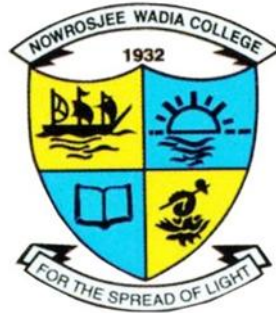


**MODERN EDUCATION SOCIETY'S**

**NOWROSJEE WADIA COLLEGE, PUNE**

**(An Autonomous College Affiliated to  
Savitribai Phule Pune University)**




**Framework of Syllabus For**

**B.SC. GEOLOGY**


**(Based on NEP 2020 framework)**

**T.Y.B.Sc. Semester – V**

**2025-26**


	<b>MODERN EDUCATION SOCIETY'S</b> <b>Nowrosjee Wadia College, Pune</b> <b>(Autonomous)</b>	<b>Academic</b> <b>Year</b> <b>2025-2026</b>
	<b>Bachelor of Science (Hons.) with research in</b> <b>Geology</b>	
<b>Geology Major Subject (Paper I)</b>		
<b>Year 2025</b> <b>Semester- V</b>	<b>GLMJ 351 Geology of India - I</b>	<b>Credits 2</b> <b>Hours 30</b>
<b>Course specific outcomes:</b> Students will be able to interpret and correlate stratigraphic sequences of rock layers to reconstruct geological history, including relative age relationships, depositional environments, and major geological events, utilizing field observations, laboratory analysis, and relevant stratigraphic principles.		
<b>UNITS</b>	<b>COURSE CONTENT / SYLLABUS</b>	<b>LECTURES</b>
<b>Unit 1</b>	<b>Precambrian Stratigraphic framework of Peninsular India.</b>	7
<b>Unit 2</b>	<b>Brief account of distribution, Geographical location, classification, lithological succession, structure and economic importance, with a broad range stratigraphic correlation.</b> a) Dharwar Craton. b) Singhbhum – Odisha Iron Ore Craton c) Central Indian Craton/ Bastar Craton d) Aravalli Craton e) Bundelkhand Craton f) Eastern Ghat mobile belt	8
<b>Unit 3</b>	<b>The Archaean – Proterozoic boundary in India.</b>	7
<b>Unit 4</b>	<b>Stratigraphy, tectonics, depositional environment and correlation of the following Proterozoic Basins of India:</b> a) Vindhyan Supergroup b) Cuddapah Supergroup c) Delhi Supergroup d) Bhima Supergroup e) Kaladgi Supergroup f) Chhattisgarh Supergroup.	8

<b>References</b>	<ol style="list-style-type: none"><li>1. Valdiya, K. S. (2010) The Making of India: Geodynamic Evolution, Springer.</li><li>2. Naqvi, S.M., 2005. Geological Evolution of the Indian Plate (From Haedean to Holocene -4Ga to 4Ka).</li><li>3. G.G. Deshpande (2002) Geological of Maharashtra- Geological Society of India – Special Publication.</li><li>4. Ramakrishnan M, and Vaidynadhan, R (1994) Geology of India, Geological Society of India Publication, Bangalore. Vol. I</li><li>5. Krishnan, M.S. (1982) Geology of India and Burma, 6th Edition. CBS Publ.</li><li>6. Valdiya, K.S. (1984) Aspects of tectonics, Tata Mcgrath Hill.</li><li>7. Wadia, D. (1973) Geology of India. McGraw Hill Book co.</li><li>8. Sinha Singbhum - Orissa Iron Ore Craton: Geological Society of India – Special Publication</li></ol>
<b>Learning outcomes</b>	The student will gain knowledge about the stratigraphy and geology of India with emphasis on the Stratigraphy of India. The Indian sub-continent exposes a wide range of lithologies that span from 3.6 billion years to present.

