



BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 620024

B.Sc., GEOLOGY

**CHOICE BASED CREDIT SYSTEM–LEARNING OUTCOMES BASED
CURRICULUM FRAMEWORK (CBCS - LOCF)**

(Applicable to the candidates admitted from the academic year 2026-2027 onwards)

Se m	Part	Courses	Title	Ins. Hrs.	Credits	Exam. Hours	Maximum Marks		
							Int.	Ext.	Total
I	I	Ability Enhancement Course – I (AEC - I)	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course – II (AEC - II)	English Course - I	6	3	3	30	70	100
	III	Core Course -1 (CC - 1)	Dynamic Geology	4	4	3	30	70	100
		Core Practical - 1 (CP - 1)	Elements of maps and surveying Techniques Practical	4	4	3	40	60	100
		Allied Course - 1 (AC - 1)	1. Mathematics - I (or) 2. Chemistry - I	4	4	3	30	70	100
		Allied Course Practical - 1 (ACP-1)	1. Mathematics (or) 2. Chemistry	2	**	**	**	**	**
	IV	Value Education	Value Education	2	2	3	30	70	100
		Interdisciplinary Course - 1 (IDC - 1) #	One Course from Outside Department	2	2	3	30	70	100
	Total			30	22	--	--	--	700
II	I	Ability Enhancement Course – III (AEC - III)	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course – IV (AEC - IV)	English Course - II	6	3	3	30	70	100
	III	Core Course- 2 (CC - 2)	Structural Geology	4	4	3	30	70	100
		Core Practical – 2 (CP - 2)	Structural Geology Practical	4	4	3	40	60	100
		Allied Course - 2 (AC - 2)	1. Mathematics - II (or) 2. Chemistry - II	4	4	3	30	70	100
		Allied Course Practical - 1 (ACP-1)	1. Mathematics (or) 2. Chemistry	2	4	3	40	60	100
	IV	Skill Enhancement Course - 1 (SEC - 1) ##	Naan Mudhalvan Course	2	2	3	30	70	100
		Interdisciplinary Course - 2 (IDC - 2) #	One Course from Outside Department	2	2	3	30	70	100
	Total			30	26	--	--	--	800

III	I	Ability Enhancement Course – V(AEC - V)	(Tamil\$ / Other Languages+,#)	6	3	3	30	70	100
	II	Ability Enhancement Course – VI (AEC - VI)	English Course - III	6	3	3	30	70	100
	III	Core Course - 3(CC - 3)	Palaeontology	4	4	3	30	70	100
		Core Practical - 3 (CP - 3)	Palaeontology Practical	4	4	3	40	60	100
		Allied Course - 3 (AC - 3)	Physics - I	4	4	3	30	70	100
		Allied Course Practical - 2 (ACP-2)	Physics practical	2	**	**	**	**	**
	IV	Skill Enhancement Course - 2 (SEC - 2) ##	Naan Mudhalvan Course	2	2	3	30	70	100
		Interdisciplinary Course - 3 (IDC - 3) \$\$	One Course from Outside Department	2	2	3	30	70	100
		Health & Wellness @		–	1	–			100
	Total			30	23	–	--	--	800
I	Ability Enhancement Course – VII (AEC - VII)	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100	
IV	II	Ability Enhancement Course – VIII (AEC - VIII)	English Course - IV	6	3	3	30	70	100
	III	Core Course - 4(CC - 4)	Crystallography	4	4	3	30	70	100
		Core Practical - 4(CP - 4)	Crystallography Practical	4	4	3	40	60	100
		Allied Course - 4 (AC - 4)	Physics - II	4	4	3	30	70	100
		Allied Course Practical - 2 (ACP-2)	Physics practical	2	4	3	40	60	100
	IV	Skill Enhancement Course - 3 (SEC - 3) ##	Naan Mudhalvan Course	2	2	3	30	70	100
		Interdisciplinary Course - 4 (IDC - 4) \$\$	One Course from Outside Department	2	2	3	30	70	100
	Total			30	26	–	--	--	800
	Summer Internship / Industrial Activity during the Summer Vacation after II Year								

