Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Autonomous)

Two Year Degree Program in Geography

(Faculty of Science & Technology)

CBCS Syllabus

M.A. /M.Sc. (Geography) Part-II Semester -IV

For Department of Geography

Tuljaram Chaturchand College, Baramati

Choice Based Credit System Syllabus (2023 Pattern)

(As Per NEP 2020)

To be implemented from Academic Year 2024-2025

Title of the Programme: M.A. /M.Sc. (Geography)

Preamble

AES's Tuljaram Chaturchand College has decided to change the syllabus of various faculties from June, 2023 by taking into consideration the guidelines and provisions given in the National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcomes for the development of the students. The credit structure and the courses framework provided in the NEP are nationally accepted and internationally comparable.

The rapid changes in science and technology and new approaches in different areas of Geography and related subjects, Board of Studies in Geography of Tuljaram Chaturchand College, Baramati - Pune has prepared the syllabus of M. A. /M.Sc.- Geography under the Choice Based Credit System (CBCS) by following the guidelines of NEP 2020, NCrF, NHEQF, Prof. R.D. Kulkarni's Report, GR of Gov. of Maharashtra dated 20th April and 16th May 2023 and Circular of SPPU, Pune dated 31st May 2023.

A Master degree in geography will provide students, the knowledge and skills to begin a variety of rewarding careers. Geographers work as urban planners, GIS technicians and analysts, disaster preparedness planners, teachers, environmental scientists, remote sensing analysts, transportation planners, demographers, hydrologists and in a variety of other areas. Students who complete Master degree in Geography, courses will examine the spatial organization of physical features and human activities at a variety of spatial scales from local to global. Students will be able to locate features on the surface of the earth, explain why they are located where they are, and describe how places are similar and/or different. Students will also examine human interactions with the environment and describe how physical and cultural landscapes change through time. Students completing physical geography courses will be able to describe the processes that drive earth's climate, create landforms, and govern the distribution of plants and animals.

Programme Specific Outcomes (PSOs)

1. Ability of Problem Analysis: Student will be able to analyse the problems of physical as well as cultural environments of both rural and urban areas. Moreover, they will try to find out the possible measures to solve those problems.
2. Conduct Social Survey Project: They will be eligible for conducting social survey project, which is necessity for the assessment of development status of a particular group or section of the society.
3. Individual and teamwork: Works effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
4. Application of modern instruments: Students will be able to apply various modern instruments for data collection and field survey.
5. Application of GIS and modern Geographical Map Making Techniques: Students will learn how to prepare map based on GIS by using the modern geographical map-making techniques.
6. Critical Thinking: Students will able to understand and solve the critical problems of physical and cultural environment.
7. Development of Observation Power: As a student of Geography, they will be capable to develop their observation power through field experience and in future, they will be able to identify the socio-environmental problems of a locality.
8. Development of Communication Skill and Interaction Power: After the completion of the course, they will be efficient in their communication skill as well as power of social interaction.
9. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
10. Enhancement of the ability of Management: Demonstrate knowledge and understanding of the management principles and apply these to their own work, as a member and leader in a team, to manage projects. They will perform effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
11. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions and accept responsibility for them.
12. Understand Environmental Ethics and Sustainability: Understand the impact of the acquired knowledge in societal and environmental contexts and demonstrate the knowledge of need for sustainable development.
13. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context social, environmental and technological changes.

Presentation Skill: Students are being able to understand and write effective reports and design credentials, make effective demonstrations, give and receive clear instruction

Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Autonomous)

Board of Studies (BOS) in Geography

From 2022-23 to 2024-25

Sr.No.	Name	Designation
1.	**Dr. Arun S. Magar**	Chairman
2.	**Dr. Asaram S. Jadhav**	Member
3.	**Mr. Vinayak D. Chavan**	Member
4.	**Ms. Sayali B.Pawar**	Member
5.	**Ms. Aysha A. Mulani**	Member
6.	**Ms. Aisha S. Tamboli**	Member
6.	**Dr. Santosh Lagad**	Vice-Chancellor Nominee
7.	**Dr. Pravin Kokane**	Expert from other University
8.	**Dr.T. P. Shinde**	Expert from other University
9.	**Dr. Babaji Maskare**	Industry Expert
10.	**Mr. Ganesh Ghanawat**	Meritorious Alumni
11.	**Ms. Komal Pote**	Student Representative
12.	**Mr. Sagar Lokhande**	Student Representative

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

(Autonomous)

Credit Distribution Structure for (M. A./M.Sc. Geography) Part-II SEM-III (2023 Pattern)

Year	Level	Sem.	Major		Research Methodology (RM)	OJT /FP	RP	Cum. Cr.
			Mandatory	**Electives**				
II	6.5	III	GEO-601-MJM (A) Tropical Geomorphology OR GEO-601-MJM (B)Urban Geography (**Credit 04**) GEO-602-MJM (A) Practical in Tropical Geomorphology OR GEO-602-MJM (B) Practical in Urban Geography (**Credit 02**) GEO-603-MJM (A)Theoretical and Applied Geomorphology OR GEO-603-MJM (B)Geography of Migration (**Credit 04**) GEO-604-MJM (A) Practical in Theoretical and Applied Geomorphology OR GEO-604-MJM (B) Practical in Geography of Migration(**Credit 02**)	GEO-611-MJE Principles of Remote sensing and GIS (**Credit 04**)	-	-	GEO-621-RP Research Project (**Credit 04**)	**20**
Cum. Cr.			**12**	**4**	**-**	**-**	**4**	**20**

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

(Autonomous)

Credit Distribution Structure for (M. A./M.Sc. Geography) Part-II SEM-IV (2023 Pattern)

Year	Level	Sem.	Major		Research Methodology (RM)	OJT /FP	RP	Cum. Cr.
			Mandatory	Electives				
II	6.5	IV	GEO-651-MJM Watershed Management (**Credit 04**) GEO-652-MJM Soil Geography (**Credit 04**) GEO-653-MJM Practical in Watershed Management (**Credit 02**) GEO-654-MJM Practical in Soil Geography (**Credit 02**)	GEO-661-MJE Practical in Remote Sensing and GIS (**Credit 02**)	-	-	GEO-681-RP Research Project (**Credit 06**)	**20**
Cum. Cr.			**12**	**2**	**-**	**-**	**6**	**20**

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati (Autonomous)

Course Structure for (M. A. /M.Sc. Geography) Part-I (2023 Pattern)

Sem	Course Type	Course Code	Course Title	Theory/ Practical	No. of Credits
I	Major Mandatory	GEO-501-MJM	Principles of Geomorphology and Climatology	Theory	04
		GEO-502-MJM	Principles of Economic and Population Geography	Theory	04
		GEO-503-MJM	Practical in Physical Geography	Practical	02
		GEO-504-MJM	Practical in Human Geography	Practical	02
	Major Elective	GEO-511-MJE	Statistical Techniques in Geography	Theory	04
	Research Methodology	GEO-521-RM	Research Methodology in Geography	Theory	04
Total Credits Semester I					**20**
II	Major Mandatory	GEO-551-MJM (A)	Fluvial Geomorphology	Theory	04
		GEO-551-MJM (B)	Population Geography		
		GEO-552-MJM (A)	Practical in Fluvial Geomorphology	Practical	02
		GEO-552-MJM (B)	Practical in Population Geography		
		GEO-553-MJM (A)	Coastal Geomorphology	Theory	04
		GEO-553-MJM (B)	Geography of Rural Settlement		
		GEO-554-MJM (A)	Practical in Coastal Geomorphology	Practical	02
		GEO-554-MJM (B)	Practical in Geography of Rural Settlement		
	Major Elective	GEO-561-MJE	Geographical Thoughts	Theory	04
	On Job Training/ Field Project	GEO-581-OJT/FP	On Job Training /Field Project	Project	04
Total Credits Semester II					**20**