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	<b>Bachelor of Science (Hons.) with research in</b> <b>Geology</b>	
<b>Geology Major Subject (Paper II)</b>		
<b>Year 2025</b> <b>Semester- V</b>	<b>GLMJ 352 Advanced Mineralogy &amp;</b> <b>Gemmology</b>	<b>Credits 2</b> <b>Hours 30</b>
<b>Course specific outcomes:</b> Students will be able to identify common rock-forming minerals based on their physical properties, including crystal habit, cleavage, luster, hardness, color, and specific gravity, and distinguish them from one another using hand lens and basic laboratory techniques.		
UNITS	COURSE CONTENT / SYLLABUS	LECTURES
<b>Unit 1</b>	<b>Mineral Optics &amp; Mineral Chemistry</b> Mineral Optics: a) Refractive index & methods of comparing R.I of minerals: Becke line, shadow method & immersion method b) Relief of minerals c) Uniaxial & biaxial minerals, indicatrices d) Vibration direction & optic orientation e) Pleochroism & absorption f) Accessory plates: Quartz wedge, Mica plate & Gypsum plate g) Compensation & Determination of interference colours h) Sign of minerals i) Sign of elongation of uniaxial minerals where C axis is known Mineral Chemistry: a) Isomorphism b) Polymorphism c) Pseudomorphism	7
<b>Unit 2</b>	<b>Descriptive Mineralogy-I</b> Study of the following mineral groups (silicates) with reference to their silicate structure, chemical & optical characters, paragenesis & alteration products a) Olivine group b) Garnet group c) Aluminosilicates: Sillimanite, Kyanite & Andalusite d) Pyroxene group e) Amphibole group f) Mica group g) Felspar group	8


<p><b>Unit 3</b></p>	<p>h) Feldspathoid group i) Zeolite group</p> <p><b>Introduction to Gemmology</b></p> <p>a) Introduction to Gemmology and Gems b) Physical and Optical properties of Gems: Crystallography, crystal forms and habit, colour, lustre, sheen, hardness, tenacity, pleochroism, specific gravity and its determination, refractive index. c) Description of the following gem species w.r.t. their varieties (colour wise), chemical composition, crystal system, physical and optical properties and geographical occurrence: d) Corundum, Beryl, Garnet, Feldspar, Silica, Tourmaline, Topaz, Spinel, Chrysobery and Diamonds. e) Opaque and organic gemstones</p>	<p>8</p>
<p><b>Unit 4</b></p>	<p><b>Gemological instruments, Gem synthesis &amp; Gemstone enhancement</b></p> <p>a) Gemological instruments and their use in gemstone identification (hand lens, refractometer, polariscope, dichroscope and Chelsea filter) b) Gem synthesis and distinction between synthetic and Natural gem stones. c) Gemstone enhancement and lapidary</p>	<p>7</p>
<p><b>References</b></p>	<ol style="list-style-type: none"> <li>Ram S. Sharma and Anurag Sharma (2013) Crystallography and Mineralogy - Concepts and Methods. Text Book Series, Geological Society of India, Bangalore</li> <li>Dana, E.S. and Ford, W.E., (2002) A textbook of Mineralogy (Reprints).</li> <li>Flint, Y., (1975) Essential of crystallography, Mir Publishers.</li> <li>Phillips, F.C., (1963) An introduction to crystallography. Wiley, New York.</li> <li>Berry, L.G., Mason, B. and Dietrich, R.V., (1982) Mineralogy. CBS Publ.</li> <li>Read, H.H., (1968) Rutley's Element of Mineralogy (Rev. Ed.). Thomas Murby and Co.</li> <li>Berry and Mason, (1961) Mineralogy. W.H. Freeman &amp; Co.</li> <li>Read, P. (2012). Gemmology. Routledge</li> <li>Fareeduddin, M. R., &amp; Mitchell, R. H. (2012). Diamonds and their source rocks in India. Geological Society of India, Bangalore, 434.</li> <li>Karanth, R. V. (2008) Gemstones Enchanting Gifts of Nature. GSI Publications.</li> <li>Karanth, R. V. (2000) Gems and gem industry in India (No. 45).</li> </ol>	

	<p>Geological Society of India.</p> <p>12. Babu, T. M. (1998) Diamonds in India. GSI Publications.</p> <p>13. Sinkankas, J. (1966) Mineralogy: a first course.</p> <p>14. Webster, R. (1962) Gems: their sources, descriptions and identification.</p>
<b>Learning outcomes</b>	<p>The student will gain knowledge about the ability to identify and classify different minerals based on their physical properties, chemical composition, and crystal structure, including the skill to use optical microscopy to analyze minerals in thin sections, while understanding the relationship between mineral formation and geological processes; essentially, gaining a comprehensive knowledge of minerals to recognize and interpret their characteristics in various geological contexts.</p>


