

**ANNEXURE - I**  
**SYLLABUS FOR AUTONOMOUS COURSES IN GEOGRAPHY**  
**BACHELOR OF SCIENCE**  
**SEMESTER IV**

**CORE COMPULSORY**

**Paper Title: Fundamentals of Geomorphology (Theory)**

**Paper Code: GEG-IV. SC-6**

**Name of Faculty: Anagha Bicholcar**

**Marks: 75**

**Credits: 3**

**Duration: 45 lectures of 1 hour each**

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**Course Objectives:** The Course provides the fundamentals of geomorphology. It also focuses on application of geomorphological knowledge to resolve the challenging issues of man environment relationships.

**Learning Outcomes:** At the end of this course, students will be familiar with fundamentals of geomorphology and learn the techniques of application of geomorphological knowledge to solve the challenging issues of man environmental relationships.

<b>Unit</b>	<b>Title</b>	<b>Lectures</b>
I.	Interior of the Earth: Composition and Structure Endogenetic Processes : folds, faults, rift valleys, plate tectonics. Earthquakes, Volcanoes.	18
II.	Exogenetic processes: Weathering and erosion, cycle of erosion Slope development theory. Mass Movements: Concept and Types. Aeolian landscapes: Erosional & Depositional. Glacial Landscapes: Erosional and Depositions	10
III.	Application of Geomorphology: <ul style="list-style-type: none"><li>• Regional planning</li><li>• Urban planning and transportation</li><li>• Mining</li><li>• Hazard management</li><li>• Agriculture</li><li>• Environmental management</li></ul>	17
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**BACHELOR OF SCIENCE**  
**SEMESTER IV**

**References:**

1. Ahmed, E., 2005 : Geomorphology , Kalyan Publishers, New Delhi
2. Bloom, Arthur L., 2004: Geomorphology – A systematic Analysis of Late Cenozoic Landforms, Prentice Hall, Engle Wood Cliff, N.J
3. Chorley, Richard J., 2002: Spatial Analysis in Geomorphology, Harper and Row Publishers, New York, London.
4. Cooke R. U. and Doornkamp J.C. (1989): Geomorphology in Environmental Management, 2nd Edition, Oxford : Clarendon Press
5. Dayal, P. (2nd edition) 2006 A Textbook of Geomorphology, Shukla Book Depot, Patna
6. Sharma, H.S. (ed), 2002: Perspective in Geomorphology, Vol. I & Vol. IV, Concept, New Delhi.
7. Sharma, V.K., 2006 : Geomorphology, Earth Surface Processes and Forms, Tata Mc. Graw Hill, New Delhi
8. Sharma, V.K., 2006 : Geomorphology, Earth Surface, Process and forms, Tata McGraw Hill, New York
9. Singh, S: Physical Geography, Pustak BHawan, Allahabad, 2005
10. Sparks, B.W., 2000: Geomorphology, Longman, London, 2<sup>nd</sup> edition.
11. Strahler, A.N. : Physical Geography, 3<sup>rd</sup> Ed., Wiley, 2006
12. Thornbury W.D, 2001: Principles of Geomorphology , 2<sup>nd</sup> Ed., Wiley International edition, Wiley Eastern Reprint, 2001
13. Wooldridge, S.W. and Morgan, R.S., 2000: The Physical Basis of Geography, Longman.
14. Worcestor, P.G., 2005: A textbook of Geomorphology, Van Nostrand, 2<sup>nd</sup> Ed., East west Edition, New Delhi

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**BACHELOR OF SCIENCE**  
**SEMESTER IV**

**CORE COMPULSORY**

**Paper Title: Fundamentals of Geomorphology (Practical)**

**Paper Code: GEG-IV. SC-6**

**Name of Faculty: Anagha Bicholcar**

**Marks: 25**

**Credits: 1**

**Duration: 15 sessions of 2 hour each**

**Course Objectives:** The Course provides the skills in rock identification and their uses. strategies to the challenging issues of man environment relationships.

**Learning Outcomes:** At the end of this course, students will be familiar with the skills of identification and application of geomorphology and the techniques of application of geomorphological knowledge to solve the challenging issues of man environmental relationships.