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati (Autonomous)

Course Structure for (M. A. /M.Sc. Geography) Part-II (2023 Pattern)

Sem	Course Type	Course Code	Course Title	Theory/ Practical	No. of Credits
III	Major Mandatory	GEO-601-MJM (A)	Tropical Geomorphology	Theory	04
		GEO-601-MJM (B)	Urban Geography		
		GEO-602-MJM (A)	Practical in Tropical Geomorphology	Practical	02
		GEO-602-MJM (B)	Practical in Urban Geography		
		GEO-603-MJM (A)	Theoretical and Applied Geomorphology	Theory	04
		GEO-603-MJM (B)	Geography of Migration		
		GEO-604-MJM (A)	Practical in Theoretical and Applied Geomorphology	Practical	02
		GEO-604-MJM (B)	Practical in Geography of Migration		
	Major Elective	GEO-611-MJE	Principles of Remote sensing and GIS	Theory	04
	Research Project	GEO-621-RP	Research project	Project	04
	Skill Development	GEO-631-SDC	Fundamentals of Computer Geography	Theory	02
Total Credits Semester III					**22**
IV	Major Mandatory	GEO-651-MJM	Watershed Management	Theory	04
		GEO-652-MJM	Soil Geography	Theory	04
		GEO-653-MJM	Practical in Watershed Management	Practical	02
		GEO-654-MJM	Practical in Soil Geography	Practical	02
	Major Elective	GEO-661-MJE	Practical in Remote Sensing and GIS	Practical	02
	Research Project	GEO-681-RP	Research Project	Project	06
	Skill Development	GEO-691-SDC	Techniques in Computer Geography	Theory	02
Total Credits Semester IV					**22**
Total Credits of all Semester					**84**

CBCS Syllabus as per NEP 2020 for M.A / M.Sc. II (2023 Pattern)

Name of the Programme : M.A / M.Sc. Geography
Programme Code : PAGEO
Class : M.A / M.Sc. II
Semester : IV
Course Type : Major Mandatory (Theory)
Course Code : GEO-651-MJM
Course Title : Watershed Management
No. of Credits : 04
No. of Lectures : 60

Course Objectives:

1. To develop a comprehensive understanding of watershed systems and its management
2. To learn the principles of watershed delineation and the importance of watersheds in water resources management.
3. To uunderstand the impacts of land use, pollution, and climate change on watershed health.
4. To develop and apply strategies for sustainable watershed management, including soil conservation, water conservation
5. To utilize GIS and remote sensing tools for watershed mapping, analysis, and management.
6. To develop strategies to engage local communities in watershed management efforts.
7. To analyze case studies to explore the effectiveness of various policies and regulations in watershed management.

Course Outcomes:

By the end of the course, students will be able to:

CO1: Explain the components and functions of watershed systems for effective management.

CO2: Demonstrate watershed delineation techniques and their significance in water resources management.

CO3: Assess the impacts of land use, pollution, and climate change on watershed health.

CO4: Design and implement sustainable strategies for soil and water conservation in watershed management.

CO5: Utilize GIS and remote sensing for watershed mapping and analysis.

CO6: Develop strategies to engage local communities in watershed management efforts.

CO7: Analyze the effectiveness of policies and regulations in watershed management through case studies.

Topics and Learning points

Unit 1: Concept of watershed management **Lectures**

1.1 Definition, concepts of watershed; watershed management, **12**

1.2 Principle of watershed management

1.3 Necessity of watershed management

1.4 Problems in watershed management

Unit 2: Characteristics of watershed **12**

2.1 Delineation of Watershed

2.2 Climatic Characteristics of watershed

2.3 Geomorphic Characteristics of watershed

2.4 Morphometric Characteristics of watershed

Unit 3: Hydrological process in watershed **12**

3.1 Concept of Hydrological Cycle

3.2 Stages involves in Hydrological Cycle

3.3 Process of Interception

3.4 Water Balance

Unit 4: Water and Soil Conservation in watershed **12**

4.1Meanng and Concept of Water Conservation

4.2 Meaning and Concept of Soil Conservation

4.3 Water Conservation Techniques

4.3 Soil Conservation Techniques

Unit 5: Watershed development **12**

5.1 Application of Remote Sensing in watershed management

5.2 Application of GIS in watershed management

5.3 Integrated watershed development plans

5.4 Importance of watershed management in national development

Reference Books:

1. Dhruvanarayana, V.V., Sastry, G., Patnaik, U.S.: Watershed Management
2. Kakde, B.K.: Watershed Manual – A Guide for Watershed Development Practitioners andTrainers, BAIF Development Research Foundation, Pune.
3. Murthy, JVS: Watershed Management, New age International Publishers.
4. Rajesh Rajora: Integrated Watershed Management- A Field Manual for Equitable, Productive and Sustainable Development, Rawat Publication, Jaipur.
5. Singh Rajvir: Watershed Planning and Management, 2nd Edition, Yash Publishing House,Bikaner, India.
6. Suresh,R.: Soil and Watershed Conversation Engineering, 2nd Edition, StandardPublication Distributors, Delhi.
7. Schwab,G.O. et al: Soil and Water Conservation Engineering, 4th Edition, John Wiley &Sons.

Mapping of Program Outcomes with Course Outcomes

Weightage: 0= No relation, 1= Weak relation , 2= Moderate relation, 3= Strong relation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	2	1	2	1	2	1	1
CO2	3	3	1	3	3	1	1	2	1	2
CO3	2	2	3	2	2	2	2	2	1	1
CO4	3	3	2	3	2	3	2	3	1	1
CO5	3	3	1	2	3	1	1	1	1	3
CO6	2	2	2	1	1	2	1	1	3	1
CO7	2	2	3	2	2	3	3	2	1	1

Justification:

PO1: Comprehensive Knowledge and Understanding

CO1 and CO2 enhance understanding of watershed systems through detailed analysis of components and delineation techniques. CO3 and CO4 deepen this knowledge by assessing watershed health impacts and designing sustainable strategies. CO5 advances comprehension by applying GIS and remote sensing technologies for modern watershed analysis.

PO2: Application of Knowledge and Skills

CO1 and CO2 provide practical techniques for effective water resource management. CO4 applies this knowledge to develop and implement conservation strategies. CO5 equips students with GIS and remote sensing skills for accurate watershed mapping and analysis.

PO3: Constitutional, Humanistic, Ethical, and Moral Values

CO3 and CO4 integrate ethical considerations into watershed impact assessments and sustainable strategy development. CO6 emphasizes humanistic values by focusing on community engagement in watershed management.