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	<b>Bachelor of Science (Hons.) with research in</b> <b>Geology</b>	
<b>Geology Major Subject (Paper V)</b>		
<b>Year 2025</b>	<b>GLMJ353 Hydrogeology</b>	<b>Credits 2</b>
<b>Semester- V</b>		<b>Hours 30</b>
<b>Course specific outcomes:</b> The course is designed for the students to understand the basic principles in hydro-geology, study aquifers and related aspects and to study of hydrogeology chemistry, systematically hydrogeological survey and water quality monitoring.		
<b>UNITS</b>	<b>COURSE CONTENT / SYLLABUS</b>	<b>LECTURES</b>
<b>Unit 1</b>	<b>Introduction and basic concepts in Hydrogeology</b> Definitions: Hydrology, Geo-hydrology, Hydrogeology Water bearing properties of rocks: a) Interstices and porosity, permeability, specific yield and specific retention, storativity, transmissivity and Hydraulic conductivity b) Aquifers, Geologic formations as aquifers- Aquicludes, Aquitard and Aquifuge. c) Vertical distribution of subsurface water-zone of saturation and zone of aeration. d) Types of aquifers – unconfined, confined, Perched.  Groundwater Flow: a) Darcy's law and its validity b) Aquifer parameters-transmissivity, storage coefficient, hydraulic conductivity, Intrinsic permeability c) Groundwater flow rates and flow direction d) Laminar and turbulent groundwater flow	8
<b>Unit 2</b>	<b>Field and laboratory methods used to characterize aquifer properties and hydrogeology of rocks</b> a) Field methods: Pumping tests and slug test - Principles – types of pumping tests, procedures, Determination of aquifer properties and well; Characteristics by Methods of Theim's equilibrium method. b) Laboratory methods: Grain size Analysis method (GSA) consolidated and unconsolidated sediments; Permeameter method.	7

<p><b>Unit 3</b></p> <p><b>Groundwater chemistry</b> Groundwater chemistry:</p> <p>a) Chemical standards for drinking, and irrigational water b) Major ion and isotope analyses, chemical tracers in groundwater c) Physical and chemical properties of water and water quality. BIS, WHO standard; d) Groundwater contamination; natural (geogenic) and anthropogenic contaminants; e) Saline water intrusion in coastal aquifers-Ghyben Herzberg relation</p> <p><b>Unit 4</b></p> <p><b>Groundwater Resources of India, Groundwater Quality Hotspots in India</b> Groundwater Resources i.e. aquifers of India a) Unconsolidated sedimentary b) Consolidated sedimentary c) Sedimentary Aquitards d) Folded metamorphic e) Jointed Crystalline f) Fractured Crystalline</p> <p>Groundwater quality hotspots in India a) Hydrogeology in Maharashtra b) Groundwater quality hotspots in India- TDS, F, Ar, U, Fe</p>	<p>c) Well inventory: Water Well Construction – Selection of suitable site for well construction, Water well design criteria and specifications, maintenance of production wells and types of well. d) Hydrogeology of rocks</p> <p>7</p> <p>8</p>	
<p><b>References</b></p>	<p>1) Brassington, R. (2017) Field Hydrogeology, Wiley Blackwell 2) Pawar N.J, Das, S. And Duraiswami R.A (2012) Hydrogeology of Deccan Traps and associated Formations in Peninsular India, Geol. Soc. India, Bangalore 3) Hiscock, K. M. (2005) Hydrogeology: Principles and Practice, Blackwell Publishing 4) Todd, D.K. and Mays, L.W. (2004) Groundwater Hydrology, John Wiley &amp; Sons. 5) Raghunath, H.M. (1987) Groundwater, New Age International 6) Freeze, R. A. and Cherry, J. A. (1979) Groundwater, Prentice Hall</p>	
<p><b>Learning outcomes</b></p>	<p>The course deals with hydrogeology resulting in basic understanding of the concept of hydrogeology, types of aquifers, water bearing properties and movement of water in the aquifer. The students will get the knowledge about Understand type of wells, changes in water quality and water quality standards.</p>	





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	<b>Bachelor of Science (Hons.) with research in GEOLOGY</b>	
<b>Geology Major Subject</b>		
<b>Year - 2025</b>	<b>GLMJ 354 Practical related to Advanced Mineralogy and Geology of India -I</b>	<b>Credits 2</b>
<b>Semester- V</b>		<b>Hours 60</b>
<p><b>Course specific outcomes:</b> This course is devised to provide basic knowledge of Stratigraphical map reading and geological maps, able to describe the lithologies of different periods of Precambrian stratigraphy of India.</p>		
Sr. No.	COURSE CONTENT / SYLLABUS	No. of Lectures
1	Study of typical hand specimens of rocks from different lithological units of Precambrians of India: Dharwar Craton, Bastar Craton, Aravalli Craton, Orissa- Singhbhum Craton, Bundelkhand Craton, Eastern Ghat mobile belt, Vindhyan, Cuddapah, Kaladgi, Chattisgarh Supergroups.	4
2	Study of paleogeographical maps of different periods of Precambrians of India.	1
3	Geographic distribution of various geological formations of Precambrians of India.	2
4	Interpretation of geological map of India.	1
5	Megascopic study and identification (atleast 15 minerals form amongst the following minerals in hand specimen) Neso silicate: Staurolite, Topaz Inosilicate (Single chain): Hypersthene, Wollastonite Inosilicate (Double chain): Actinolite, Tremolite, Asbestos Phyllosilicate: Phlogopite, Chlorite, Serpentine, Kaolinite Tectosilicate: Sanidine, Labrodorite, Sodalite, Leucite Cyclosilicate: Beryl, Tourmaline, Apatite, Corundum Sorosilicate: Epidote.	2
6	Microscopic Study and identification of the following minerals under a microscope Colourless Minerals: Tremolite, Quartz, Orthoclase, Sanidine, Leucite, Hauyne/ Nosean	2

