

**Centre for Geography and Geology
Central University of Punjab**

Syllabus for Ph.D. Course work Geology										
Course Code	Course Title	Credit Hours				% Weightage				E
		L	T	P	Cr	A	B	C	D	
Semester – I										
Core courses										
EGS. 701	Research Methodology, Computer application and Basic Statistics	4	1	-	4	25	25	25	25	100
Elective courses: Select any two of the specialized courses listed below										
EGS. 702	Stratigraphy and Paleontology	4	1	-	4	25	25	25	25	100
EGS.703	Geochemistry and Isotope Geology	4	1	-	4	25	25	25	25	100
EGS. 704	Remote Sensing and GIS	4	1	-	4	25	25	25	25	100
EGS. 705	Igneous and Metamorphic petrology	4	1	-	4	25	25	25	25	100
EGS. 706	Geomorphology and Quaternary Geology	4	1	-	4	25	25	25	25	100
EGS. 707	Hydrogeology and Environmental Geology	4	1	-	4	25	25	25	25	100
EGS. 708	Structural and Engineering Geology	4	1	-	4	25	25	25	25	100
EGS. 709	Sedimentology and Sequence stratigraphy	4	1	-	4	25	25	25	25	100
Semester – II onwards										
EGS	Ph.D. Research work									

<p>Continuous Assessment:</p> <p>A: Based on objective type tests</p> <p>B:Mid-Term Test-1: Based on objective and subjective type test</p>	<p>C: Mid-Term Test-2: Based on objective and subjective type test</p> <p>D: End-Term Exam (Final): Based on objective type tests</p> <p>E: Total Marks</p>
<p>L: Lectures T: Tutorial P: Practical Cr: Credits</p>	

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Semester – I

Core courses:

Course title: Research Methodology, Computer application and Basic Statistics	L	T	P	Cr	Marks
Course code: EGS. 701	4	1		4	100

Unit-I: Concept and definition of Research; Academic research, basic and fundamental research, applied research, theoretical, conventional and experimental research. Concepts and needs of research hypothesis. Objective processes and steps in research methodology; Research proposal and concepts. Developing research proposal in the field of Geosciences. Research approach and identifying gap areas from literature review; problem formulation and statement of research objectives; Developing of bibliography. Concepts on plagiarism, ISSN and ISBN numbers, impact factors and citation index of research articles and assessing the quality of research articles.

Unit-II: Pre-field preparations: preparation of maps, survey of the study area through satellite imageries, google earth, etc. Field mapping and documentation. Procedure of sampling-grab sampling, random sampling, stratified random sampling, stratified profile sampling, lateral sampling, sampling documentation. Introduction to field mapping and section measurement. Introduction on laboratory techniques of sample analysis and their limitations.

Unit-III: Parts of computers, Hardware, BIOS, Operating systems, Binary system, Logic gates and Boolean algebra; Application software: Spreadsheet applications, word processing applications, Microsoft excel, Presentation applications, Internet browsers, Reference Management, and Image processing applications; studies of the application of software such as Map-info, Arc GIS, Rock wares, Erdas, Sigma plot, Corel Draw etc.

Unit-IV: Experimental design and analysis: Sampling techniques, Sampling theory, Steps in sampling, Collection of data-types and methods. Diagrammatic representation of frequency distribution: histogram, frequency polygon, frequency curve, ogives, stem and leaf plot, pie chart. Measures of central tendency, dispersion (including box and whisker plot), skewness and kurtosis. Data on two attributes, independence and association of attributes in 2x2 tables.

Suggested reading:

1. Qualitative Research Methods for Social Sciences by Bruce, L. B. 2001, Allyn and Bacon, Boston.
2. Computer Applications in the Social Sciences by Edward, E.B., 1990, Temple University Press, Philadelphia.
3. Survey Methodology by Robert, M. B, et al., 2009, Wiley, New Jersey.
4. Research Design: Qualitative, Quantitative and Mixed Methods Approaches by John, W. C., 2011, Sage Publications, Thousand Oaks.
5. Principles of Writing Research Papers by Lester, James, D. and Lester Jr. J. D., 2007, Longman, New York.
6. Social Research Methods: A Reader by Seale C., 2004, Routledge, London.