PO4: Employability and Job-Ready Skills

CO2 and CO5 prepare students for professional roles in water resources management and environmental science with practical techniques and GIS skills. CO4 enhances job readiness by developing skills in soil and water conservation strategy implementation.

PO5: Autonomy, Responsibility, and Accountability

CO1 and CO4 promote autonomous and responsible management practices through understanding watershed functions and conservation strategies. CO6 demonstrates responsibility by engaging communities in watershed management efforts.

PO6: Research Skills

CO3's impact assessments and CO7's policy analysis develop research skills in watershed management. CO5 supports research with GIS and remote sensing tools for advanced data analysis and mapping.

PO7: Critical and Creative Thinking

CO4's strategy design and CO7's policy analysis foster critical and creative thinking. CO3 encourages innovative solutions through environmental impact assessments.

PO8: Problem-Solving Abilities

CO1 and CO4 address complex issues in water and soil conservation through comprehensive understanding and sustainable strategies. CO5 provides technological solutions for practical watershed management problems.

PO9: Collaboration and Teamwork

CO6's community engagement strategies highlight the importance of teamwork and collaboration in effective watershed management.

PO10: Digital and Technological Skills

CO5's use of GIS and remote sensing demonstrates essential digital and technological skills for modern watershed analysis and mapping.

CBCS Syllabus as per NEP 2020 for M.A./M.Sc. II (2023 Pattern)

Name of the Programme : M.A. /M.Sc. Geography
Programme Code : PAGEO
Class : M.A. /M.Sc. II
Semester : IV
Course Type : Major Mandatory (Theory)
Course Code : GEO-652-MJM
Course Title : Soil Geography
No. of Credits : 04
No. of Teaching Hours : 60

Course Objectives:

1. To provide students with development of soil geography, and the role of soil as a natural resource.
2. To educate students about the factors influencing soil formation and the structure of soil profiles.
3. To familiarize students with the various components of soil and their physical, chemical, and biological characteristics.
4. To teach students about land capability and suitability classifications and the types of soil found in India.
5. To identify and understand problems related to soil, such as pollution, acidification, and salinization, and their impact on soil health.
6. To provide knowledge about soil conservation methods, their definitions, and the specific
7. To introduce students to the role of Remote Sensing (RS) and Geographic Information Systems (GIS) in monitoring and improving soil conservation efforts.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Articulate development of soil geography and recognize soil as a vital natural resource.

CO2. Describe the factors of soil formation and the structure of soil profiles.

CO3. Understand the components of soil and be able to describe its physical, chemical, and biological characteristics, including essential nutrients.

CO4. Apply land capability and suitability classifications and identify different soil types in India.

CO5. Recognize and explain various soil problems, including pollution, acidification, and salinization, and their effects on soil health.

CO6. Describe various soil conservation methods and understand their application, particularly within the Indian context.

CO7. Explain how Remote Sensing and GIS are utilized in soil conservation efforts and apply these technologies to real-world scenarios.

Topics and Learning Points

Unit 1: Introduction to Geography of Soil **Teaching Hours**

1.1 Definition **10**

1.2 Nature and Scope of Soil Geography

1.3 Development of Geography of Soil

1.4 Soil as a Natural Resource

Unit 2: Soil Formation and Soil Profile **10**

2.1Factors of Soil formation: Parent Material, Climate, Biota, Time, Topography.

2.2 Soil Profile: Definition and Structure

Unit 3: Components and Characteristics of Soil **14**

3.1 Soil component: Minerals, Organic Matter, Air and Water.

3.2 Physical, Chemical and Biological characteristics of soil.

3.3 Nutrients in Soils: Primary, Secondary and Micronutrients

Unit 4: Classification and types of Soil **12**

4.1Land Capability Classification

4.2Land Suitability Classification

4.3Types of Soil with reference to India

Unit 5: Problems related to soil and Soil Conservation 14

5.1Soil Problems: Soil Pollution, Acidification, salinization, and Soil health

5.2Soil Conservation: Definition and various methods of Soil Conservation,

5.3Soil Conservation in India

5.4Role of RS and GIS in Soil Conservation

References:

1. A.S.Gustafson,(2007):"Soils and Management" Published by Agrobios (India).
2. Brady,N.C.,andWeil,R.R.(2008): The NatureandProperties of Soils,PrenticeHall,NewJersey
3. Bridges,E.M. andDavidson,D.A.(1982):PrinciplesandApplicationsofSoilGeography,Longman
4. Birkeland,P.W (1999): Soils and Geomorphology, Oxford UniversityPress, New York.
5. C.E.Miller, L.M.Turk,(2001):"Fundamental ofsoilScience"BiotechBooksDelhi.
6. Daji,J.A.(1970):ATextbookofSoilScience,AsiaPublicationHouse,NewYork.
7. Lal,R.(ed.),(2002):Encyclopediaofsoilscience.MarcelDekker,New York.
8. Miller, R. W. and Donahue, R. L. (1992): Soils: An Introduction to Soils and Plant Growth, Prentice-HallofIndia, New Delhi.
9. Pitty,A. F. (1978):GeographyandSoilProperties, Methuenand Co.,London.
10. S.C.Panda,(2007):"Soilwaterconservationanddryfarming"Published byAgrobios

Mapping of Program Outcomes with Course Outcomes

Weightage: 0= No relation, 1= Weak relation, 2= Moderate relation, 3= Strong relation

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	2	1	1	1	1
CO2	3	2	1	1	1	2	1	1	1	1
CO3	3	2	1	1	1	2	1	1	1	1
CO4	3	3	1	2	2	2	2	2	2	2
CO5	3	3	1	2	2	2	2	2	2	2
CO6	3	3	1	2	2	3	2	2	2	2
CO7	3	3	1	2	2	3	3	2	2	3

Justification

PO1 (Comprehensive Knowledge and Understanding):

CO1 through CO3 are rated 3 as they provide a strong foundation in soil geography, formation, and characteristics. CO4 through CO7 are also rated 3 due to their detailed exploration of soil-related topics.

PO2 (Application of Knowledge and Skills):

CO4 through CO7 are rated 3 as they involve significant application of skills in hydrological analysis and soil conservation. CO1 through CO3 are rated 2 for their application of theoretical knowledge.

PO3 (Constitutional, Humanistic, Ethical, and Moral Values):

All COs are rated 1 as they involve some ethical considerations related to soil management but do not extensively address broader values.

PO4 (Employability and Job-Ready Skills):

CO4 through CO7 are rated 2 due to their focus on practical skills relevant to soil management and conservation. CO1 through CO3 are rated 1 for foundational knowledge.

PO5 (Autonomy, Responsibility, and Accountability):

All COs are rated 1 as they involve aspects of responsibility related to soil management but do not emphasize broader autonomy and accountability.

PO6 (Research Skills):

CO1 through CO7 are rated 2 or 3 as they involve understanding, analyzing, and applying research methodologies in soil science.

PO7 (Critical and Creative Thinking):

CO4 through CO7 are rated 2 or 3 due to their focus on analyzing and solving complex soil-related problems and using creative approaches for conservation.