7	<p>Coloured Minerals: Staurolite, Andalusite, Sphene, Hypersthene, Diopside, Actinolite, Chlorite, Tormaline</p> <p>Study of physical and optical properties of selected gemstones.</p>	<p>3</p> <p><b>Total - 15</b></p>
<b>Reference</b>	<p>Deer, W. A., Howie. R. A. and Zussman, (2013) Rock forming Minerals, Mineralogical Society of Great Britain and Ireland; Third edition</p> <p>Medlicott, Henry Benedict, and William Thomas Blanford (2011) A manual of the geology of India: chiefly compiled from the observations of the geological survey. Cambridge University Press.</p> <p>Valdiya, K. S. (2010) The Making of India: Geodynamic Evolution, Springer.</p> <p>Dana, E. S. (2006) A Text Book of Mineralogy, CBS Publishers &amp; Distributors; 4th edition, page no. 1-156.</p> <p>Naqvi, S.M. (2005) Geological Evolution of the Indian Plate (From Haedean to Holocene -4Ga to 4Ka).</p> <p>Rutley, (2005) Elements of Mineralogy, CBS; 27th edition page no. 1-482.</p> <p>Ramakrishnan, M. (1999) "The Indian Precambrian." Geological Society of India.</p> <p>Mac Kenzie, W. S., &amp; Adams, A. E. (1994). A color atlas of rocks and minerals in thin section. Ramakrishnan M, and Vaidynadhan, R (1994) Geology of India, Geological Society of India Publication, Bangalore. Vol. I</p> <p>Chowdary, YMK Chandra, and K. S. Rao (1985) "Purana Basins of Peninsular India." Geological Society of India 26.7 496-504. Geological Society of India: Quaternary of India.</p> <p>Valdiya, K.S. (1984) Aspects of tectonics, Tata Mcgrath Hill.</p> <p>Krishnan, M.S. (1982) Geology of India and Burma, 6th Edition. CBS Publ.</p> <p>Wadia, D. (1973) Geology of India. McGraw Hill Book co.</p>	
<b>Learning outcomes</b>	<p>Students will be able to accurately identify and interpret stratigraphic relationships in field outcrops, including the recognition of key stratigraphic surfaces &amp; lithofacies variations to reconstruct the depositional history of a geological sequence.</p> <p>Students will also learn to identify and distinguish between different minerals and gemstones.</p>	

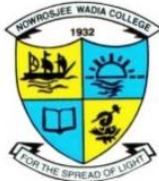
	<b>MODERN EDUCATION SOCIETY'S</b> <b>Nowrosjee Wadia College, Pune</b> <b>(Autonomous)</b>	<b>Academic</b> <b>Year</b> <b>2025-2026</b>
	<b>Bachelor of Science (Hons.) with research in</b> <b>GEOLOGY</b>	
<b>Geology Major Subject</b>		
<b>Year 2025</b>	<b>GLMJ 354 Practicals related to Hydrogeology</b>	<b>Credits 2</b>
<b>Semester- V</b>		<b>Hours 30</b>
<p><b>Course specific outcomes:</b>          In the course, students will understand the concept of contour maps and groundwater contour maps, groundwater flow direction and properties of aquifer. The idea of the course is to make students aware about different aquifer properties and parameters which affect the water levels. Students will study water quality parameters and conduct the Morphometric analysis of a watershed basin area.</p>		
<b>Sr. No</b>	<b>COURSE CONTENT / SYLLABUS</b>	<b>No. of Practicals</b>
1	Preparation and interpretations of hydrographs from given water level data.	2
2	Preparation of water table contour maps from given water level data.	1
3	Estimation of aquifer properties as porosity and permeability, hydraulic conductivity. Storage coefficient and Transmissivity.	2
4	Estimation of aquifer properties as Storage coefficient and Transmissivity.	1
5	pH and electrical conductivity of water samples	1
6	Groundwater quality analysis using Piper's plot.	2
7	Problems related to saline water intrusion	2
8	Morphometric analysis.	2
9	Problems related to artificial groundwater recharge	2
		<b>Total = 15</b>
<b>References</b>	1. Brassington, R. (2017) Field Hydrogeology, Wiley Blackwell 2. Sanjay Akhauri & H. M. Akhauri Fundamentals of Hydrogeology (2016) 3. Freeze, R. A. and Cherry, J. A. (1979) Groundwater, Prentice Hall 4. Pawar N.J, Das, S. And Duraiswami R.A (2012) Hydrogeology of Deccan Traps and associated	