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7. An Introduction to Operating Systems: Concepts and Practice by Bhatt, Pramod Chandra P., 2nd edition, 2008, PHI Learning Pvt. Ltd., New Delhi.
8. Elementary Statistics for Geographers by Burt J.E. Barber. G.E. Rigby D. L., 2009, Guilford Press, New York.
9. Fundamentals of MS Office 2007 by Douglas, Gretchen and Mark Connell, 2nd edition, 2007, Kendall Hunt Publication Company, Dubuque.
10. MS Word for Dummies by Gookin, D. 2007, Wiley.
11. MS Excel for Dummies by Harvey, G. 2007, Wiley.

Further reading

1. DOS: The Pocket Reference by Jamsa, Kris A., 1993, Berkeley: Osborne McGraw-Hill.
2. DOS: The Easy Way: Complete Guide to Microsoft's MS DOS by Murdock, Everett E., 1993, HOT Press, Easy Way Downloadable Books.
3. Database Management System by Narang R., 2006, PHI Learning Pvt. Ltd., New Delhi.
4. Fundamentals of Computers by Raja Raman V., 2003, PHI Learning Pvt. Ltd., New Delhi.
5. Analyzing talk and text. In N. Denzin and Y. Lincoln, eds. Handbook of Qualitative Research by Silverman D., 2000, Sage Publications, Thousand Oaks, CA.
 1. 1993, Longman U.K.

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Elective courses: Select any two of the specialized courses listed below:

Course title: Paleontology and Stratigraphy	L	T	P	Cr	Marks
Course code: EGS.702	4	1	-	4	100

Unit-I: Basic principle, species concepts, speciation, mechanism of evolution and diversification, adaptation and functional morphology, taphonomic consideration. Types and classification of microfossils and their applications.

Invertebrates, vertebrates and plant fossils of India. Cenozoic biostratigraphy and palaeoecology.

Unit-II: Field and laboratory techniques in palaeontology: sampling and processing techniques, preparation of samples for SEM, EDX, petrological studies, etc.

Introduction to applied paleontology: Use of palaeontological data in Stratigraphy, Palaeoecology, Evolution, palaeoclimate and sea level changes, climate, exploration, tectonics and Palaeobiogeography.

Unit-III: Recent advances in stratigraphy, Principles of stratigraphy, stratigraphic sequences and depositional framework. Stratigraphy in relationship with other branches of geology.

Need for stratigraphic correlation, Different correlation techniques and related methodologies, relationship with evolutionary history of life, statistical analysis.

Unit-IV: Geology and stratigraphy of some important sections of Archaeans-Precambrian, Palaeozoic, Gondwana, Mesozoic and Cenozoic deposits of India, their significances and major stratigraphic boundaries.

Suggested reading:

1. Geology of India, Geological Society of India, Bangalore, by Ramakrishnan M. and Vaidyanathan R., 2008, Vol. 1 & 2, ISBN No: 978-81-85867-98-4.
2. Principles of Stratigraphy by Danbar, C.O. and Rodgers, J., 1957, John Wiley & Sons.
3. Precambrian Geology of India by Naqvi, S.M. and Rogers, J.J.W., 1987, Oxford University Press.
4. Vertebrate Palaeontology, by Michael Benton, 3rd edition, 2004, Wiley-Blackwell, ISBN: 9780632056378.
5. Microfossils, by Howard A. Armstrong, Martin D. Brasier, 2nd edition, Blackwell Publishing Ltd., ISBN: 9780632052790.
6. Principles of Invertebrate Paleontology by N. Shrock, 2nd edition, 2005, CBS Publisher; ISBN-13: 978-8123912189

Further reading:

1. Geology of India and Burma by Krishnan, M.S., 1982, C.B.S. Publishers & Distributors, Delhi.
2. A Manual of the Geology of India & Burma by Pascoe, E.H.1968. (Vols.I-IV) Govt. of India Press,

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3. Fundamentals of historical geology and stratigraphy of India by Ravindra Kumar, 1998. NEW AGE, ISBN-13: 978-0852267455.
4. Stratigraphy: Principles and Methods by Schoch, Robert M., 1989, Van Nostrand Reinhold, New York.
5. Introduction to Stratigraphy and Paleontology, in Indian Ocean Geology and Biostratigraphy (eds. J.R. Heirtzler, H.M. Bolli, T.A. Davies, J.B. Saunders and J.G. Sclater) by Bolli, H. M. and Saunders, J. B. 1977, American Geophysical Union, Washington, D. C.
6. Unlocking the Stratigraphic Record by Doyle, P. & Bennett. M.R. 1996, John Willey.
7. Bringing Fossils to Life: An Introduction to Paleobiology, by Donald R. Prothero, 2nd edition, 2003, McGraw-Hill Higher Education; ISBN-10:0073661708
8. Paleontology Invertebrate by Henry Wood 2004, 8th Edition, CBS Publication ISBN: 9788123-910802.

Course title: Geochemistry and isotope Geology	L	T	P	Cr	Marks
Course code: EGS.703	4	1	-	4	100

Unit I: Recent trend in pure and applied geochemistry, geochemical data and their controls, analysis and analytical methods for the procurement of geochemical data. Sample preparation techniques, correlation, regression, principle component analysis.

Unit II: Use of major, traces, REE, PGEs, element data in rock classification and their significance in environment, provenance, climatic and tectonic settings

Unit III: Principle of isotope geology. Principles, methods and applications Carbon, Oxygen, Sulphur isotopes and its use in geosciences. Fractionation of stable isotopes in hydrologic cycle; Processes involve in stable isotopic studies in laboratory and data analysis.

Unit IV: Radiogenic isotopes and their application in geochronology and geochemistry. Principles, methods, applications and limitations of K-Ar, Ar-Ar, Rb-Sr, Sm-Nd, U-Th-Pb methods, etc. Radionuclide as tracer for geochemical process. Application of ¹⁰Be and ²⁶Al to understand earth surface processes.

Suggested reading:

2. Principles and applications of Geochemistry by Gunter Faure, 2nd edition, 1998, Prentice Hall.
3. Essentials of Geochemistry by John V. Walther, 2010, Jones and Bartlett Publication.
4. Geochemistry: Pathways and Processes by McSween, H.Y. Jr., Richardson, S.M. and Uhle M.E. 2003, Columbia Univ. Press.
5. Geochemistry, An introduction by Francis Albarede, 2003, Cambridge Univ. Press.
6. Jochen Hoefs, 2015. Stable isotope Geochemistry. Springer.
7. Claude Allegre, 2008. Isotope Geology. Cambridge University Press.

Further reading:

8. Radiogenic Isotope Geology by Dickin A.P. 2005, Cambridge University Press.

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9. Introduction to Geochemistry by Mason, B. and Moore, C.B. 1991, Wiley Eastern.
10. Introduction to Geochemistry by Krauskopf K.B., 1967, McGraw Hill.
11. Geochemistry by William M. White, 1st Edition, 2013, Wiley-Blackwell.
12. Introduction to Geochemistry by Mason, B. and Moore C.B., 1991, Wiley Eastern.
13. Using geochemical data: Evaluation, Presentation, Interpretation by Rollinson H.R.,

Course title: Remote Sensing and GIS	L	T	P	Cr	Marks
Course Code: EGS.704	4	1		4	100

Unit-I: Concept of Remote Sensing and GPS: Fundamentals of Remote Sensing, Sensors; Active and passive remote sensing; Types of platform; Types of orbits (Geostationary, Polar, Sun-synchronous); Scanning Systems (Pushbroom and Whiskbroom); Types of Sensors; Data collection, Aerial Photography, Visual Image Interpretation, Digital image processing. Introduction to Global Positioning System (GPS); Satellite remote sensing; Types of Satellites.

