate. Woods, Henry. CBS Publishers & Distributors.

SEMESTER – II

Title of the **Paper – III STRUCTURAL GEOLOGY**

Contact hours – 30 Total Marks 50 (UA – 40 + CA – 10) (Credit 2)

UNIT – I	**Contact hrs**
Introduction to structural Geology; Elementary ideas of bed, dip and strike, contours and Outcrops.	**04**
Introduction to Topographic and Geological maps; Use of Clinometer and Brunton Compass	**03**
UNIT – II	
Elementary ideas of types of deformation (Tensional, compressional and shear stresses).	**05**
Folds: definition, nomenclature and types of Folds: anticline, syncline, symmetrical, asymmetrical, isoclinal, overturned and recumbent.	
Faults: definition, nomenclature and classification of Fault. Types of faults: normal, reverse, horst, graben and strike slip.	**06**
Joints: definition, classification (Geometric and genetic); Significance of Joints.	**05**
Unconformity: definition and types; Significance of Unconformities	**04**
	03

Course Learning Outcome: At the end of the course the student will acquire:

1. Understand various deformations due to tectonic forces.
2. Acquire skill to use various instrumentation to understand stress.
3. Knowledge of morphology of various structures developed in the rocks.

Recommended Books

5. Billings, M.P., 1972. Structural Geology. Prentice Hall.
6. Davis, G.R., 1984. Structural Geology of Rocks and Region. John Wiley
7. Hills, E.S., 1963. Elements of Structural Geology. Farrold and Sons, London.
8. Singh, R. P., 1995. Structural Geology. A Practical Approach. Ganga Kaveri Publ., Varanasi

Title of the **Paper – IV CRYSTALLOGRAPHY**

Contact hours – 30 Total Marks 50 (UA – 40 + CA – 10) (Credit 2)

UNIT – I	**Contact hrs**
Introduction to crystallography, definition of crystal, Crystal elements: faces, edges, solid angles and forms. Interfacial angle: Law of constancy of interfacial angle, contact Goniometer.	**03**
Crystallographic axes and angles. Parameters and Indices, Law of Rational Indices.	**02**
Classification of crystal systems systems and Elements of Symmetry	**03**
UNIT – II	
Description of Normal class of - Isometric, Tetragonal, Hexagonal, Orthorhombic, Monoclinic and Triclinic system.	**07**

Course Learning Outcome: At the end of the course the student will acquire:

1. Understand classification of crystals.
2. Acquire skill to identify various faces, interfacial angles, edges and laws of crystal structure.

Recommended Books

1. Dana, E.S. and Ford, W.E., 2002. A textbook of Mineralogy (Reprints).
2. Flint, Y., 1975. Essential of crystallography, Mir Publishers.
3. Phillips, F.C., 1963. An introduction to crystallography. Wiley, New York.

PRACTICAL COURSE

Contact hours – 60 Total Marks: 100 (UA – 80, CA – 20)

Credit – 04

PHYSICAL AND STRUCTURAL GEOLOGY
DSC – A Laboratory course

PHYSICAL GEOLOGY:

Study of erosional and depositional features formed by river, wind, ocean and groundwater. Study of important and common geomorphological models. Reading of Toposheets and identification of natural and manmade features

STRUCTURAL GEOLOGY:

Identification of strike and dip, folds, faults, unconformity and joints from block models

Preparation of cross-section profile and description from geological maps – Horizontal / Inclined beds (with unconformity and fault)

Exercises on basic structural problems

CRYSTALLOGRAPHY AND PALAEONTOLOGY
DSC – B Laboratory course

CRYSTALLOGRAPHY:

Study of Normal class of Isometric, Tetragonal, Hexagonal, Orthorhombic, Monoclinic and Triclinic systems with crystallographic axes, elements of symmetry, type mineral, holding position and forms with faces and indices.

Isometric / cubic system – Cube, Octahedron, Dodecahedron, Tetrahexahedron, Trapezohedron, Trisoctahedron, Hexaoctahedron

Tetragonal system –189, 190, 191, 192, 198, 199, 205.