	<p>Formations in Peninsular India, Geol. Soc. India, Bangalore</p> <p>5. Hiscock, K. M. (2005) Hydrogeology: Principles and Practice, Blackwell Publishing.</p> <p>6. Todd, D.K. and Mays, L.W. (2004) Groundwater Hydrology, John Wiley &amp; Sons.</p> <p>7. Fetter Jr. C. W. "Applied Hydrogeology" 4<sup>th</sup> Edition (Nov. 2000)</p> <p>8. Raghunath, H.M. (1987) Groundwater, New Age International</p>	
<b>Learning outcomes</b>	<p>The students are expected to prepare water table contour maps and demarcate the groundwater flow direction. Students will be able to prepare the hydrograph and interpret the same. Students will be able to identify the water type and its suitability for drinking or other usage. Students will be able to calculate total basin area and find out the factor controlling the drainage in the area based on calculation in the morphometric analysis.</p>	

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	<b>Bachelor of Science (Hons.) with research in</b> <b>GEOLOGY</b>	
<b>Geology Major Subject (Elective)</b>		
<b>Year 2025</b> <b>Semester- V</b>	<b>GLMJ 355 Climate Change: Past, Present and Future</b>	<b>Credits 2</b> <b>Hours 30</b>
<b>Course specific outcomes:</b> The course introduces the students to the Earth's climate system and explores the science of global climate change using different proxies. It will give students an insight to important processes governing Earth's climate like Milankovitch cycles El-Nino, La-Nina and Ocean circulation. This course introduces the student to the Indian Monsoon system and the hazards resulting due to climate change.		
<b>Units</b>	<b>COURSE CONTENT / SYLLABUS</b>	<b>No. of Lectures</b>
<b>Unit 1</b>	<b>Introduction to climate change and Processes</b> a) Composition and structure of atmosphere, study climate change models. b) The factors affecting Earth's climate, anthropogenic impacts on climate.	8
<b>Unit 2</b>	<b>Reasons and Effects of Climate Change</b> a) Milankovitch cycles: Introductions, Earth's movement b) Greenhouse gases, El-Nino, La-Nina, Ocean Circulation.	8
<b>Unit 3</b>	<b>Climate Change and its modelling</b> a) Indian Monsoon system b) Agro-Climatic divisions of Indian subcontinent c) Use of Climate proxies to model and monitor past and present climate indicators.	8
<b>Unit 4</b>	<b>Climate Change and atmospheric hazards</b> a) Changes in rainfall patterns/ intensity. b) Storm surges, Cyclone, Floods, droughts, etc	6
<b>Reference</b>	1. Climatology by Savindra Singh (2023) 2. Climatology by D. S. Lal (2021) 3. Ruddiman, W.F. (2008) Earth's Climate, Past Present and Future, W H Freeman & Co. 4. Bradley R.S. (1999) Paleoclimatology: Reconstructing climates of the quaternary. Academic Press v. 64 of International Geophysical series.	
<b>Learning outcomes</b>	Students should be able to describe how the Earth's climate system works and summarize general atmosphere circulation patterns, ocean circulation patterns and climate oscillations such as El-Nino, La-Nina.	