Unit-II: Concepts of GIS: Elements of GIS; Map Projection; Data structures in GIS: Raster and Vector data; GIS softwares; Hierarchical, Network and relational data; Geo-relational and object oriented vector data structure; Vector and Raster based analysis; Overlays operations; Map algebra; Network Analysis; Spatial analysis

Unit-III: Applications of Remote Sensing and GIS in Geology – 1 : Thermal Infra-red remote sensing in geological studies; microwave remote sensing for geological applications; Applications of remote sensing - identification of rocks, geological surveys; volcanic eruptions, environmental geology; geobotany; event mapping and monitoring; geo-hazard mapping.

Unit-IV: Applications of Remote Sensing and GIS in Geology – 2 : Applications of remote sensing- lithological mapping; mineral explorations, alteration zones mapping; surficial deposit/bedrock mapping; structural mapping; sand and gravel (aggregate) exploration/exploitation; hydrocarbon exploration; sedimentation mapping and monitoring.

Suggested reading:

1. Remote sensing and image interpretation by Lillisand, T. M. and Keifer, R. W. 2007, John Willey and Sons, USA
2. Introduction to environmental remote sensing by Barrett, E. C. and Curtis, L. F. 1999, Chapman and Hall Publishers, USA.
3. Fundamentals of remote sensing by Joseph G. 2003, Universities Press, Hyderabad.
4. Introduction to geographic information systems by Chang, Kang-Taung 2002, Tata McGraw-Hill, USA.
5. Methods of Environmental Impact Assessment by Morris, P. and Therivel, R. 2001, Spoon Press.
6. Remote Sensing: Principles and Interpretation by Sabbins Jr, F.F. 1986, WH Freeman & Co, New York.
7. Remote Sensing Geology by Gupta, R.P., 1990, Springer Verlag.

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Further reading:

8. Trends in Geological Remote Sensing by Ramasay, S.M. 1996, Rawat Publishers, Jaipur.
9. Environmental impact assessment: Practical solutions to recurrent problems by Lawrence, D.P. 2003, John Wiley and Sons, New Delhi.
10. Introduction to Remote Sensing of the Environment by Richason, B. F., Jr. ed. 1978, Kendall/Hunt Publishing Company. Dubuque, Iowa.
11. Aerial photography and Image Interpretation for Resource Management by Paine, D.P., 1981, John Wiley.
12. Principles and Applications of Photogeology by Pandey, S.N., 1987, Wiley Eastern, New Delhi.

Course title: Igneous and Metamorphic petrology	L	T	P	Cr	Marks
Course code: EGS.705	4	1	-	4	100

Unit -I: Recent trend in pure and applied petrology including the recent development in recent methodology and instrumentation. Magmatic processes: concepts and models; classification of igneous rocks using multiple criteria; textures and structures in igneous rocks and their origin.

Unit-II: Petro genesis of crustal igneous rocks; petrography, chemistry of acid, basic and ultra-basic igneous rocks. Igneous rocks in different tectonic setting, origin of structures and textures in igneous rocks.

Unit-III: Metamorphic textures and structures, classical and advanced techniques for textural analysis, nucleation and growth of materials in magmatic and metamorphic systems; replacement textures and reaction rims and their roles in reconstructing P-T histories of metamorphism; tectonites, foliation, lineation; deformation Vs metamorphic growth, analysis of polydeformed and polymetamorphic rocks; equilibrium of mineral assemblages and metamorphic phase rules and phase diagrams.

Unit-IV: Metamorphic reactions and thermodynamics of metamorphic reactions. Geothermometry and geobarometry. Calculating P-T-t path from zoned crystals. Review of experimental works in metamorphic mineral stabilities and recrystallization. Problems of regional metamorphism illustrated by Precambrian terrain and more recent orogenic belts.