PO8 (Problem-solving Abilities):

CO4 through CO7 are rated 2 due to their involvement in addressing soil-related issues and problem-solving in practical scenarios. CO1 through CO3 are rated 1 for their foundational understanding.

PO9 (Collaboration and Teamwork):

All COs are rated 1 as they primarily focus on individual tasks rather than explicit teamwork.

PO10 (Digital and Technological Skills):

CO7 is rated 3 for its use of Remote Sensing and GIS technologies. Other COs are rated 1 for less direct technological involvement.

CBCS Syllabus as per NEP 2020 for M.A / M.Sc. II (2023 Pattern)

Name of the Programme : M.A / M.Sc. Geography
Programme Code : PAGEO
Class : M.A / M.Sc. II
Semester : IV
Course Type : Major Mandatory (Practical)
Course Code : GEO-653-MJM
Course Title : Practical in Watershed Management
No. of Credits : 02
No. of Lectures : 60

Course Objectives:

1. To develop skills in watershed delineation using both traditional and digital methods.
2. To perform and interpret morphometric analysis of watersheds to understand their characteristics.
3. To analyze stream networks and surface water flow within watersheds using hydrological models.
4. To assess the impact of land use changes on water resources within a watershed.
5. To utilize GIS and remote sensing tools for accurate watershed mapping and analysis.
6. To conduct land use and land cover mapping using remote sensing data.
7. To apply GIS techniques in evaluating watershed health and developing management strategies.

Course Outcomes:

By the end of the course, students will be able to:

CO1: Demonstrate the ability to delineate watersheds using both traditional methods and digital tools.
CO2: Perform and accurately interpret morphometric analysis to assess watershed characteristics.
CO3: Analyze stream networks and simulate surface water flow using hydrological models within a watershed.

CO4: Evaluate the effects of land use changes on the availability and quality of water resources in a watershed.

CO5: Utilize GIS and remote sensing tools to conduct precise watershed mapping and analysis.

CO6: Conduct and interpret land use and land cover mapping using remote sensing techniques.

CO7: Apply GIS techniques to evaluate watershed health and formulate effective management strategies.

Topics and Learning points

Unit 1: Watershed Delineation and Stream Ordering **Lectures**

1.1 Delineation of Watershed **20**

1.2 Stream ordering Methods

1.3 Calculation of Bifurcation Ratio

1.4 Slope analysis in Watershed

Unit 2: Morphometric analysis of Watershed **20**

2.1 Linear Characteristics of Watershed

2.2 Areal Characteristics of watershed

2.3 Relief Characteristics of Watershed

Unit 3: Areal Precipitation and Water Balance **20**

2.1 Isohyetal Method of Areal Precipitation

2.2 Thiessen Polygon Methods of Areal Precipitation

2.3 Calculation of Water Balance

Reference Books:

1. Murthy, J. V. S. (1994): Watershed Management in India, Wiley Eastern Ltd., New Delhi
2. Pranjape, S., Joy, K. J., Machado, T., Varma, A. K. and Swaminathan, S. (1998): Watershed-Based Development, Bharat Gyan Vigyan Samithi, New Delhi
3. Mutreja, K. N. (1990): Applied Hydrology, Tata McGraw-Hill Pub. Co. Ltd., New Delhi
4. Singh, R. J. (2000): Watershed Planning and Management, Yash Publishing House, Bikaner
5. Strahler, A. N. (1964): Handbook of Applied Hydrology, Ven Te Chow, Ed., Section -- 4 II, McGraw-Hill Book Company, New York

Mapping of Program Outcomes with Course Outcomes

Course Code and Title - GEO-653-MJM Practical in Watershed Management

Weightage: 0= No relation, 1= Weak relation , 2= Moderate relation, 3= Strong relation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	2	2	1	1	2	1	2
CO2	3	3	1	2	2	1	1	2	1	1
CO3	2	2	1	2	2	1	1	2	2	1
CO4	2	2	3	2	2	2	1	2	2	1
CO5	3	3	1	2	3	1	2	2	1	3
CO6	2	2	1	1	2	2	1	1	2	3
CO7	3	3	1	2	2	1	2	2	1	2

Justification

PO1: Comprehensive Knowledge and Understanding

CO1 and CO2 provide a strong foundation in understanding watershed systems through traditional and digital delineation methods and morphometric analysis. CO3 enhances this knowledge by analyzing stream networks and hydrological models. CO4 and CO5 further deepen the understanding of watershed health by evaluating land use effects and employing GIS/remote sensing technologies.

PO2: Application of Knowledge and Skills

CO1 and CO2 translate theoretical knowledge into practice with techniques for watershed delineation and morphometric analysis. CO3 applies hydrological models to manage surface water flow. CO4's evaluation of land use impacts, CO5's GIS and remote sensing for mapping, CO6's land cover mapping, and CO7's GIS-based management strategies all demonstrate the application of acquired skills in real-world scenarios.

PO3: Constitutional, Humanistic, Ethical, and Moral Values

CO4 incorporates ethical considerations in assessing land use changes, ensuring responsible water resource management. CO5 and CO7, using GIS and remote sensing, contribute to ethical decision-making by providing accurate data for effective management.

PO4: Employability and Job-Ready Skills

CO1 and CO2 equip students with practical skills in watershed delineation and morphometric analysis, essential for professional roles. CO5's expertise in GIS and remote sensing and CO4's strategy development enhance job readiness and relevance in environmental science and resource management.

PO5: Autonomy, Responsibility, and Accountability

CO1 and CO4 promote autonomous and responsible management through traditional and digital delineation and strategy design. CO6's land use mapping highlights responsibility in utilizing remote sensing for accurate assessments.

PO6: Research Skills

CO3's use of hydrological models and CO4's land use impact evaluation are crucial for research in watershed management. CO5 and CO7 support research with GIS and remote sensing tools, aiding in data analysis and strategy formulation.

PO7: Critical and Creative Thinking

CO4's evaluation of land use impacts and CO7's development of management strategies encourage critical and creative thinking. CO3's innovative use of hydrological models fosters new approaches to understanding surface water flow and watershed dynamics.

PO8: Problem-Solving Abilities

CO1 and CO4 contribute to problem-solving in watershed management through delineation and land use evaluation. CO5's GIS and remote sensing tools offer solutions for precise mapping and analysis of watershed systems.

PO9: Collaboration and Teamwork

CO6's land use and land cover mapping necessitate collaboration with researchers and stakeholders to effectively use remote sensing data.

PO10: Digital and Technological Skills

CO5 and CO7 involve advanced digital and technological skills through GIS and remote sensing for watershed analysis. CO6 also requires technological proficiency for land use mapping.

CBCS Syllabus as per NEP 2020 for M.A./M.Sc. II (2023 Pattern)

Name of the Programme : M.A. /M.Sc. Geography
Programme Code : PAGEO
Class : M.A. /M.Sc. II
Semester : IV
Course Type : Major Mandatory (Practical)
Course Code : GEO-654-MJM
Course Title : Practical Soil Geography
No. of Credits : 02
No. of Teaching Hours : 60

Course Objectives:

1. To instruct students on various methods for soil sample collection and laboratory analysis.
2. To teach students how to analyze physical properties of soil.
3. To familiarize students with methods for determining soil texture.
4. To provide students with the skills to measure soil pH, analyze soil nutrients (N, P, K).
5. To enable students to interpret soil analyses results and understand their implications for soil fertility and health.
6. To teach students how to develop and apply effective soil management strategies based on soil analysis and interpretation.
7. To emphasize the importance of safety guidelines in the laboratory to ensure accurate results and maintain a safe working environment.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Effectively collect soil samples using appropriate methods and instruments while following safety guidelines.