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	<b>Bachelor of Science (Hons.) with research in</b> <b>Geology</b>	
<b>Geology Major Subject (Elective)</b>		
<b>Year 2025</b>	<b>GLMJ 356 Engineering Geology</b>	<b>Credits 2</b>
<b>Semester- V</b>		<b>Hours 30</b>
<b>Course specific outcomes:</b> To impart sufficient knowledge of engineering geology so as to be able to anticipate the technical problems related to geology of various engineering sites and suggest possible remedial measures.		
UNITS	COURSE CONTENT / SYLLABUS	LECTURES
<b>Unit 1</b>	<b>Engineering properties of rocks</b> a) Introduction to Engineering Geology b) Significance of Geology in Engineering and Environment projects c) Factors controlling the engineering properties of the rock. d) Specific gravity, porosity, sorption, strength of rocks (Compressive, shear & tensile), elasticity of rocks, residual and shear stresses in rocks. e) Importance of weathering and clay formations.	7
<b>Unit 2</b>	<b>Rocks as Construction Material</b> a) Building stone, Facing stone, and Foundation material. b) Factors influencing engineering usefulness of the rocks (Durability of rock). c) Use of rocks as an aggregate in different types of constructions, source of different grades of aggregates. d) Types of aggregates. e) Physical and Engineering properties of aggregates.	8
<b>Unit 3</b>	<b>Site selection for Tunnel and Bridges</b> a) Types of tunnels and Site selection for tunnel construction b) Tunnelling in various terrains like tunnel in bedded rocks and folded rocks, influence of divisional planes, effects of faults and crushed zones. c) Tunnels in the vicinity of slopes. d) Role of groundwater in tunnelling. e) Tunnels in the Deccan Traps. f) Names and locations of at least six very important	7

<p><b>Unit 4</b></p>	<p>tunnels in India, Case study: Jawahar Tunnel  g) Types of bridges and Site selection for bridge construction  h) Names and locations of at least six very important bridges in India. Case study: Mumbai Sea-Link</p> <p><b>Site selection for Dams and Reservoir</b>  a) Types of Dams and reservoirs  b) Site selection for dam and reservoir construction  c) Location with type of all the important dams and hydroelectric projects in India. Case study: Sardar Sarovar Dam</p>	<p>8</p>
<p><b>References</b></p>	<ol style="list-style-type: none"> <li>1. Chenna Keshvalli (2018) Text book of Engineering Geology, Laxmi Publications.</li> <li>2. Tony Waltham (2009) Foundations of Engineering Geology, Taylor and Francis.</li> <li>3. Gokhale, K.V.G. (2006) Principles of engineering geology, BS publications.</li> <li>4. Krynine, D.P and Judd, W.R (2005) Principles of Engineering Geology and Geotechniques, CBS Publishers &amp; Distributors</li> <li>5. Blyth, F.G.H. and M. H. de Freitas (1984) Geology for Engineers, Butterworth - Heinemann Title</li> <li>6. Ries, H. and T. L. Watson, (1949) Elements of Engineering Geology, New York, John Wiley &amp; Sons, Inc.</li> </ol>	
<p><b>Learning outcomes</b></p>	<p>Upon completion of the course the student will become aware of the importance of geological studies and its applicability to various engineering problems. The student will be educated on geological site investigations for engineering structures and will provide skills in geological mapping and making geotechnical measurements.</p>	


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	<b>Bachelor of Science (Hons.) with research in Geology</b>	
<b>Geology Minor Mandatory</b>		
<b>Year 2025</b>	<b>GLMN 357 Introduction to Stratigraphy &amp; Palaeontology</b>	<b>Credits 2</b>
<b>Semester- V</b>		<b>Hours 30</b>
<b>Course specific outcomes:</b>  Grasp the fundamental principles of stratigraphy and its applications in geological studies. Understand the classification and nomenclature of stratigraphic units, including lithostratigraphy, chronostratigraphy, and biostratigraphy. Analyze and interpret stratigraphic data from outcrops and correlate geological formations across regions. Develop knowledge of the stratigraphy and tectonics of Indian cratons and Proterozoic basins. Learn the processes of fossilization, the role of index fossils, and their use in stratigraphic correlation.		
<b>UNITS</b>	<b>COURSE CONTENT / SYLLABUS</b>	<b>LECTURES</b>
<b>Unit 1</b>	<b>Stratigraphy</b> a) Introduction to Stratigraphy: b) Definition, principles, and importance of stratigraphy. c) Development of stratigraphic concepts. d) Stratigraphic Classification and Nomenclature: e) Lithostratigraphy, Chronostratigraphy, Biostratigraphy, and their units	7
<b>Unit 2</b>	<b>Stratigraphy of Indian Cratons and Proterozoic Basins</b> <b>Indian Cratons:</b> a) Study of Dharwar, Singhbhum, Central Indian, Aravalli, Bundelkhand Cratons, and Eastern Ghat Mobile Belt: Geographical location, lithological succession, and economic importance. <b>Proterozoic Basins:</b> a) Stratigraphy, tectonics, and correlation of Vindhyan, Cuddapah, Pranhita-Godavari, Bhima, Kaladgi, and Chhattisgarh Supergroups. b) Gondwana supergroup, deccan volcanic province, Recent sediments	8