Unit	Title	Practical sessions
I.	Identification of rocks, their properties and uses Soil profile, Soil testing and analysis and their application in crop cultivation(sample of any three soil types)	10
II.	Interpretation of geological map, identifications of faults, lineaments, dykes and sills, rock types	5
III.	Journal and viva voce	
		15

**References:**

- Ahmed, E., 2005 : Geomorphology , Kalyan Publishers, New Delhi
- Bloom, Arthur L., 2004: Geomorphology – A systematic Analysis of Late Cenozoic Landforms, Prentice Hall, Engle Wood Cliff, N.J
- Chorley, Richard J., 2002: Spatial Analysis in Geomorphology, Harper and Row Publishers, New York, London.
- Dayal, P. (2<sup>nd</sup> edition) 2006 A Textbook of Geomorphology, Shukla Book Depot, Patna
- Sharma, V.K., 2006 : Geomorphology, Earth Surface, Process and forms, Tata McGraw Hill, New York
- Singh, S: Physical Geography, Pustak BHawan, Allahabad, 2005
- Strahler, A.N. : Physical Geography, 3<sup>rd</sup> Ed., wiley, 2006
- Thornbury W.D, 2001: Principles of Geomorphology , 2<sup>nd</sup> Ed., Wiley International edition, Wiley Eastern Reprint, 2001
- Sharma, H.S. (ed), 2002: Perspective in Geomorphology, Vol. I & Vol. IV, Concept, New Delhi.
- Sharma, V.K., 2006 : Geomorphology, Earth Surface Processes and Forms, Tata Mc. Graw Hill, New Delhi
- Sparks, B.W., 2000: Geomorphology, Longman, London, 2<sup>nd</sup> edition.
- Wooldridge, S.W. and Morgan, R.S., 2000: The Physical Basis of Geography, Longman.
- Worcestor, P.G., 2005: A textbook of Geomorphology, Van Nostrand, 2<sup>nd</sup> Ed., East west Edition, New Delhi

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**SYLLABUS FOR AUTONOMOUS COURSES IN GEOGRAPHY**  
**BACHELOR OF SCIENCE**  
**SEMESTER IV**

**CORE ELECTIVE**

**Paper Title: Coastal Geomorphology (Theory)**

**Paper Code: GEG-IV.E-5**

**Name of Faculty: Mr. A. Ashish**

**Marks: 75**

**Credits: 3**

**Duration: 45 lectures of 1 hour each**

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**Course Objectives:** The basic objective of this course is to familiarize students about the mechanism of landform development resulting from coastal processes.

**Learning outcomes:** At the end of this course, students are expected to have an understanding of the various processes and associated landforms in coastal regions. Besides learn the methods of coastal hazard management

<b>Unit</b>	<b>Title</b>	<b>Lectures</b>
I	Introduction to coastal Processes Waves: Formation, Drifts and Tides. Types of coastlines, Coastal erosion and deposition. Coastal landforms.	15
II	Beach Geomorphology: Types and Configuration of beaches Coastal wetlands. Coral reefs and marine environment. Coasts of India.	15
III	Coastal Ecosystem Management. Coastal Hazard Management.	15
		45

**References**

1. Cooke R. U. and Doornkamp J.C. (1989): Geomorphology in Environmental Management, 2<sup>nd</sup> Edition, Oxford : Clarendon Press
2. Eric Bird: Coastal Geomorphology: An Introduction, John Wiley & Sons; 1 edition (November 7, 2000),
3. Gerhard Masselink , Michael Hughes :An Introduction to Coastal Processes and Geomorphology (Hodder Arnold Publication), ISBN-10: 0340764112 , ISBN-13: 978-0340764114
4. Kale, V. S. and Gupta, A. (Rep.2011): Introduction to Geomorphology, Orient Longman, Calcutta.
5. Karlekar, S. (2009): Coastal Processes and Landforms: Diamond Publications, Pune
6. Richard Davis Jr. , Duncan Fitzgerald : Beaches and Coasts, Wiley-Blackwell; 1st edition (July 15, 2004), ISBN-10: 0632043083 , ISBN-13: 978-0632043088
7. Timothy Beatley , Anna K. Schwab , David Brower (2002):An Introduction to Coastal Zone Management, Island Press; REV edition

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**SYLLABUS FOR AUTONOMOUS COURSES IN GEOGRAPHY**  
**BACHELOR OF SCIENCE**  
**SEMESTER IV**

**CORE ELECTIVE**

**Paper Title: Practicals in Coastal Geomorphology**

**Paper Code: GEG-IV. E-5**

**Name of Faculty: Mr. A. Ashish**

**Marks: 25**

**Credits: 1**

**Duration: 15 sessions of 2 hours each**

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**Course Objectives:** To develop the skills of identification and interpretation of coastal landforms and processes.