V	III	Core Course - 5 (CC - 5)	Mineralogy	4	4	3	30	70	100
		Core Course - 6 (CC - 6)	Stratigraphy	5	4	3	30	70	100
		Core Course - 7 (CC - 7)	Mining geology	5	4	3	30	70	100
		Core Course - 8 (CC - 8)	Engineering Geology	5	4	3	30	70	100
		Core Practical - 5 (CP - 5)	Mineralogy Practical	5	4	3	40	60	100
	IV	Skill Enhancement Course - 4 (SEC - 4)	Environmental geology	2	2	3	30	70	100
		Skill Enhancement Course - 5 (SEC - 5) ##	Naan Mudhalvan Course	2	2	3	30	70	100
		Introduction to Disaster Management		2	2	3	30	70	100
		Summer Internship / Industrial Activity @@	(with Viva-Voce)	--	2	--	20	80	100
	Total			30	28	--	--	--	900
VI	III	Core Course - 9(CC - 9)	Petrology	4	4	3	30	70	100
		Core Course- 10(CC - 10)	Economic Geology	5	4	3	30	70	100
		Core Practical- 6 (CP - 6)	Petrology and Economic Geology Practical	5	4	3	40	60	100
		Core Project Work(CPW) @@	Project Work (with Viva-Voce)	6	4	3	20	80	100
	IV	Value Added Course	General Studies for Competitive Examinations	2	1	--	30	70	100
		Skill Enhancement Course - 6 (SEC - 6)	Exploration Techniques	2	2	3	30	70	100
		Skill Enhancement Course - 7 (SEC - 7) ##	Naan Mudhalvan Course	2	2	3	30	70	100
		Environmental Studies		2	2	3	30	70	100
		Gender Studies		2	1	3	30	70	100
		Extension Activities *		--	1	--	--	--	--
	Total			30	25	--	--	--	900
Grand Total			180	150	--	--	--	4900	

Allied Paper

First Year Students

1. MATHEMATICS (or) CHEMISTRY

Second Year Students

PHYSICS

SKILL ENHANCEMENT COURSE (SEC)			
Sl. No.	Title of paper	Sl. No.	MANDATORY Naan Mudhalvan Scheme##
1.	Environmental Geology	1.	2nd Semester:
2.	Exploration Techniques		
3.	Field Geology	2.	3rd Semester:
4.	Remote Sensing		
5.		3.	4th Semester:
6.			
7.		4.	5th Semester:
--		5.	6th Semester:

INTERDISCIPLINARY COURSE (IDC) FOR WHO HAVE OPT TAMIL AS PART-I (for other Department Students only)	
1 st Semester	
2 nd Semester	
3 rd Semester	
4 th Semester	

INTERDISCIPLINARY COURSE (IDC)# FOR WHO HAVE NOT OPT TAMIL AS PART - I		
Those who have Studied Tamil upto 10th+2 but opt for other languages in degree	1st Semester	Special Tamil - I
	2nd Semester	Special Tamil - II
Those who have not studied Tamil in school level	1st Semester	Basic Tamil - I
	2nd Semester	Basic Tamil – II
Those students who opt for either special Tamil (or) Basic Tamil as IDCs, have to choose 2 more IDCs courses in their 3rd and 4th Semester from Outside his/her department.		

INTERDISCIPLINARY COURSE (IDC) \$\$ FOR NCCADETS ONLY	
NCC Course is a Compulsory Course for the NCC Cadets in the 3rd Semester:	NCC Course is a Compulsory Course for the NCC Cadets in the 4th Semester:
Introduction to NCC	1. Special Subject Army (or) 2. Special Subject Navy (or) 3. Special Subject Air force
Those students who opt for NCC Courses as IDCs, have to choose 2 more IDCs courses in their 1 st and 2 nd Semester from Outside his/her department.	

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Courses	No. of Courses	Credits for each Course	Total Credits	Marks
1.	I	Ability Enhancement Course	4	3	12	400
2.	II	Ability Enhancement Course	4	3	12	400
3.	III	Core Course	10	4	40	1000
4.		Core Practical	6	4	24	600
5.		Allied Course (AC)	4	4	16	400
6.		Allied Course Practical (ACP)	2	4	8	200
7.		Core Project Work (CPW)	1	4	4	100
8.	IV	Skill Enhancement Course (SEC)	7	2	14	700
9.		Interdisciplinary Course (IDC)	4	2	8	400
10.		Value Education	1	2	2	100
11.		Health and Wellness	1	1	1	100
12.		Introduction to Disaster Management	1	2	2	100
13.		Summer Internship / Industrial Activity	1	2	2	100
14.		Value Added Course	1	1	1	100
15.		Environmental Studies	1	2	2	100
16.		Gender Studies	1	1	1	100
17.		EXTENSIONACTIVITIES (NCC / NSS / SPORTS / ANTI DRUG CELL / YRC & Any Other Activities	--	1	1	--
Total			49	-	150	4900