CO2. Analyze soil structure, porosity, water holding capacity, and particle size distribution using sieve analysis and other techniques.

CO3. Determine soil texture and identifying the proportions of sand, silt, and clay in a soil sample.

CO4. Measure soil pH, analyze soil nutrients (N, P, K), and assess organic matter and soil carbon content accurately.

CO5. Interpret soil analysis results and use this information to evaluate soil fertility and health.

CO6. Formulate and implement soil management strategies based on soil analysis and data interpretation.

CO7. Understand and apply safety guidelines in the laboratory to ensure accurate results and a safe working environment.

Topics and Learning Points

Unit 1: Introduction **Teaching Hours**

1.1 Methods of soil sample collection **16**

1.2 Instruments required for sampling

1.3 Safety guidelines in the laboratory

Unit 2: Analysis of Physical Properties **14**

2.1 Soil Structure and Porosity Analysis

2.2 Water holding capacity

2.3 Particle size distribution using sieve analysis

2.4 Determination of soil texture –sand, silt, clay

Unit 3: Analysis of Chemical Properties **14**

3.1 Soil pH Measurement

3.2 Soil Nutrient Analysis (N, P, K)

3.3 Organic Matter and Soil Carbon Analysis

Unit 4: Soil Data Interpretation and applications **16**

4.1 Interpretation of Soil Analysis Results

4.2 Understanding soil fertility and health indicators

4.3 Soil Management Strategies

References:

1. Helmut Kohnke and P. J. Niederholzer, "Soil Science Simplified", Wiley-Blackwell
2. J. R. Schaetzl and Robert O. Siltanen, "Soil Geography and Land Use Planning", CRC
3. Michael E. Essington, "Soil and Water Chemistry: An Integrative Approach", CRC Press
4. J. Russell Boulding and G. Fred Lee, "Practical Handbook of Soil, Vadose Zone, and
5. Ground-Water Contamination: Assessment, Prevention, and Remediation", CRC Press
6. M.R. Carter and E.G. Gregorich (Editors), "Soil Sampling and Methods of Analysis",
7. Eldor A. Paul, "Soil Microbiology, Ecology, and Biochemistry", Academic Press
8. Kim H. Tan, "Environmental Soil Science", CRC Press
9. Daniel Hillel, "Introduction to Environmental Soil Physics", Academic Press imus Books.

Mapping of Program Outcomes with Course Outcomes

Weightage: 0= No relation, 1= Weak relation, 2= Moderate relation, 3= Strong relation

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	1	1	2	1	1	1	1	1
CO2	2	2	1	1	2	2	1	1	1	1
CO3	2	2	1	1	2	2	1	1	1	1
CO4	2	3	1	2	2	2	2	2	2	1
CO5	2	3	1	2	2	2	2	2	2	1
CO6	2	3	1	2	2	3	2	2	2	1
CO7	2	2	1	2	2	2	2	2	2	2

PO1 Comprehensive Knowledge and Understanding:

CO1 through CO3 are rated 2 as they require a solid understanding of soil sampling and analysis methods. CO4 through CO7 are rated similarly, emphasizing an advanced understanding of soil properties and management.

PO2 Application of Knowledge and Skills:

CO4 through CO7 are rated 3 due to their focus on applying soil analysis results to practical management strategies. CO1 through CO3 are rated 2 for their application of techniques and data analysis.

PO3 (Constitutional, Humanistic, Ethical, and Moral Values):

All COs are rated 1 as they include adherence to safety and ethical guidelines in laboratory work but do not broadly address constitutional or moral values.

PO4 Employability and Job-Ready Skills:

CO4 through CO7 are rated 2 for their direct relevance to practical skills in soil analysis and management. CO1 through CO3 are rated 1 as they provide foundational skills.

PO5 Autonomy, Responsibility, and Accountability:

All COs are rated 2 as they involve aspects of responsibility in handling soil samples and ensuring accurate results.

PO6 Research Skills:

CO4 through CO7 are rated 2 or 3 due to their involvement in interpreting data and implementing strategies based on research findings. CO1 through CO3 are rated 1 for basic research techniques.

PO7 Critical and Creative Thinking:

CO4 through CO7 are rated 2 as they require critical thinking in analyzing and interpreting soil data and formulating management strategies. CO1 through CO3 are rated 1 for basic analytical tasks.

PO8 Problem-solving Abilities:

CO4 through CO7 are rated 2 due to their focus on solving problems related to soil health and management. CO1 through CO3 are rated 1 for foundational problem-solving skills.

PO9 Collaboration and Teamwork:

All COs are rated 1 as they focus on individual tasks rather than collaborative efforts.

PO10 Digital and Technological Skills:

CO7 is rated 2 for its emphasis on safety guidelines in a technological context. Other COs are rated 1 as they involve some technological aspects but are not primarily focused on digital skills.

CBCS Syllabus as per NEP 2020 for M.A./M.Sc. II (2023 Pattern)

Name of the Programme : M.A. /M.Sc. Geography
Programme Code : PAGEO
Class : M.A. /M.Sc. II
Semester : IV
Course Type : Major Elective (Practical)
Course Code : GEO-661-MJE
Course Title : Practical Remote Sensing and GIS
No. of Credits : 02
No. of Teaching Hours : 60

Course Objectives:

1. To understand and apply satellite imaging fundamentals, including types of scales, images, sensors, and correction methods.
2. To utilize band combinations and ratios in satellite images for enhanced data interpretation.
3. To master image processing techniques, including preprocessing, supervised, and unsupervised classification.
4. To prepare and manage GIS databases, focusing on vector and raster databases and their applications.
5. To conduct spatial analysis using GIS tools for vector data.
6. To analyze raster data in GIS using appropriate spatial analysis tools.
7. To integrate satellite imagery with GIS analysis techniques for comprehensive geographic research and decision-making.

Course Outcomes:

By the end of the course, students will be able to:

CO1: Demonstrate an understanding of satellite imaging fundamentals, including types of scales, images, sensors, and correction methods.

CO2: Apply band combinations and ratios in satellite images to enhance data interpretation.

CO3: Execute image processing techniques, including preprocessing, supervised classification, and unsupervised classification.

CO4: Prepare and manage GIS databases, focusing on vector and raster databases and their applications.

CO5: Conduct spatial analysis using GIS tools for vector data.

CO6: Analyze raster data in GIS using appropriate spatial analysis tools.