Suggested reading:

1. An introduction to Igneous and Metamorphic Petrology by Winter J.D., 2001, Prentice Hall.
2. Igneous Petrology by Bose, M.K., 1997, World Press, Kolkata.
3. Igneous and Metamorphic Petrology by Best Myron G., 2002, Blackwell Science.
4. The Interpretation of Igneous Rocks by Cox, K.G., Bell, J.D. and Pankhurst, R.J., 1993, Chapman & Hall, London.
5. Petrogenesis of Metamorphic Rocks by Bucher K. and Martin F., 7th revised edition 2002, Springer – Verlag.

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6. Mineralogical Phase Equilibria and pressure – temperature – time Paths by Spear, F. S. 1993, Mineralogical Society of America.

Further reading:

7. Igneous Petrology by Hall A., 1997, Longman.
8. Igneous Rocks: A Classification and Glossary of Terms by Le Maitre R.W., 2002, Cambridge University Press.
9. Igneous Petrology by McBirney, 1994, CBS Publishers, Delhi.
10. Principles of Igneous and Metamorphic Petrology by Phillpotts, A.R. 1994, Prentice Hall, India.
11. Modern Igneous Petrology by Sood M.K., 1982, Wiley-Interscience Publ., New York.
12. Principles of Igneous and Metamorphic Petrology by Philpotts A.R. 1994, Prentice Hall.
13. An introduction to Metamorphic Petrology by Yardley, B.W.D. 1989, Longman Scientific & Technical, New York.
14. Equilibrium thermodynamics in Petrology: An Introduction by Powell, R. 1978, Harper & Row Publishers, London.

Course title: Geomorphology and Quaternary Geology	L	T	P	Cr	Marks
Course Code: EGS.706	4	1	-	4	100

Unit-I: Geomorphology- principles, scope and aspects of research, certain field and laboratory techniques, advance mapping techniques of geomorphic features. Evolution of landforms and their climatic, structural and tectonic controls. Understanding of computer software involve in geomorphological studies.

Unit-II: Detail geomorphic features of fluvial, glacial, Aeolian and coastal deposition system and their response to climate and tectonics. Study of the physiography of India.

Unit-III: Quaternary climate, sedimentation, tectonics and stratigraphy. Quaternary geology of northwestern India, knowledge gaps and future prospects. Various techniques used in studying the quaternary records. Evolutions of major river system of India and their tectonic implications. Major issues on quaternary geology and sustainable development.

Unit-IV: Tectonic set up of India. Use of GPS and satellite image for tectonic study. Seismic wave, paleoseismology, active fault, fault nucleation and propagation, earthquake-fault relationship in tectonic domains, extensional and compressional tectonic environment, and liquefaction induced palaeoseismic features and age determination of such features.

Suggested reading:

1. Indian Geomorphology by Sharma, H.S. 1991, Concept Publishing Co. New Delhi. ISBN: 817022344X.
2. Applied Geomorphology: Theory and Practice by Allison R. J. 1st edition, 2002, Wiley.
3. Tectonic Geomorphology by Douglas, W. B and Anderson, R. S., 2nd edition, 2011, Wiley-Blackwell, ISBN-13: 978-1444338867.

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4. Geomorphology: The Mechanics and Chemistry of Landscapes by Anderson, R.S. and Anderson S. P., 1st edition, 2010, Cambridge University Press, ISBN-13: 978-0521519786.
5. Key Concepts in Geomorphology by Paul R. B. and David R. M., 2013, W. H. Freeman, ISBN-13: 978-1429238601
6. Geomorphology and Global Tectonics by Michael A.S. 2000, Wiley, ISBN: 978-0471-971931.

Further reading

1. Introduction to geomorphology by Kale V. S., & Gupta, A. 2001, Orient Longman, Bangalore.
2. Physical geography by Singh S., 2011, Prayag Pustak Bhavan, Allahabad.
3. An introduction to physical geography by Strahler A.N. & Strahler, 1996, John Wiley & Sons.