\$	For those who have studied Tamil upto 10 th +2 (Regular Stream)															
+	Syllabus for other Languages should be on par with Tamil at degree level															
#	Those who have studied Tamil upto 10 th +2 but opt for other languages in degree level under Part-I should study special Tamil and those who have not studied Tamil in the school level should study Basic Tamil in Part-IV under the Inter disciplinary Course.															
**	Examination at the end of the next semester															
##	Naan Mudhalvan Scheme: As per the Naan Mudhalvan Scheme instructions, 5 courses from 2 nd to 6 th semester should be studied under Skill Enhancement Course.															
\$\$	NCC Course is one of the Choices in the Interdisciplinary Course. Only the NCC Cadets are eligible to choose this course. However, NCC Course is a Compulsory Course for the NCC Cadets.															
@	Health and Wellness: Assessments: • Use self-reflective work sheets to assess their understanding • submit the worksheets to internal audit / external audit • Every student's activity report should be documented and the same have to be assessed by the Physical Director with Mentor. The evaluation should be for 100 marks. • Examination is required. Scheme of Evaluation: <table><tr><th>Part</th><th>Description</th><th>Marks</th></tr><tr><td>A</td><td>Report</td><td>40</td></tr><tr><td>B</td><td>Attendance</td><td>20</td></tr><tr><td>C</td><td>Activities (Observation During Practice)</td><td>40</td></tr><tr><td colspan="2">Total</td><td>100</td></tr></table>	Part	Description	Marks	A	Report	40	B	Attendance	20	C	Activities (Observation During Practice)	40	Total		100
Part	Description	Marks														
A	Report	40														
B	Attendance	20														
C	Activities (Observation During Practice)	40														
Total		100														
@ @	Summer Internship / Industrial Activity Internship will be carried out during the summer vacation after the second year. Viva-Voce will be conducted by the college and Marks shall be sent to the University and the same will be included in the 5th semester Mark Statement. Summer Internship / Industrial Activity & Project Work Scheme of Evaluation: <table><tr><th>Description</th><th>Marks</th></tr><tr><td>Report</td><td>80</td></tr><tr><td>Viva-Voce</td><td>20</td></tr><tr><td>Total</td><td>100</td></tr></table>	Description	Marks	Report	80	Viva-Voce	20	Total	100							
Description	Marks															
Report	80															
Viva-Voce	20															
Total	100															
*	Extension Activities shall be outside instruction hours.															

First Year

CORE COURSE 1

Semester: I

Code:

**DYNAMIC GEOLOGY
(Theory)**

Credits: 4

COURSE OBJECTIVES:

To learn about the basic principles of Geology, Solar system, Earthquakes, Mass movements like Soil creep, Rock Creep and Solifluction, Earth's various exogenetic processes like weathering and action of geological agents and Endogenetic processes like earthquake, volcanoes, tectonic process and mountains.

UNIT - I:

Definition of Geology–Branches of Geology–The Solar system:–Origin of Earth–Nebular hypothesis – Planetesimal hypothesis – Tidal hypothesis –VonWeis zacker's hypothesis–Dust Cloud hypothesis–Bigbang theory. Detailed study of the structure and composition of Earth's interior - Age of the earth – sedimentation method - salinity method.

UNIT - II:

Earthquakes: Definition – Focus and Epicenter – Magnitude and Intensity – Properties and propagation of seismic waves – Seismograph and Seismogram – DistributionofEarthquakesinIndia-- PredictionofEarthquakes–Tsunami.

UNIT - III:

Volcanoes: Definition – Types, –Distribution of volcanoes, Causes of volcanism – Effects of Volcanic activity - Prediction of volcanoes.

UNIT - IV:

Distribution of continents and Oceans –Continental drift: Wegner's and Taylor's hypothesis–Merits and demerits of drift theories; Seafloor spreading–Concept of plate tectonics – Different kinds of plate margins.

UNIT - V:

Mountains: Classification – Life cycle of mountains – Origin of mountains. Geosynclines: Stille's, Kay's, Strahler's and Schuchert's Classifications; Types of plateaus and plains. Causes, effects and evidences of Sea level changes.

UNIT - VI: CURRENT CONTOURS (for Continuous Internal Assessment Only):

Tectonic zones of the world Recent Earth quakes and volcanic eruption.