Hexagonal system – 238, 240, 242, 244, 875, 1016.

Orthorhombic system – 316, 317, 323, 327, 330, 333.

Monoclinic system – 353, 354, 362, 847,

Triclinic system – 379, 382, 383, 827.

PALAEONTOLOGY:

Study of morphological characters of hard parts with description of fossil genera and age of following phylum:

A. PHYLUM MOLLUSCA:
    1. Class Pelecypoda (Lamellibranchia): *Cardita, Cardium and Pectene.*
    2. Class Gastropoda: *Conus, Turritella and Voluta.*
    3. Class Cephalopoda: *Nautilus and Goniatites.*
B. PHYLUM BRACHIOPODA: *Spirifer, Terebratule and Productus.*
C. PHYLUM ECHINODERMATA: *Echinus, Micraster and Hemiaster*
D. PHYLUM ARTHROPODA:
    Class Trilobita: *Ogygia, Paradoxida and Trinucleus.*

PLANT FOSSILS: *Glossopteris, Gangamopteris and Ptilophyllum*.

One day Geological Field Training for students to undergo field training in a suitable geological area and submit a report thereof or completion of a project.

Practical examination will be conducted annually at the end of Second Term of every academic year.

Duration: 1 Day (6 Hours approx.). Marks: 80. Minimum for passing: 32.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Nature of Question Paper for choice based credit system (CBCS) Semester Pattern

• Faculty of Science • (w. e. f. June 2022)

B.Sc. – I

Time: - 2 hrs. **Total Marks-40**

Instructions:

1. *All questions are compulsory.*
2. *Draw **neat diagrams** wherever necessary.*
3. *Figures to the **right** indicate **full marks**.*

Q. No.1) Fill in the blanks with appropriate answer from following options. (08)

1) ----------

a) b) c) d)

2)
3)
4)
5)
6)
7)
8)

Q.No.2) Answer any four of the following (08)

i)
ii)
iii)
iv)
v)

Q.No.3 Write short notes on any two of the following (08)

i)
ii)
iii)

Q. No.4) Answer any Two of the following (08)

i)
ii)
iii)

Q.No.5) Answer any one of the following (08)

i)
ii)

CA – Continuous Assessment (Internal Examination) of total marks – 10.

Nature / pattern of examination may be as follows:

One internal examination of 10 marks or two examinations of 5 marks each.

Open book examination / Home Assignment / Classroom Test / Seminar / Field work report / Project report etc.

Scheme of Marking for University Practical Examination

Total Marks: 80

Q.1	Identify and describe physical features in geomorphic models kept on table nos. 1 to 5	**10**
Q.2	Identify and describe any five natural and man-made features from each toposheets kept on table nos. 7 to 9	**06**
Q.3	Identify, describe and draw diagrams of structural models kept on table 11 to 13	**06**
Q.4	Identify crystallographic model kept on table 15 to 22. Describe crystallographic system, elements of symmetry, forms and indices.	**08**
Q.5	Identify and describe fossil specimens kept on table 23 to 29. Classification, morphology of hard part, and range.	**08**
Q.7	Draw a cross section along X – Y of geological map. Describe geomorphology, geology and geological history of the given map.	**14**
Q.8	Solve the given structural problem.	**08**
Q.9	Tour/project report	**10**
Q.10	Laboratory record / Journal	**10**
	Total –	**80**

Equivalence to the B.Sc. – I (w.e.f. 19-20)

Paper No.	B.Sc. – I (19-20)	B.Sc. – I (22-23)
I	PHYSICAL GEOLOGY	PHYSICAL GEOLOGY
II	MINERALOGY	PALAEONTOLOGY
III	STRUCTURAL GEOLOGY	STRUCTURAL GEOLOGY
IV	CRYSTALLOGRAPHY	CRYSTALLOGRAPHY

The syllabus of B.Sc. – I for the years 19-20 and 22-23 are **NOT EQUIVALENT**