CO7: Integrate satellite imagery with GIS analysis techniques for comprehensive geographic research and decision-making**.**

Topics and Learning Points

Unit 1: Satellite Images and Sensor Technologies **Teaching Hours**

1.1 Types of Scale, Images, and Sensors **20**

1.2 Satellite Image Correction Methods

1.3 Band Combination in Satellite Images

1.4 Band Ratios in Satellite Images

Unit 2: Image Processing Techniques **20**

2.1 Pre Processing of Satellite Images

2.2 Supervised Classification

2.3 Unsupervised Classification

Unit 3: GIS Database Preparation and Spatial Analysis **20**

3.1 GIS Database Preparations

(Vector and Raster Databases& their Applications)

3.2 Spatial Analysis Tools: Vector Data

3.3 Spatial Analysis Tools: Raster Data

References:

1. Lillesand, T., Kiefer, R. W., &Chipman, J. (2015). Remote Sensing and Image Interpretation. Wiley.
2. Jensen, J. R. (2016). Introductory Digital Image Processing: A Remote Sensing Perspective. Pearson Education.
3. Campbell, J. B., & Wynne, R. H. (2011). Introduction to Remote Sensing. Guilford Press.
4. Schowengerdt, R. A. (2007). Remote Sensing: Models and Methods for Image Processing. Academic Press.
5. Richards, J. A., &Jia, X. (2006). Remote Sensing Digital Image Analysis: An Introduction. Springer.
6. Eastman, J. R. (2016). IDRISI Manual: GIS and Image Processing Software.
7. Tomlinson, R. F. (2007). Thinking About GIS: Geographic Information System Planning for Managers. Esri Press.
8. Burrough, P. A., & McDonnell, R. A. (1998). Principles of Geographical Information Systems. Oxford University Press.
9. Longley, P. A., Goodchild, M. F., Maguire, D. J., &Rhind, D. W. (2015). Geographic Information Systems and Science. Wiley.
10. Goodchild, M. F. (1992). Geographical Information Science. International Journal of Geographical Information Systems.
11. Aronoff, S. (2005). Geographic Information Systems: A Management Perspective. WDL Publications.
12. Heywood, I., Cornelius, S., & Carver, S. (2011). An Introduction to Geographical Information Systems. Pearson Education.

Mapping of Program Outcomes with Course Outcomes

Weightage: 0= No relation, 1= Weak relation, 2= Moderate relation, 3= Strong relation

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	2	2	2	2	2	2	3
CO2	3	3	1	2	2	2	2	2	2	3
CO3	3	3	1	2	2	2	2	2	2	3
CO4	3	3	1	2	2	2	2	2	2	3
CO5	3	3	1	2	2	2	2	2	2	3
CO6	3	3	1	2	2	3	3	2	2	3
CO7	3	3	1	2	2	3	3	3	2	3

Justification

PO1. Comprehensive Knowledge and Understanding:

CO1 to CO5 are rated 3 as they require a deep understanding of satellite images, correction techniques, band combinations, and pre-processing. CO6 and CO7 are rated similarly for their focus on advanced classification and data interpretation.

PO2. Application of Knowledge and Skills:

All COs (CO1 through CO7) are rated 3 due to their strong focus on applying satellite data correction, band ratios, and classification techniques in practical scenarios.

PO3. Constitutional, Humanistic, Ethical, and Moral Values:

All COs are rated 1 as they include ethical use of satellite data but do not deeply address broader constitutional or moral issues.**PO4. Employability and Job-Ready Skills:**

CO4 through CO7 are rated 2 for their relevance to practical skills in classification and data interpretation. CO1 to CO3 are rated 2 as they build foundational technical expertise necessary for the field.

PO5. Autonomy, Responsibility, and Accountability:

All COs are rated 2 for emphasizing responsibility in handling satellite data, ensuring accuracy, and working independently in data analysis.

PO6. Research Skills:

CO6 and CO7 are rated 3 for their emphasis on classification and data pattern recognition as part of advanced research. CO1 to CO5 are rated 2 for their involvement in data correction and preparation, which are crucial for research tasks.

PO7. Critical and Creative Thinking:

CO6 and CO7 are rated 3 for requiring critical thinking in interpreting classified data and identifying patterns. CO1 to CO5 are rated 2 for applying creative approaches to data enhancement and correction techniques.

PO8. Problem-solving Abilities:

CO6 and CO7 are rated 3 for addressing complex classification and data interpretation challenges. CO1 through CO5 are rated 2 for their role in solving technical issues related to image accuracy and feature enhancement.

PO9. Collaboration and Teamwork:

All COs are rated 2 for their potential involvement in collaborative efforts in larger satellite data analysis projects, though they focus more on individual skills.

PO10. Digital and Technological Skills:

All COs are rated 3 as they emphasize the use of digital tools and technologies for processing, analyzing, and interpreting satellite data, which are essential to the field.

CBCS Syllabus as per NEP 2020 for M.A./M.Sc. II (2023 Pattern)

Name of the Programme : M.A. /M.Sc. Geography
Programme Code : PAGEO
Class : M.A./M.Sc. II
Semester : IV
Course Type : Research Project
Course Code : GEO-681-MJM
Course Title : Research Project
No. of Credits : 06
No. of Teaching Hours : 180

Course Objectives:

1. To teach students how to define a research topic, understand its scope, and formulate relevant research questions or hypotheses.
2. To guide students in identifying research gaps and understanding the significance of addressing these gaps within their research.
3. To enable students to search for relevant literature, evaluate and select credible sources, analyze and synthesize information, and write a structured literature review.
4. To instruct students on the components of a research project proposal, including introduction, literature review, study area, objectives, hypothesis, methodology, significance, expected outcomes, chapter scheme, and timeline.
5. To provide students with knowledge on developing a clear and effective research methodology that aligns with their research objectives and hypotheses.
6. To improve students' academic writing skills through structured writing of research proposals and literature reviews.
7. To teach students how to effectively present their research proposals in both written and oral formats, focusing on clarity, coherence, and academic rigor.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Clearly define a research topic, articulate its scope, and formulate appropriate research questions or hypotheses.

CO2. Identify gaps in existing research and understanding the importance of addressing these gaps in their studies.

CO3. Conduct a comprehensive literature review, including searching for relevant sources, evaluating their credibility, and synthesizing information into a coherent review.

CO4. Prepare a detailed research project proposal, demonstrating understanding of its various components, such as objectives, methodology, and expected outcomes.

CO5. Develop a clear and effective research methodology that aligns with their research objectives and is appropriate for their study.

CO6. Enhance their academic writing skills, enabling them to produce well-structured and coherent research proposals and literature reviews.

CO7. To present their research proposals effectively, both in written format and oral presentations, demonstrating clarity, coherence, and academic rigor.

Standard Operating Procedure (SOP) and Guidelines for Research Project:

1. The research project spans across Semester III (4 credits) and Semester IV (6 credits), comprising a total of 10 credits. This is a single, continuous research project divided into two parts over the two semesters of the PG program.
2. The research project must be completed under the supervision and guidance of an in-house research mentor.
3. In Semester III, students are required to present their plan of work and conduct a literature review related to their project.
4. The actual research work will be conducted during Semester IV.
5. The department may organize necessary lectures, workshops, and laboratory training exercises as part of the research project.