**Learning outcome:** At the end of the course students are expected to independently prepare geographic map and interpret coastal landscape. Besides they should be able to carry out beach profiling using instruments.

<b>Unit</b>	<b>Title</b>	<b>Practical sessions</b>
1	Identification of coastal features and processes on SOI toposheet.	05
2	Beach profiling & identification of major and minor coastal features on beach. Profile of various types of coast. Geomorphic mapping of Coastal Areas.	10
3	Journal and Viva	
		15

**References**

1. Bygot, J.: An Introduction to Map Work and Practical Geography, 2001
2. Campbell, J., 2004: Introductory Cartography, Printice Hall, Inc Englewood
3. Misra, R.P. and Ramesh, A., 2005: Fundamentals of Cartography, Concept Pub. Co., New Delhi
4. Monkhouse, I.J. and Wilkinson, H.R., 2001: Maps and Diagram, B.I. Publication, New Delhi
5. Raisz, E.: General Cartography, McGraw Hills Co., London ,2005
6. Robinson, A.H., et al.; Elements of Cartography, John Wiley and Sons, New York,2003
7. Singh, R.L.: Elements of Practical Geography, Kalyani Publishers, New Delhi ,2000
8. Jackson, R.H. and Hudmar, L.E.: Regional Geography: Issues for today ,2001
9. Singh, R ; Singh L.R., Mapworks in Practical Geography,Central book Depot, Allahabad,2001

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**SYLLABUS FOR AUTONOMOUS COURSES IN GEOGRAPHY**  
**BACHELOR OF SCIENCE**  
**SEMESTER IV**

**CORE ELECTIVE**

**Paper Title: Fluvial Geomorphology (Theory)**

**Paper Code: GEG-IV. E-6**

**Name of Faculty: Mr. A.Ashish**

**Marks: 75**

**Credits: 3**

**Duration: 45 lectures of 1 hour each**

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**Course Objectives:** The Rivers being a major agent of erosion, the course assumes significance as it mainly deals with fluvial forms and processes.

**Learning outcomes:** At the end of this course, students are expected to have an understanding of the fundamental concepts of river and its processes.

<b>Unit</b>	<b>Title</b>	<b>Lecture</b>
I	River basin and Drainage Network: River and Stream, Drainage basin and network characteristics, River Dynamics, Classification, Phases of development, Patterns.	15
II	Fluvial processes: Erosion, Transportation and Deposition. Fluvial cycle and Fluvial landforms.	15
III	Applied fluvial geomorphology: Environmental changes and river metamorphosis. Flood and its impact (case studies)	15
		45

**Reference Books:**

1. Chorley, R. J., Schumm, S. A. and Sugden, D. E. (1984): Geomorphology, Methuen, London.
2. Fairbridge, R. W. (1968): Encyclopedia of Geomorphology, Reinholdts, New York.
3. Kale, V. S. and Gupta, A. (Rep.2011): Introduction to Geomorphology, Orient Longman, Calcutta.
4. Luna Bergere Leopold, Markley Gordon Wolman, John P. Miller (1995): Fluvial Processes in Geomorphology. Dover Publications Inc., New York
5. R.J. Small (1989) Geomorphology and Hydrology (Longman modular geography series), Longman Publication, Harlow, Essex, England
6. Savindra Singh (Rep. 2011): Geomorphology, Prayag Pustak Bhawan, Allahabad
7. Strahler A. H and Strahler, A. N. (1992) : Modern Physical Geography, John Wiley, New York
8. Thornbury, W. D. (Rep.2011): Principles of Geomorphology, John Wiley and Sons, New York.

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**SEMESTER IV**

**CORE ELECTIVE**

**Paper Title: Practicals in Fluvial Geomorphology**

**Paper Code: GEG-IV. E-6**

**Name of Faculty: Mr. A. Ashish**

**Marks: 25**

**Credits: 1**

**Duration: 15 sessions of 2 hours each**

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**Course Objectives:** To develop the skills of river morphometry analysis, river profiling, fluvial processes.

**Learning outcome:** At the end of the course student are expected to independently prepare drainage map and interpret fluvial landscape. Besides they should be able to carry out river profiling using instruments.