Course Outcomes:

On completion of the course the student would have gained knowledge on the

1. Branches of geology and their connection to the Earth system.
2. Earth's internal structure, isostasy theories, continental drift, seafloor spreading and plate tectonics
3. Geological hazards like earthquakes and volcanoes, and their impacts.
4. Processes and landforms due to weathering, river action and groundwater
5. Processes and landforms due to glacial, aeolian, coastal and marine processes
6. Coral reefs and major landforms of India

Text Books

1. **Arthur Holmes (1965)**. Principles of Physical Geology (II Revised Edition), Thomson Learning.
2. **Dayal, P (2010)**. A Text Book of Geomorphology, Rajesh Publications.
3. **Kale, V and A. Gupta (2010)**. Introduction to Geomorphology, Universities Press.
4. **Mahapatra, G.B (2016)**. Text Book of Physical Geology, CBS Publishers & Distributors.
5. **Patwardhan, A.M (2010)**. The Dynamic Earth System (II edition), PHI Learning Private Ltd.
6. **Roy, A.B (2010)**. Fundamentals of Geology, Narosa Publishing House Pvt. Ltd.
7. **Tar buck, E.J., Lutgens, F.K., & D Tasa (2017)**. Earth Science. Pearson.
8. **Thompson, G.R and J. Turk (1997)**. Introduction to Physical Geology (II Ed.), Brooks Cole Publishers.
9. **Savindra Singh (2018)**. Geomorphology, Pravalika Publications.

REFERENCES:

1. Arthur Holmes (1992) Principles of Physical Geology: Thomas Nelson & sons London.
2. Philip G. Worcester (1939) A text book of geomorphology: D. Van Nostrand and co., London.
3. Radhakrishnan.V (1966). General Geology-V.V.P. Press.
4. Mahapatra,G.B. (2015) A text book of Geology-CBS, Delhi
5. Patwardhan,A.M. (2012) The Dynamic Earth System-PHI Learning PVT. Ltd, New Delhi
6. William J. Miller (1949)-Principles of physical Geology-Thomas Nelson & sons, London.
7. W. D. Thornbury (1969) A text book of geomorphology - D. Van Nostrand co., London.
8. A.L.Bloom (1978) General Geology-V.V.P. Press.
9. L.D.Leet & Judson (1960) Physical Geology-Prentice Hall, India.
10. EdgerW. Spencer Earth Science (2002)-McGraw Hill, New Delhi.
11. Richard John Huggett, 2016, Fundamentals of Geomorphology, Taylor and francis, Fourth edition
12. Vishwas.s.kale and Avijit Gupta, 2018, Introduction to Geomorphology, The orient black swan Publications
13. Michael A. Summer field, 2011 Geomorphology and global tectonics, John Willey Publications

Course Objectives:

To impart knowledge on

1. The ability to read and analyze topographic maps to analyse the terrain features
2. The analysis of drainage morphometric parameters
3. Gaining proficiency in basic surveying techniques using instruments like chain, compass, dumpy level, auto level, and plane table.
4. The description of the morphological characters of invertebrate fossils and their identification.

1. Top sheet Reading

Exercises relating to

- Location of sites using geographic coordinates. Finding the geographic coordinates of the given feature.
- Identification of natural and man-made features from the symbols, colours, etc. given in toposheets
- Determination of elevation of a point and, elevation differences between two points
- Identification of landforms such as hills, valleys, plateaus, plains, etc. from the contours
- Identification of water bodies, interpreting their nature and the direction of flow of rivers
- Estimation of distance between any two points using map scale
- Estimation of areal extent of features such as cities, tanks, forests, etc.
- Drawing profile along a line between two points on a map to interpret the elevation changes
- Estimation of drainage morphometric parameters

2. Surveying

- Determination of linear distance between the given features using chain / tape by triangulation method and plotting on a paper.
- Determination of elevation of different points and distance between the points of elevation using dumpy level and chain/tape.
- Determination of elevations of different points and distance between the points of elevation using Auto level and chain/tape.
- Determination of angle between two points, or bearings of points using prismatic compass and chain/tape and plotting on a paper.

- Determination of angles between two points, or bearings of points using Brunton compass and chain/tape and plotting on a paper.
- Plotting of field features on a paper by simultaneous observation using plane table and chain/tape.

Course Outcomes: On completion of the course the student would have gained practical knowledge on

1. The ability to read and analyze topographic maps to analyse the terrain features
2. The analysis of drainage morphometric parameters
3. Gaining proficiency in basic surveying techniques using instruments like chain and compass
4. Gaining proficiency in using instruments dumpy level, auto level, and plane table.
5. The description of the morphological characters of invertebrate fossils and their identification.
6. Plant fossils

Text Books:

1. Ramachandran, V. (2022). Topographic Map Reading and Surveying. Himalaya Publishing House.

Course Objectives:

To know about the Topographic, Geological maps and its applications, Primary and secondary structures, geometry and elements of fold, fault and joint surface recognition in the field, Foliation Mechanism and Uses of compass in field.