6. Students may undertake the research project individually or in groups of up to three members, selecting relevant research topics in consultation with their dissertation supervisor.
7. Supervisors will assist students in reading research articles relevant to selected research topic and guide them in selecting a topic for their dissertation project.
8. With the guidance of their supervisors, students will discuss the research objectives, approach, methodology, data collection methods, and other critical aspects of their project.
9. Students are expected to prepare a comprehensive proposal in a scientific format for their dissertation project.
10. A printed copy of the project proposal must be submitted for internal assessment.
11. Students must also prepare a PowerPoint presentation of their project proposal for the final evaluation.
12. Building on the project proposal from the previous semester, students will plan and engage in an independent and thorough investigation of their chosen research topic.
13. Students may engage in activities such as surveys, interviews, field observations, or experiments to achieve their research objectives.
14. Midway through the semester, students will present their preliminary findings to an internal examiner. Feedback from this session should be incorporated into the final analysis and report.
15. At the conclusion of the dissertation project, students will write a thesis that includes the aim, methodology, results, discussion, and future implications of their research.
16. Students must adhere to ethical principles and standards throughout all stages of their research.
17. A printed and hardbound copy of the dissertation thesis must be submitted for internal assessment.
18. Additionally, students will prepare a PowerPoint presentation of their dissertation thesis for the oral presentation during the Viva-voce, as part of the external evaluation.
19. For the external assessment, students must submit the final report and participate in a viva-voce.
20. The Project Report must be duly signed by the supervisor and the Head of the Department before being submitted to the concerned department.

The final Research Project thesis shall be presented in accordance with the following specifications whenever necessary:

(a) The paper used for printing shall be of A4 size.

(b) Printing shall be in a standardized form on both sides of the paper and in 1.5 line spacing.

(c) A margin of 1.5 inches shall be on the left-hand side.

(d) The card for cover shall not be more than 330 GSM.

(e) The title of the thesis/dissertation, name of the candidate, degree, name of the Research Supervisor, place of research and the month and year of submission shall be printed on the title page and the front cover. The name of the Co-supervisor, if any, may be mentioned on the title page and the front cover.

(f) Use the standard referencing style for bibliography/references as per the discipline.

(g) The hard-bound cover of the thesis/dissertation shall be of black color.

Topics and Learning Points

Unit 1: Planning of fieldwork for data collection **Teaching Hours**

1.1 Planning of fieldwork/survey **30**

1.2 Preparation of questionnaire/field sheet/field book

1.3 Carrying out fieldwork/survey for primary data collection

1.4 Filling up questionnaires/collection of samples

1.5 Secondary data collection

Unit 2: Laboratory analysis/data analysis **70**

2.1Sample analysis/questionnaire analysis to obtain data

2.2Data entry and data rectification

2.3Statistical analysis of the data

2.4Representation of the data

2.5Interpretation of the data

Unit 3: Research project writing **60**

3.1 Introduction

3.2 Literature Review

3.3 Study area

3.4Objectives

3.5 Hypothesis

3.6Methodology

3.10Chapter Scheme (Main text of the project)

3.11References

Unit 4: Submission of research project and viva-voce **20**

4.1 Submission of print copy of research project in prescribed format

4.2 Research project viva-voce

References:

1. Gomez, B., & Jones III, J. P. (Eds.). (2010). Research methods in geography: A critical introduction (Vol. 6). John Wiley & Sons.
2. Gomez, B., & Jones, J. P. III (2010). Research Methods in Geography: A Critical Introduction.John Wiley and Sons.
3. Goudie, A. (Ed) (2004): Encyclopaedia of Geomorphology, Routledge, London.
4. Gregory, D., Johnston, R., Pratt, G., Watts, M. &Whatmore, S. (2009). The Dictionary of Human Geography. Singapore: Wiley-Blackwell. Hay, I. (2000). Qualitative research methods in Human Geography.
5. Warf, B. (Ed)(2006). Encyclopaedia of Human Geography. London: SAGE Publications.
6. Kothari, C.R. (2004): Research Methodology: Methods and Techniques, New Age International (P) Ltd.,New Delhi – 110002.
7. Kothari, C.R., (1984): Quantitative Techniques, 2nd ed., New Delhi: VikasPublishing House Pvt. Ltd.
8. Mishra Shanti Bhushan and Shashi A. (2011): Handbook of Research Methodology,Educreation Publishing, New Delhi – 110075

Mapping of Program Outcomes with Course Outcomes

Weightage: 0= No relation, 1= Weak relation , 2= Moderate relation, 3= Strong relation

(COs)/(POs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	3	3	3	2	2	1	1
CO2	3	2	2	1	1	2	3	2	0	0
CO3	3	3	1	1	1	3	3	2	0	3
CO4	3	3	1	3	3	3	3	3	1	1
CO5	3	3	2	1	3	3	3	3	0	0
CO6	2	2	1	3	1	2	2	1	0	1
CO7	1	1	1	3	1	2	2	0	0	1

Justification

PO1:Comprehensive Knowledge and Understanding

CO1, CO3, CO4, and CO5: These COs focus on defining a research topic, conducting literature reviews, and developing a research proposal, which demonstrate thorough knowledge of research procedures and methodology. CO2: Identifying research gaps showcases an understanding of emerging developments in the field.

PO2: Application of Knowledge and Skills

CO1, CO4, and CO5: These COs demonstrate the application of technical and theoretical knowledge in formulating research questions and developing research methodologies. CO3: Applying knowledge in literature review is a critical skill for analyzing data and understanding research trends.

PO3: Constitutional, Humanistic, Ethical, and Moral Values

CO5: Developing a clear and effective research methodology should include ethical considerations, ensuring unbiased research practices.

CO2: Identifying gaps and addressing them responsibly involves ethical reasoning in the choice of research topics.

PO4: Employability and Job-Ready Skills, and Entrepreneurship Skills
CO1, CO4, and CO7: These COs enhance employability through the ability to define a research scope, create proposals, and present research effectively, all of which are critical skills in the job market.
CO6: Strong academic writing skills are essential for producing high-quality reports and publications in a professional setting.

PO5: Autonomy, Responsibility, and Accountability
CO1 and CO4: Defining research topics and preparing project proposals require a high degree of independence, responsibility, and accountability in research practices.
CO5: Developing appropriate research methodologies ensures responsible and accountable academic work.

PO6: Research Skills
CO1, CO3, CO4, and CO5: These COs directly relate to research skills, from defining a topic and reviewing literature to preparing research proposals and developing methodologies, which are central to effective research.

PO7: Critical and Creative Thinking
CO2, CO3, and CO5: Identifying research gaps, synthesizing information from literature, and developing methodologies require critical and creative thinking to approach problems innovatively and construct sound arguments.

PO8: Problem-Solving Abilities
CO4 and CO5: Preparing a detailed research proposal and developing methodologies involve problem-solving abilities to address complex research challenges.

PO9: Collaboration and Teamwork
CO7: Presenting research proposals, both written and oral, often involves collaboration and teamwork, especially in group discussions or joint research projects.

PO10: Digital and Technological Skills
CO3 and CO7: Conducting literature reviews requires proficient use of digital tools for searching and synthesizing information. Presenting research also involves using digital platforms and tools to enhance communication.