<b>Unit</b>	<b>Title</b>	<b>Practical sessions</b>
1	Preparation of drainage map. Identification and Interpretation of fluvial landforms, Patterns and processes from SOI toposheet. Slope analysis.	05
2	Drainage basin morphometry: Morphometric analysis of drainage basin. Field visit : river Profiling and to observe fluvial processes	10
3	Journal and Viva	
		15

**References**

1. Bygot, J.: An Introduction to Map Work and Practical Geography, 2001
2. Campbell, J., 2004: Introductory Cartography, Printice Hall, Inc Englewood
3. Misra, R.P. and Ramesh, A., 2005: Fundamentals of Cartography, Concept Pub. Co., New Delhi
4. Monkhouse, I.J. and Wilkinson, H.R., 2001: Maps and Diagram, B.I. Publication, New Delhi
5. Raisz, E.: General Cartography, McGraw Hills Co., London ,2005
6. Robinson, A.H., et al,: Elements of Cartography, John Wiley and Sons, New York, 2003
7. Singh, R.L.: Elements of Practical Geography, Kalyani Publishers, New Delhi ,2000
9. Singh, R ; Singh L.R., Map works in Practical Geography, Central book Depot, Allahabad, 2001

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**SYLLABUS FOR AUTONOMOUS COURSES IN GEOGRAPHY**  
**BACHELOR OF SCIENCE**  
**SEMESTER IV**

**CORE ELECTIVE**

**Paper title: Watershed Management (Theory)**

**Paper Code: GEG-IV.E-7**

**Name of the Faculty: Adrian Ferro**

**Marks: 75**

**Credits: 3**

**Duration: 45 lectures of 1 hour each**

**Course Objective:** The objective of this course is to acquaint students with basic concepts and importance of Watershed Management. This course will also help students in understanding various processes that take place and that are involved in a watershed.

**Learning outcomes:** At the end of this course, students are expected to have a holistic understanding of Watershed Management. It will help them to develop a process-based understanding of how land surface characteristics will affect fluxes of mass and energy within a watershed.

UNIT NO.	COURSE CONTENT	TEACHING PERIODS
I	Introduction to Watershed Management : Definition, Principles, objectives, Need of Watershed Management, Identification of problems in Watershed Management	15
II	Characteristics of watershed : Delineation, Geomorphological Characteristics, linear aspects, aerial aspects and relief aspects, land use, runoff characteristics River discharge Sediment load	15
III	Hydrological Process in Watershed : Hydrological cycle, Water Budget, Ecological Characteristics of the river Soils in Watershed: Soil characteristics, Physical, Hydrological and Processes of Soil Erosion. Erosion due to water and wind. Watershed Conservation methods.	15
		45

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**REFERENCES:**

- Manual of water and soil conservation: Government of India, ICAR
  - Manuals of the USDA
1. DeBarry. A. Paul, 2004, Watersheds : Processes, Assessment, and Management, Hoboken, N.J. : John Wiley & Sons, New Jersey
  2. Heathcote. W. Isobel , 2009, Integrated Watershed Management : Principles and Practice, 2<sup>nd</sup> Edition, Hoboken, N.J. : John Wiley & Sons, New Jersey
  3. National Watershed Program Manual, The U.S. Department of Agriculture (USDA), Washington, D.C, December, 2009
  4. Narayana, V.V. Dhruva, 2002, Soil and water conservation research in India, Published by ICAR, New Delhi
  5. Singh Rajvir, 2003, Watershed Planning and Management, 2nd Edition, Yash Publishing House, Bikaner, India

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**CORE ELECTIVE**

**Paper title: Practicals in Watershed Management**

**Paper Code: GEG-IV.E-7**

**Name of the Faculty: Adrian Ferro**

**Marks: 25**

**Credits: 1**

**Duration: 15 sessions of 2 hours each**

**Course Objective:** The objective of this practical is to acquaint students with basic concepts and importance of Watershed Management. This practical will also help students in understanding various processes that take place and that are involved in a watershed.

**Learning outcomes:** At the end of this practical, students are expected to have a holistic understanding of Watershed Management as it will help them to develop a process-based understanding of how land surface characteristics will affect fluxes of mass and energy within a watershed, so that science-based management principles may be effectively applied to watershed systems.