UNIT I:

Scope and aim of Structural Geology – Methods of representing physiographic features-Contours–Topographic and Geological maps, their preparation and uses. Physical properties of rocks: Deformation – brittleness, plastic and elastic properties. Beds and their attitudes – Dip and strike – Trends of outcrop – Rule of V of outcrops – Relation between true and apparent dips. Width of outcrops, True thickness, vertical thickness and their mutual relations.

UNIT II:

Primary and Secondary Structures -Primary Structures of extrusive and intrusive igneous rocks- Primary structures of sedimentary rocks. Plutons - concordant and discordant plutons — dyke – sill - phacolith- lopolith - batholith, ring dyke and cone sheets-brief study of salt domes.

UNIT III:

Folds–geometry and elements of folded surface–classification–descriptive study of different types of folds – recognition of folds in the field and on map. Unconformities – definition – types – significance – recognition in the field and on map–overlap and off lap; Inlier and Outlier.

UNIT IV:

Faults – definition – terminology – genetic and geometric classification and description–recognition of faults in the field and on the map–distinction between faults and unconformities–a short account to rift valleys. Joints– definition–geometric and genetic–classification–descriptive study– applications of joints.

UNIT V:

Definition and features of Foliation–Primary and secondary foliations; Cleavage and Schistosity. Lineation; Mechanism and Uses of Clinometer and Brunton compass.

UNIT VI: CURRENT CONTOURS (for Continuous Internal Assessment Only):

Major structural features, its distribution and importance in natural resources and disaster mapping.

COURSE OUTCOME:

Acquire knowledge on different types of structures, its formation and its causes and further useful for earth's dynamic study

REFERENCES:

1. Billings, M.P. (1974), Structural Geology: Prentice Hall, Englewood Cliffs, U.S.A.
2. Novin, C.M. (1953), Principles of structural Geology John Willey, New York.
3. Gokhale, N.W. (2013): Theory of Structural Geology. CBS Publishers.
4. Ghosh, S.K. (1993), Fundamentals and Modern developments. Per gamon Press.
5. V.V. Belousov (1962)- Structural Geology, Moscow
6. P.C. Bedgley (1965)- Structural and Tectonic, Principles: Harper & Row, New York.
7. E.W. Spencer (1977), An Introduction to structural Geology: McGraw, Hill, New York.
8. Park, P.G. (2011) Fundamentals of structural Geology, John Willey & sons,
9. Ajitksil, 2018, Geotectonics and geomorphology vol1, The Himalyan books
10. Tarling, 1981, Economic Geology and geotectonics, Halstead Press
11. Hatcher, Robert d Christopher Bailey, 2019, Strtuctural Geology, principles, concepts and problems, Oxford univ press
12. Pearson, 2017, Basic methods of structural geology, Pearson education

PRACTICAL COURSE OBJECTIVES:

To know about the Exercises to predict the trends of the outcrop of horizontal, vertical and inclined beds with respect to topography, reading of solid fold and fault, maps construction and problems relating to true dip and apparent dip. Fundamental and applications of surveying.

Interpretation of contour maps for solving problems relating to geological structures

- Exercises to predict trends of the outcrop of horizontal, vertical and inclined beds with respect to topography
- Reading of solid conformable maps
- Deciphering dip and strike of outcrops
- Construction of map when three points over a bedding plane are given
- Construction of vertical sections, thickness and order of superposition
- Reading of solid fold and fault maps
- Construction of vertical sections
- Determination of throw of vertical faults
- Reading of unconformable solid maps and construction of sections
- Reading of solid maps of areas when more than one structure is involved
- Determination of comparative ages of structures and intrusions
- Deciphering geological history.

2.1 Structural Geology problems relating to the determination of

- a) true dip & apparent dip b) Vertical and true thickness

2.2 Stereographic projection of linear and planar structures

Course Outcomes (COs): On completion of the course the student would have gained knowledge on

1. Identification of rocks by studying their megascopic characters.
2. Identification of rocks by studying their microscopic characters.
3. Interpreting and analysing geological structures from contour maps and solid geological maps.
4. Developing skills towards solving structural geology problems.
5. Determination of true and apparent thickness and vertical and true thickness
6. Using stereographic projection techniques for analyzing planar and linear geological structures.