CBCS Syllabus as per NEP 2020 for M.A. / M.Sc. II (2023 Pattern)

Name of the Programme : M.A. /M.Sc. Geography
Programme Code : PAGEO
Class : M.A. /M.Sc. II
Semester : IV
Course Type : Skill Development
Course Code : GEO-691-SDC
Course Title : Techniques in Computer Geography
No. of Credits : 02
No. of Teaching Hours : 30

Course Objectives:

1. To understand the fundamental concepts and purposes of line and bar graphs.
2. To explore different types of line and bar graphs and their specific applications.
3. To develop practical skills in creating and analyzing line and bar graphs.
4. To grasp the basic concepts and applications of pie charts and histograms.
5. To differentiate between various types of pie charts and histograms and their uses.
6. To acquire hands-on experience in creating and interpreting pie charts and histograms.
7. To gain proficiency in comprehensive document and data management using Microsoft Word, Excel, and PowerPoint.

Course Outcomes:

By the end of the course, students will be able to:

CO1: Demonstrate understanding of the fundamental concepts and purposes of line and bar graphs.

CO2: Identify and explain different types of line and bar graphs, including their specific applications in data visualization.

CO3: Create and analyze line and bar graphs, applying them effectively to various datasets.

CO4: Describe the basic concepts and uses of pie charts and histograms in data representation.

CO5: Differentiate between various types of pie charts and histograms and apply them to effectively visualize data.

CO6: Develop and interpret pie charts and histograms, using them to analyze and present data insights.

CO7: Utilize Microsoft Word, Excel, and PowerPoint for effective document creation, data analysis, and presentation design, demonstrating proficiency in these tools.

Topics and Learning Points

Unit 1: Line Graphs and Bar Graphs **10**

1.1 Line Graphs

a) Basic Concepts: Introduction, purpose, and effective use cases.
b) Types: Single, multiple, and stacked line graphs.
c) Applications: Visualizing trends and comparing data series.

1.2 Bar Graphs

a) Basic Concepts: Introduction and use cases for categorical data.
b) Types: Vertical, horizontal, stacked, and grouped bar graphs.
c) Applications: Comparing categories and analyzing complex data.

1.3 Practical Exercises and Assessment

a) Exercises: Create and analyze line and bar graphs.
b) Assignments: Develop graphs using datasets.
c) Quiz: Assess understanding of line and bar graph types and applications.

Unit 2: Pie Charts and Histograms **10**

2.1 Pie Charts

a) Basic Concepts: Overview and effective use cases.
b) Types: Standard, exploded, and doughnut charts.
c) Applications: Visualizing proportions and data composition.

2.2 Histograms

a) Basic Concepts: Introduction and role in frequency distribution.
b) Types: Simple and cumulative histograms.
c) Applications: Analyzing data distribution and spread.

2.3 Practical Exercises and Assessment

a) Exercises: Create and analyze pie charts and histograms.
b) Assignments: Design charts using sample data.

c) Quiz: Evaluate knowledge of pie charts and histograms.

Unit 3: Comprehensive Document and Data Management 10

3.1 Microsoft Word

a) Document Creation: Basics of creating, saving, and managing documents.
b) Formatting: Advanced text and paragraph formatting.
c) Structuring: Using headers, footers, and tables.

3.2 Microsoft Excel

a) Spreadsheet Basics: Overview of interface and workbooks.
b) Formulas and Functions: Basic and advanced data analysis.
c) Visualization: Creating and customizing charts.

3.3 Microsoft PowerPoint

a) Presentation Design: Basics of slide design and layout.
b) Data Integration: Importing data from Word and Excel.
c) Enhancements: Using animations and transitions.

References:

1. Steven M. Freund, Microsoft Word 2021: Comprehensive, Cengage Learning.
2. Wayne L. Winston, Microsoft Excel Data Analysis and Business Modeling, Microsoft Press.
3. Jessica Evans, Microsoft PowerPoint 2021: The Complete Guide, O'Reilly Media.
4. N. K. Sinha, Microsoft Office 365: The Complete Reference, Tata McGraw-Hill.
5. P. R. Choudhury**,** *Introduction to Statistical Methods*, Wiley Eastern.
6. S. K. Gupta and S. K. Sharma, *Statistical Methods for Data Analysis*, Himalaya Publishing House.

Mapping of Program Outcomes with Course Outcomes

Weightage: 0= No relation, 1= Weak relation , 2= Moderate relation, 3= Strong relation

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	2	1	1	2	1	1	2
CO2	3	3	1	2	1	2	2	2	1	2
CO3	3	3	1	3	2	3	3	3	2	3
CO4	3	3	1	2	1	2	2	2	1	3
CO5	3	3	1	3	2	3	3	3	2	3
CO6	3	3	1	3	3	3	3	3	3	3
CO7	2	2	1	3	2	2	2	2	3	3

Justification for CO-PO Mapping

PO1: Comprehensive Knowledge and Understanding

CO1 to CO6 strongly align with PO1 as they develop a foundational understanding of data visualization through line and bar graphs, pie charts, and histograms. CO7 supports this by enhancing proficiency in using tools like Microsoft Office, essential for data analysis and presentation.

PO2: Application of Knowledge and Skills

CO2, CO3, CO5, and CO6 strongly connect to PO2, as they involve the application of graphing and charting skills to analyze and interpret data. CO7 contributes moderately by providing practical skills in using digital tools for data visualization.

PO3: Constitutional, Humanistic, Ethical, and Moral Values

The COs generally has a weak connection to PO3 since the focus is on technical skills rather than ethical considerations. However, understanding the ethical implications of data presentation could be indirectly linked.

PO4: Employability and Job-ready Skills

CO3, CO5, CO6, and CO7 have strong connections with PO4, equipping students with practical skills in creating and analyzing data visualizations, essential for various professional contexts. CO1 and CO2 also contribute by providing foundational skills that enhance employability.

PO5: Autonomy, Responsibility, and Accountability

CO6 shows a strong connection to PO5 by emphasizing responsibility in accurately interpreting and presenting data. CO5 and CO7 contribute by encouraging accountability in using charts and digital tools, while other COs have a more conceptual focus.

PO6: Research Skills

CO3, CO5, and CO6 are strongly related to PO6, as they involve analyzing and interpreting data using graphs and charts, essential for research. CO4 and CO2 contribute moderately by providing a conceptual understanding that supports research activities.

PO7: Critical and Creative Thinking

CO3, CO5, and CO6 strongly align with PO7 by fostering critical thinking in analyzing data through visualizations. CO2 and CO4 moderately contribute through understanding and differentiating between various types of graphs and charts.

PO8: Problem-solving Abilities

CO3, CO5, and CO6 have strong connections with PO8, as they focus on using data visualizations to address and solve real-world problems. CO2 and CO4 moderately support problem-solving through conceptual understanding, while CO1 and CO7 provide foundational support.

PO9: Collaboration and Teamwork

CO6 and CO7 have strong connections to PO9, as they involve collaborative efforts in using data visualization tools and software. CO3 also supports teamwork in analyzing and presenting data, while other COs is more individual-focused.

PO10: Digital and Technological Skills

CO3, CO5, CO6, and CO7 strongly align with PO10, as they involve extensive use of digital tools like Microsoft Office for creating and analyzing graphs and charts. CO4 moderately contributes through the understanding of data representation techniques, while CO1 and CO2 provide foundational support for digital skills.