<p><b>Unit 3</b></p>	<p><b>Paleontology: Introduction to Fossils</b></p> <p>a) Definition of fossils (Megafossils, Microfossils, Ichnofossils).</p> <p>b) Branches of Palaeontology</p> <p>c) Conditions and modes of fossil preservation.</p> <p>d) Uses of fossils and methods of collection and preparation.</p> <p>e) Index Fossils: Introduction</p>	<p>8</p>
<p><b>Unit 4</b></p>	<p><b>Introduction to Megapalaeontology</b></p> <p>Classification, morphological characters and Geographical distribution of the following invertebrate fossils from</p> <p>a) Phylum Mollusca:</p> <p>b) Class Bivalvia</p> <p>c) Class Gastropoda</p> <p>d) Class Cephalopoda(Nautilus,Ammonoites,Belemnites).</p> <p>e) Phylum Brachiopoda</p> <p>f) Phylum Arthropoda</p>	<p>8</p>
<p><b>References</b></p>	<p><b>Stratigraphy:</b></p> <ol style="list-style-type: none"> <li>1. Telford, M. W., Geldart, L. P., &amp; Sheriff, R. E. (2022). Applied Geophysics. Cambridge University Press.</li> <li>2. Miall, A. D. (2018). The Geology of Stratigraphic Sequences. Springer.</li> <li>3. Hedberg, H. D. (2019). Stratigraphic Methods: Basic Principles and Concepts. Springer.</li> <li>4. Vail, P. R., &amp; Todd, R. G. (2016). Stratigraphic Nomenclature and Classification. Society for Sedimentary Geology.</li> <li>5. Sengupta, S. (Ed.) (2014). Stratigraphy and Sedimentation of Indian Subcontinent. Springer</li> </ol> <p><b>Paleontology:</b></p> <ol style="list-style-type: none"> <li>1. Shukla, A. D., &amp; Rajamani, V. (2011). Geological Evolution and Stratigraphy of India. Springer.</li> <li>2. Jain, V., &amp; Ghosh, S. (2009). Paleontology and Evolution of India. Indian National Science Academy.</li> <li>3. Jha, B. K. (2004). Stratigraphy and Sedimentology of the Gondwana Supergroup of India. Geological Society of India.</li> <li>4. Ghosh, S. K., &amp; Ranjan, P. (1996). Fossils and Paleontological Studies of India. Geological Society of India.</li> <li>5. Chandra, S., &amp; Bhat, M. A. (1990). Palaeontology and Fossil Record of India. Eastern Book Company.</li> </ol>	
<p><b>Learning outcomes</b></p>	<p>Upon completion of the course the student will become aware of the importance of geological studies and its applicability to various engineering problems. The student will be educated on geological site investigations for engineering structures and will provide skills in geological mapping and making geotechnical measurements.</p>	

	<b>MODERN EDUCATION SOCIETY'S</b> <b>Nowrosjee Wadia College, Pune</b> <b>(Autonomous)</b>	<b>Academic Year</b> <b>2025-2026</b>
	<b>Bachelor of Science (Hons.) with research in</b> <b>GEOLOGY</b>	
<b>Geology Minor Mandatory</b>		
<b>Year 2025</b>	<b>GLMN 358 Practicals related to Stratigraphy and Palaeontology</b>	<b>Credits 2</b>
<b>Semester- V</b>		<b>Hours 30</b>
<p><b>Course specific outcomes:</b>          Acquire skills to identify and describe hand specimens from major Phanerozoic lithological units of India. Develop proficiency in interpreting geological and paleogeographical maps of India's Phanerozoic periods. Understand the geographic distribution and characteristics of Phanerozoic geological formations. Analyze Gondwana flora to interpret paleoclimate and evolutionary trends. Integrate practical knowledge for reconstructing India's Phanerozoic geological history.</p>		
<b>Sr. No.</b>	<b>COURSE CONTENT / SYLLABUS</b>	<b>No. of Lectures</b>
1.	Study of typical hand specimens of rocks from different lithological units of Phanerozoics of India: Gondwana Supergroup, Jurassics of Kachchh and Rajasthan, Cretaceous of Narmada Valley/Bagh beds, Cretaceous of Tamil Nadu and Meghalaya, Deccan Volcanic province, Cenozoic formations.	3
2.	Study of paleogeographical maps of different periods of Phanerozoics of India.	1
3.	Geographic distribution of various geological formations of Phanerozoics of India.	1
4.	Interpretation of geological map of India.	1
5.	Study of Gondwana flora.	1
	<b>Practical related to Paleontology</b> Study of Invertebrate fossils (Phylum Mollusca).	
6.	Class Bivalvia	1
7.	Class Gastropoda	1
8.	Class Cephalopoda (Nautilus, Ammonoites, Belemnites).	2
9.	Phylum Brachiopoda.	1
10.	Phylum Arthropoda	1
		<b>Total = 15</b>