UNIT NO.	COURSE CONTENT	Practical Sessions
I	Delineation of Watershed Area: Preparation of Contour map from Toposheet, Morphometric Analysis of drainage Basin. Relief Properties: Absolute Height, Relief Ratio, Ruggedness number. Areal Properties: Length, Width of Basin, Basin Perimeter, Drainage density; Linear. Properties: Stream Ordering, Bifurcation Ratio, Stream Length.	10
II	Measurement and Estimation of Soil Erosion – Revised Universal Soil Loss Equation (RUSLE), Field Visit and Report: Survey, Database Generation, Resource Mapping	5
III	Journal and Viva-voce	
		15

**REFERENCES:**

1. DeBarry. A. Paul, 2004, Watersheds : Processes, Assessment, and Management, Hoboken, N.J. : John Wiley & Sons, New Jersey
2. Heathcote. W. Isobel , 2009, Integrated Watershed Management : Principles and Practice, 2<sup>nd</sup> Edition, Hoboken, N.J. : John Wiley & Sons, New Jersey
3. National Watershed Program Manual, The U.S. Department of Agriculture (USDA), Washington, D.C, December, 2009
4. Narayana, V.V. Dhruva, 2002, Soil and water conservation research in India, Published by ICAR, New Delhi
5. Singh Rajvir, 2003, Watershed Planning and Management, 2nd Edition, Yash Publishing House, Bikaner, India

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**SEMESTER IV**

**CORE ELECTIVE**

**Paper title: Biogeography (Theory)**

**Paper Code: GEG-IV.E-8**

**Name of the Faculty: Anagha Bicholcar**

**Marks: 75**

**Credits: 3**

**Duration: 45 lectures of 1 hour each**

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**Course Objectives:** Biogeography deals with spatial and temporal patterns of biological diversity and the factors that govern the distribution and abundance .

**Learning Outcomes:** At the end of this course, students will be familiar with fundamentals of biogeography.

<b>Unit</b>	<b>Title</b>	<b>TEACHING PERIODS</b>
I.	Concept of Biogeography. Historical evolution of Biogeography. Global patterns of Biodiversity.	18
II.	Niche. Speciation and extinction. Accident and invasion. Endemism, vicariance and conservation. Island biogeography. Zoogeography and its Environmental Relationship. Palaeo botanical and Palaeo Climatological records of environmental change.	10
III.	Biodiversity hotspots. Forest communities and their distribution. Conservation- laws and practices. Social Movements of conservation.	17
		45

**References:**

1. Husain, M. (ed)., 1994: Biogeography(Part I & II), Anmol Publications, Pvt. Ltd., New Delhi.
2. Newbigin, M.I., 1939: Plants and Animal Geography.
3. Tiby, 1982: Biogeography, Longman, London.
4. Walts, D., 1971: The Principles of Biogeography, Mc. Graw Hill, London.
5. Bhattacharyya, N.N.: Biogeography, Rajesh Publications, New Delhi.
6. Singh, Savindra, 2010: Biogeography, Prayag Pustak Bhawan, Allahabad.

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**SEMESTER IV**

**CORE ELECTIVE**

**Paper title: Practicals in Biogeography**

**Paper Code: GEG-IV.E-8**

**Name of the Faculty: Anagha Bicholcar**

**Marks: 25**

**Credits: 1**

**Duration: 15 Sessions of 2 hrs each**

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**Course Objectives:** Biogeography deals with spatial and temporal patterns of biological diversity and the factors that govern the distribution and abundance .

**Learning Outcomes:** At the end of this course, students will be familiar with fundamentals of biogeography .

Unit	Title	Sessions
I.	Vegetation Map interpretation Biodiversity indexing Biomass analysis Canopy structure Stock analysis	07
II.	NDVI Density of tree Plant tress analysis Disturbance analysis	08
III.	Journal and viva voce	
		15

**References:**

1. Husain, M. (ed)., 1994: Biogeography(Part I & II), Anmol Publications, Pvt. Ltd., New Delhi.
2. Newbigin, M.I., 1939: Plants and Animal Geography.
3. Tiby, 1982: Biogeography, Longman, London.
4. Walts, D., 1971: The Principles of Biogeography, Mc. Graw Hill, London.
5. Bhattacharya, N.N.: Biogeography, Rajesh Publications, New Delhi.
6. Singh, Savindra, 2010: Biogeography, Prayag Pustak Bhawan, Allahabad.