Title of Course: Hydrogeology and Environmental Geology	L	T	P	Cr	Marks
Course code: EGS.707	4	1	-	4	100

Unit-I: System, concepts of hydraulic cycle; concepts and scopes of unit hydrograph and its applications, discharge rate. Factors that affect occurrence of groundwater – Climate, topography, geology; Exploration techniques - Integrated approach to groundwater prospecting: Role of topo sheets and Remote sensing in groundwater exploration; Hydro chemical methods: surface and subsurface Geophysical methods, Tracer techniques, Exploratory Bore well programme, use of computer software in exploration of groundwater.

Unit-II: Different processes and techniques of prospecting ground water; Modern methods of characterization and assessment techniques of groundwater qualities, modeling, groundwater management, etc.; Case study on the problem of groundwater pollution in India. Hydrological prospects in different rock terrains for groundwater exploration. Controls of groundwater, ground water provinces of India.

Unit III: Palaeohydrology, estimation of palaeo-flood discharge, erosion and sediment yields, sediment yield process and modeling.

Environmental Health – Base-line data generation; Sampling-Sampling procedures-Errors in sampling, Air, Water, Soil and Noise sampling-Instrumentation-Analysis.

Units IV: Geological hazards such as earthquake, landslide, their cause, mitigations, landuse planning development; Use of remote sensing and GIS in environment studies.

Environmental Impact Assessment (EIA), Environmental Management Plans (EMP)-REA & SEA; Environmental Legislation-National / International Standards Application of Remote Sensing and GIS in Environmental Management.

Suggested readings:

1. Ground Water Hydrology by Todd D.K., 1988, John Wiley & Sons, New York.
2. Hydrogeology by Davies, S.N. and De-West, R.J.N. 1966, John Wiley & Sons, NY.
3. Ground Water by Raghunath H.M. 1983, Wiley Eastern Ltd., Calcutta.
4. Environmental Geology by Lundgren, L. 1986, Prentice Hall Pvt. Ltd., New Delhi.

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5. Geological Hazards by Bell F.G. 1999, Routledge, London.
6. Environmental Geology by Bernett M.R., & Doyle P., 1999, John Wiley & Sons, NY.
7. Environmental Geology by Keller, E.A., 1978, Bell and Howell, USA.

Further reading:

8. Ground Water and Wells by Driscoll F.G. 1988, UOP, Johnson Div. St. Paul. Min. USA.
9. Natural Hazards by Bryant E., 1985, Cambridge University Press. London.
10. Introduction to Environmental Toxicology by Landis W.G. and Yu M.H, 1999, Lewis Publ., London.
11. Environmental Assessment source Book (1991) Volume I, II & III Environment Department, The World Bank, Washington DC.

Title of Course: Structural Geology and Engineering Geology	L	T	P	Cr	Marks
Course code: EGS-708	4	1	-	4	100

Unit-I: Modern techniques of structural geology. Structural mapping of deformed terrains, small scale structures and their relationship with the large structures; Use of stereographic projection and their kinematic analysis; use of stereographic projection related structural softwares; strain calculation of fold, fault, joints, fracture, foliation, lineation and other deformed bodies, stress trajectory and calculation of deformation paths.

Unit-II: Morphological characteristics of folds and faults in all scales and their kinematics interpretation. Overview of thrust-tectonics; shear zone geometry; microstructural studies of deformation correlation. Relationship between the internal stress and external stress and resultant strain features in rocks including mathematical analysis and analog computer studies.

Unit III: Engineering geology in planning and development; soils and rocks properties for engineer proposed; engineering classification of soils; stress, strain and constitutive process, shear strength of soil; rock strength, properties and their measurement; basic concepts of rock mechanics.

Unit IV: Importance of geology in engineering projects; site investigation for various engineering projects such as dam, highways, bridges, tunnels, etc.; Rock mass failures their types and techniques for studying rock mass failures. Geological materials for construction purposes. Case study of major engineering projects of India.