<b>References</b>	<p><b>Stratigraphy:</b></p> <ol style="list-style-type: none"> <li>1. Miall, A. D. (2018). The Geology of Stratigraphic Sequences. Springer.</li> <li>2. Hedberg, H. D. (2019). Stratigraphic Methods: Basic Principles and Concepts. Springer.</li> <li>3. Vail, P. R., &amp; Todd, R. G. (2016). Stratigraphic Nomenclature and Classification. Society for Sedimentary Geology.</li> <li>4. Sengupta, S. (Ed.) (2014). Stratigraphy and Sedimentation of Indian Subcontinent. Springer.</li> </ol> <p><b>Paleontology:</b></p> <ol style="list-style-type: none"> <li>1. Shukla, A. D., &amp; Rajamani, V. (2011). Geological Evolution and Stratigraphy of India. Springer.</li> <li>2. Jain, V., &amp; Ghosh, S. (2009). Paleontology and Evolution of India. Indian National Science Academy.</li> <li>3. Ghosh, S. K., &amp; Ranjan, P. (1996). Fossils and Paleontological Studies of India. Geological Society of India.</li> <li>4. Chandra, S., &amp; Bhat, M. A. (1990). Palaeontology and Fossil Record of India. Eastern Book Company.</li> </ol>
<b>Learning outcomes</b>	<p>Through this practical syllabus, students will gain hands-on experience in identifying rock specimens from key Phanerozoic formations of India and interpreting geological and paleogeographical maps. They will learn to analyze the distribution and structural features of geological formations and study Gondwana flora to infer paleoclimate and evolutionary patterns. These activities will enhance their practical skills in geological mapping, fossil identification, and understanding India's Phanerozoic geological history.</p>

	<b>MODERN EDUCATION SOCIETY'S Nowrosjee Wadia College, Pune (Autonomous)</b>	<b>Academic Year 2025-2026</b>
	<b>Bachelor of Science (Hons.) with research in GEOLOGY</b>	
<b>Geology Major Subject</b>		
<b>Year 2025</b>	<b>GL VSC 358 – Practicals related to Climate Change and Engineering Geology</b>	<b>Credits 2</b>
<b>Semester- V</b>		<b>Hours 30</b>
<p><b>Course specific outcomes:</b> After completing the course, students will be able to: Explain the fundamentals of climate change science and present the international climate change legal and policy framework. The students will also become aware of the importance of geological studies and its applicability to various engineering problems. The student will be educated on geological site investigations for engineering structures and will provide skills in geological mapping and making geotechnical measurements.</p>		
<b>Sr. No.</b>	<b>COURSE CONTENT / SYLLABUS</b>	<b>No. of Lectures</b>
1	Preparation and interpretation of Isotherm on the World map.	1
2	Preparation and interpretation of Isobar on the World map.	1
3	Distribution of major wind patterns on World map.	1
4	Preparation of paleogeographic maps (distribution of land and sea) of India during specific geological time intervals.	1
5	To show ocean currents on the world map.	1
6	To show the condition of El Nino and La Nina by explaining changes in wind patterns and ocean surface temperature.	1
7	Study of physical and engineering properties of Building stones.	2
8	Study of physical and engineering properties of Aggregates.	2
9	Preparation of section along mentioned directions and interpretation for construction of dam, tunnel and bridges.	5
<b>References</b>	1.Chenna Keshvallu (2018) Textbook of Engineering Geology, Laxmi Publications. 2.Dow, Kirstin (2011) The Atlas of Climate Change, 3.Tony Waltham (2009) Foundations of Engineering Geology, Taylor and Francis. 4.David Downie (2009) Climate Change: A Reference Handbook,	

	<p>Bloomsbury Publishing USA.</p> <p>5. Ruddiman, W. F. (2008) Earth's Climate, Past and Future, W H Freeman &amp; Co.</p> <p>6. Gokhale, K.V.G. (2006) Principles of engineering geology, BS publications.</p>
<b>Learning outcomes</b>	<p>The students will be able to know the impacts of climate change on the natural environment and recognize how systems work by seeing the relationships between climate and other forms of environmental change. They will also anticipate the technical problems related to the geology of various engineering sites and suggest possible remedial measures.</p>