Suggested reading:

1. Basic Methods of Structural Geology by Stephen Marshak & Gautam Mitra, 1988, Prentice Hal.
2. Structural analysis of Metamorphic Tectonites by Turner, F.J. & Weiss, L.E. 1963, McGraw Hill.
3. Structural Geology: Fundamental and Modern Developments by Ghosh, S. K., 1993, Pergamon Press.

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4. Fundamentals of Engineering Geology by Bell, F.G., 1992, Aditya Books Pvt. Ltd. Indian Edition.
5. Principles of Engineering Geology by Krynine, D.H. & Judd, W.R., 1998, CBS Edition.
6. Geology in Engineering by Schultz, J.R. & Cleaves, A.B. 1951, John Willey & Sons, NY.

Further reading:

7. Surveying (Plane and Geodetic) by Roy Chowdhary K.P. 1987, Oxford & IBH Pub. Co., New Delhi.
8. Folding and fracturing of rocks by Ramsay J.G. 1967, McGraw Hill.
9. Text Book of Surveying, vol-I. by Shahani, P.B., 1978, Oxford & IBH Pub. Co., New Delhi.
10. Techniques of Modern Structural Geology. Vol. I. Strain Analysis by Ramsay, J.G. and Huber, M.I. 1983, Academic Press.
11. Techniques of Modern Structural Geology. Vol. II. Folds and Fractures by Ramsay, J.G. and Huber, M.I. 1987, Academic Press.

Title of Course: Sedimentology and Sequence Stratigraphy	L	T	P	Cr	Marks
Course code: EGS.709	4	1	-	4	100

Unit-I: Modern techniques and methods in sedimentological studies; sedimentary structures, textures and their significances; probability scale, anatomy of probability scale, software used for log probability plots; hydrodynamic conditions of depositions of sedimentary agents such as fluvial, Aeolian, glacial, oceanic agents, etc.

Unit-II: Classification and petrography of important clastic and non-clastic rocks. Palaeocurrent analysis. Heavy minerals for correlation and provenance determination, diagenetic process; facies and facies map; Geochemical plots in sedimentary rocks, their limitations.

Unit-III: Understanding basin forming processes and basin architecture. Stratigraphic signature of a basin: sea level change, basin-floor wobbling, sedimentation rate and climate. Depositional facies, seismic facies seismic expression & configuration and log-based sequence, correlation sequence,

Unit-IV: Stratigraphic principles and facies tracts carbonate sequence stratigraphy and drowning unconformity. Application of sequence stratigraphy to basin evolution and other allied science.

Suggested readings:

1. Principles of sedimentology & stratigraphy by Sam Boggs Jr., 5th edition, 2011, Prentice Hall, ISBN-13: 978-0321643186.
2. Sedimentology and stratigraphy by Gary Nichols, 2nd edition, 2009, Wiley-Blackwell, ISBN: 978-1-4051-3592-4.
3. Sedimentary Basins by Einsele G., 1992, Springer Verlag.
4. Principle of sequence stratigraphy by Catunaenu O., 1st edition, 2006.. Elsevier.
5. Carbonate Sedimentology by Tucker M.E. and Wright V.P., 1991, Publisher Wiley, ISBN 0632014725, 9780632014729.

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6. Atlas of sedimentary rocks under the Microscope by Adams A. E., MacKenzie W. S., Guilford C., 1st edition, 1984, Prentice Hall, ISBN-13: 978-0582301184.

Further reading:

7. Sedimentary Geology by Donald R. Prothero, Fred Schwab, 3rd edition, 2013, W. H. Freeman, ISBN-13: 978-1429231558.
8. Sedimentary Rocks in the Field: A Practical Guide (Geological Field Guide) by Maurice E. Tucker, 4th edition, 2011, Wiley-Blackwell, ISBN-13: 978-0470689165.
9. Principles of Sedimentary Basin Analysis by Miall A.D., 2000, Springer-Verlag.
10. Depositional Sedimentary Environments by Reineck H.E. and Singh I.B., 1980, Springer-Verlag.
11. Introduction to Sedimentology by Sengupta S., 1997, Oxford-IBH.